Practical Training Report on

TELECOM AND DATA NETWORK

Training taken from

(JULY 10.2017 to AUGUST 9.2017)

Site of Training

ALTTC BSNL
GAZIABAD, UP

Submitted by

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Meerut Institute of Engineering and Technology

UNDER THE GUIDANCE OF:

K K S YADAV

ACKNOWLEDGEMENT

The opportunity given to us by BSNL to learn and study about their TEELECOM AND DATA NETWORK DEVICES over local area network and their state of the art devices and telecom devices like modems, routers, and their optical fibre network techniques will make a real difference in our engineering aptitude, knowledge and abilities.

I would like to thank all those who helped me by giving their valuable thoughts and information without which it would have been difficult for me to complete this report. I am obliged and honoured in expressing the deep sense of gratitude to my training instructor

Mr K K S YADAV (JTO) of ALTTC BSNL for his helpful guidance and suggestion at every stage of this report.

PREFACE

Engineering students gain theoretical knowledge only through books. Only theoretical knowledge is not sufficient for absolute mastery in any field. Theoretical knowledge in our books is not of much use without knowing its practical implementation. It has been experienced that theoretical knowledge is volatile in nature; however practical knowledge imparts solid foundation in our mind. To accomplish this aspect, Meerut Institute of Engineering and Technology under *"* Dr. A.P.J. Abdul Kalam Technical University*" has included training for students of B.Tech. III Year of 30 days in our curriculum. I have covered in this report the history ,latest developments in BSNL . I have studied the various uses of EC in BSNL like signalling, telephone exchange , internet, OFC, data network etc . This report is in fact a summary of, what I have learnt and seen during my training in "BSNL Organization." Succeeding chapters give details what I have learnt in ALTTC BSNL GAZIABAD.*

ABSTRACT

This work presented the re-engineering of a university's telephone system through the design of alternative implementation and a specification scenario for a campus-wide telephony system based on Voice over Internet Protocols (VoIP) technology; and demonstrates that the technology can be adapted for use in our university community to make cheaper calls using the desk Internet Protocol (IP) phone and data services. This research drew inspirations from similar efforts by some institutions to replace their old PSTN telephony system with the VoIP-based architecture. The Analysis phases of the Structured Systems Analysis and Design Methodology (SSADM) were adopted in carrying out a detailed study of the underlining technologies of VoIP and the possibilities of implementing a campus-wide telephony system using the technology; prototyping was deployed to build a prototype VoIP-based telephony system and Cisco Packet tracer was configured to run several simulation sessions of the developed specifications. The simulation results showed that VoIP can be successfully deployed to provide in a flexible manner, additional data-driven services in campus-wide telephony through a merger of telephone and information technology facilities.

Keywords- VOIP, Telephony, Prototyping, Cisco packet tracer (version 6.0), Design specification

CERTIFICATE OF ORIGINALITY

This is to certify that the project titled "**CONFIGURING a VOICE OVER IP PHONE (VOIP)**" is an original work of the student and is being submitted in partial fulfilment for the award of the Bachelor of technology Degree of Dr. A.P.J Abdul Kalam Technical University. This report has not been submitted earlier either to this university or to any other University/Institution for the fulfilment of the requirement of a course of study.

SIGNATURE OF SUPERVISOR	**SIGNATURE OF STUDENT**
(Mr. Krishan Kumar Yadav)	**(AMIT KUMAR YADAV)**
Place:	Place:
Date:	Date:

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INTRODUCTION TO BSNL

Particulars of Organization

Incorporated on 15.9.2000, vide Registration No. 55-107739, dated the 15th September, 2000 and became entitled to commence business with effect from 19th September, 2000.

Date of incorporation:

Incorporated on 15.9.2000, vide Registration No. 55-107739, dated the 15th September, 2000 and became entitled to commence business with effect from 19th September, 2000. The Company (BSNL) took over the .business of providing telecom services and network management throughout the country except the metro cities of Delhi and Mumbai of the erstwhile service providing departments of the Govt. of India, i.e., the Departments of Telecom Services and Telecom Operations w.e.f. 1.10.2000 pursuant to anMoU signed between the BSNL and the Govt. of India.

Type of Company

Government company under section 617 of the companies act, 1956

Administrative Ministry

Govt. of India, Ministry of Communication and Information Technology, Department of

Telecommunications.

Details of Disinvestments

The entire share capital of the Company is held by the Govt. of India.

Shareholding pattern

Government of India is holding 100% of the share capital of the Company.

Share Capital

Authorized Capital – Rs.17,500crores, divided into 1,000,00,00,000[One Thousand Crores] Equity Shares of Rs.10/- each; and 750,00,00,000 [Seven Hundred and Fifty Crores] Preference Shares of Rs.10/- each.

Objectives of the company

As set out in the objects clause of the Company's Memorandum of Association.

ASPIRATIONS

Be the leading Telecom Service Provider in India with Global presence.

Create a customer focused organization with excellence in sales, marketing and customer care.

Leverage technology to provide affordable and innovative products / services across customer segments.

Provide a conductive work environment with strong focus on performance.

Establish efficient business processes enabled by I.T.

PROFILE OF THE COMPANY'S BUSINESS

A.GLIMPSES OF MAIN SERVICES OFFERED

1. BASIC AND LIMITED MOBILE TELEPHONE SERVICES

BSNL is the leading service provider in the country in the Basic Telephone Services. As on 31.03.2012 more than 22.46 million Direct Exchange Lines & more than 4.003 Million WLL Telephone Connections are existing. BSNL has provided a number of attractive tariff packages & Plans which shall further strengthen its subscriber base.

2. CELLULAR MOBILE TELEPHONE SERVICES

BSNL's GSM Technology based Cellular Network reached a long way, covering 30,836 cities/towns with a subscriber base of over 9.450 crores as on 31st March 2012 out of which 9.108 crores cellular telephones are in pre-paid segment.

3. INTERNET SERVICES

BSNL offers Dialup Internet services to the customers by Post-paid service with the brand name ‘Netone’, and pre-paid service with the brand name ‘Sancharnet’. The post-paid service is a CLI based access service. Sancharnet is available on local call basis throughout India toISDN and PSTN subscribers. The Internet Dhaba scheme of the Company aims to further promote Internet usage in rural and semi urban areas.

To keep pace with the latest and varied value added services to its customers, BSNL uses IP/MPLS based core to offer world class IP VPN services. MPLS based VPNs is a very useful service for Corporate, as it reduces the cost involved as well as the complexity in setting up VPNs for customers networking. As on 31.07.2010, total Internet customer base was 37,58,791 and 3289 blocks were covered with Internet Dhabas.

4. Intelligent Network

BSNL Intelligent Network provides value added services to customers of fixed line and mobile. At present, BSNL offers Toll Free Phone (TFS), Premium Rate Service (PRM), India Telephone Card (ITC) now called Universal ITC, Account Card Calling (ACC), Virtual Private Network (VPN), Universal Access Number (UAN), tele-voting, Universal Personal Number and Prepaid Fixed line general and PCO (FLPP General and FLPP PCO) IN services. The Toll free Service (TFS) and Universal Access Number (UAN) are accessible from all Indian Telecom Operators. The Indian Telephone Card facility with per second pulse and new value added services are being provided throughout the country.

These value added services are provided from five number of new technology IN platforms (Four General purpose IN and One Mass Calling IN) at Ahmadabad, Bangalore, Kolkata, Lucknow& Hyderabad.

5. BROADBAND SERVICES

BSNL has launched its broadband services under brand name “BSNL BROADBAND” on 14-01-05. This offers High Speed Internet Access with speed ranging from 256 Kbps to 24 Mbps. Ever since its inception BSNL is continuously expanding its broadband network in response to ever growing demand of broadband service throughout India.

Present customer base is 76,86,033 with equipped capacity of 85,26,074. The services provided are

- High Speed Internet Connectivity.
- Band width on Demand (planned).
- Virtual Private Network (VPN) service over broadband.
- Dial VPN services to MPLS VPN customers.
- IPTV services.
- Games on Demand Service.
- VVoBB

•Entertainment portal.

B. DEVELOPMENT OF RURAL TELECOM NETWORK

1. Rural DELs : As on 31.3.2012, in BSNL's network, a total of 74,92,420 Rural Telephone Connections were working.

2. (a) Village Public Telephones (VPTs) & RCPs:-

BSNL, in its unstinted efforts to make the slogan 'Connecting India', a reality, had provided VPTs in 5,77,131 villages up to 31.3.2012 as per Census 2001.

The company entered into an agreement with USO Fund for expansion of rural telecom network for providing VPTs in 66,822 undisputed, undisturbed, accessible and inhabited villages having population more than 100 as per census 1991 in the country. The 4520 numbers of villages have already been dropped by USOF, DOT due to various reasons such as zero population, Naxalite/ Insurgent areas, Villages transferred to urban area, submerged etc. BSNL has provided VPTs in 62088 villages out of 62302 up to 31.3.2012.

BSNL has entered into an agreement with USOF, DOT in Feb. 2009 for provisioning of VPTs in 62,443 inhabited villages as per Census 2001. Out of these, BSNL has provided 49408 VPTs till 31.3.2012. The 3425 numbers of villages are covered by PBSO (Private Basic Service Operator)

There are plans to replace all MARR VPTs in the country. As of now, 1,84,785 MARR VPTs have been replaced in the country up to 31.3.2012.

All 21,958 RCPs allotted by USOF, DOT have been provided by BSNL in villages with population of more than 2,000.

2 (b). Public Telephones:-

There are more than 10,80,316 PCOs working in the BSNL Network out of which around 6,32,052 (including Highway) PCOs are having STD/ISD as on 31-03-2012. BSNL has 2905 Internet Dhabas as on 31-03-2012.

C.NETWORK MANAGEMENT

BSNL is committed to provide a robust state of the art infrastructure that will provide stable and superior services to its customers. Accordingly, the MLLN network covering more than 200 cities was made operational in May 2004. Since then, about 22000 circuits have been provided on this network. This has provided high level of stability to the leased circuits and capability to offer N X 64 Kbps circuits. Keeping in view the growing demand of leased circuits, the network is being expanded to cover about50 more locations and additional capacity at many existing locations is also being provided.

To improve the operational efficiency of CCS 7 signaling, stand-alone signaling transfer point (SSTP) equipment is being procured. This will also enable the Company to measure signaling traffic of other operators, who are using its signaling network for exchanging messages, especially with regard to cellular services. BSNL has more than 6.99 Lakhs Route Kilometers of optical fiber network in the country & has installed capacity more than 10.7 million lines for the TAX meant for the STD/ISD network.

D. Setting up KU Band VSAT network : BSNL has started KU Band VSAT services in 2006 with Hub at Bangalore. The KU Band VSAT of BSNL is meant to provide Data Service, Voice Video Conferencing, Telemedicine Service etc. in remote areas and in locations where landline service is non-feasible/fault prone. The VAST communication is predominantly data communication via satellite and smaller antennae 1.04/1.2m are deployed in the customer premises and they will be communicating to the customer centers through VSAT Hubs.

At present, three KU Band VSAT Hubs are functioning, Sikandrabad (Delhi) Hub, Mumbai Hub and Bangalore hub from where BSNL, provides its service to remote VAST sites. As on date about 11,400 VSATs including commercial customers of Banking sector, Public Sector undertakings, Govt. organizations are working from Sikandrabad Hub, Mumbai Hub and Bangalore Hub. Sikandrabad Hubs are functioning through UPSTAR Thaicom – 4 Satellite and entire country excluding Andaman Nicobar & Lakshadweep Islands are covered with 16 Spot Beams. Bangalore Hub is functioning through GSAT-8 Indian Satellite which also has whole India coverage including Andaman Nicobar & Lakshadweep Islands. Due to its fast deploy ability, the KU Band and VSAT service is also of rescue to BSNL in restoring emergency communication service.

Southern Telecom Projects, Bangalore is the nodal agency for provision of this KU Band VSAT service.

E. Policy on transmission network maintenance

BSNL have large transmission networks of Optical Fibers, Satellite, Digital M/W. To improve the maintenance of transmission network, guidelines for route parties and vehicles have been formalized. A computerized network for booking of transmission systems faults namely, SBNM (System Booking Network Management) system has already working with data server at Kolkata for booking the system faults by the Maintenance Regions and it is monitored by the Sr. GM (CNO) cell at BSNL Corporate Office, New Delhi.

One more computerized system for fault booking up to the minimum level of 64 KB / 2MB & above has been introduced, namely FMS (Fault Management System) of Regional Network Monitoring Centre (RNMC), developed & maintained by Southern Telecom Region. STR has already started the fault booking on this system. Other maintenance regions are also being implemented the model of RNMC of STR.

F. Annual Maintenance contracts for switching system & WLL

Comprehensive AMC, which includes hardware and software maintenance and upgrade, has been arranged with the respective equipment suppliers. BSNL is continuously trying to improve the performance of WLL network through AMC and preventive and corrective maintenance support. AMC arrangements have also been made with suppliers of FWTs and hand held terminals.

G. Fault Repair Services – Achievements at a glance (Basic Service)

Sl. No.	Parameters	Year	
		2010-11	**2011-12**
		Achievement	**Achievement**
1	Fault rate/100 telephones/month (%)	4.73	4.69
2	**CCR**		
	i) Local	67.22	67.4
	ii) Junction	56.84	62..84
	iii) STD	53.24	53.4
3	**Fault clearance**		
	i) Same day	80.65	75.39
	ii) Next day	89.36	87
	iii) Within 7 days	96.4	93.38
4	**MTTR**	7.86	7.05

H.COMPUTERISATION

Operation & Business Support System and billing of Wire line & Broadband customers are being managed through 4 Zonal Data Centers. Call center facility is being extended to all Wire line & BB customers by dialing 1500 & 1504 respectively.

Online bill payment facility and other customer service to wire line & Broadband customers are available through corporate website www.bsnl.co.in.

BSNL also offering Co-location & Hosted Services through 9 Internet data Centers (IDCs) spread across the country.

I.BUSINESS DEVELOPMENT

Apart from BSNL Managed Enterprise Solutions, EB-I unit takes care of Total Solutions for Large Enterprise Customers. BSNL Managed Enterprise Solutions are in following areas:-

Existing Services:

1. Managed Network Service (MNS)
2. Global Managed Network Service (GMNS)
3. Managed Software as a solution (SaaS)

4. Managed Global conferencing.
5 .Managed Telepresence (Under Finalization)
6 .Managed Digital Signage (Under Finalization)
7. Managed Unified Communication Services (Under Finalization)

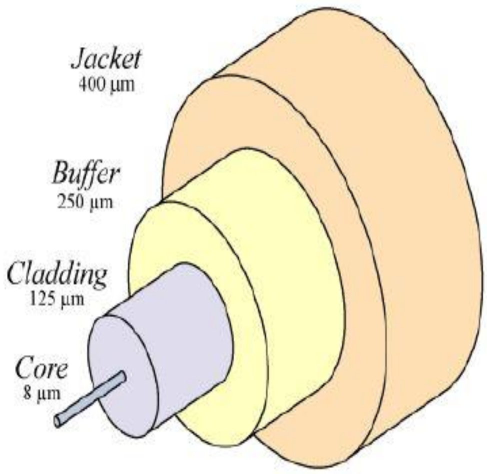
Future Services:

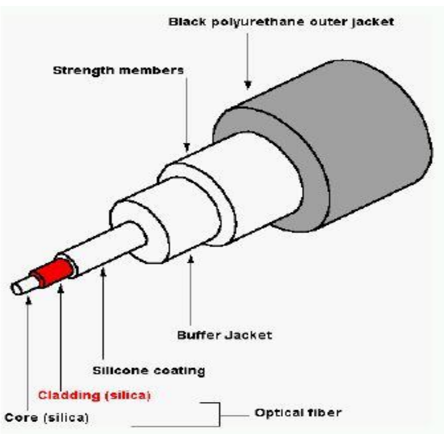
1. Managed security solution
2. Managed web-based solution.

CHAPTER 2 OPTICAL FIBRE CABLE

An optical fiber is a cylindrical dielectric waveguide made of low-loss materials such as silica glass. It has a central core in which the light is guided, embedded in an outer cladding of slightly lower refractive index. Light rays incident on the core-cladding boundary at angles greater than the critical angle undergo total internal reflection and are guided through the core without refraction. Rays of greater inclination to the fiber axis lose part of their power into the cladding at each reflection and are not guided.

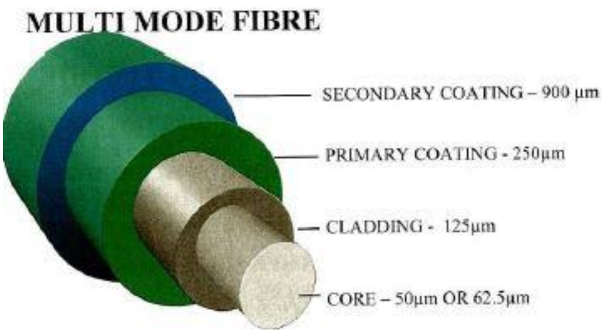
As a result of recent technological advances in fabrication, light can be guided through 1 km of glass fiber with a loss as low as = 0.16 dB (= 3.6 %). Optical fibers are replacing copper coaxial cables as the preferred transmission medium for electromagnetic waves, thereby revolutionizing terrestrial communications. Applications range from long-distance telephone and data communications to computer communications in a local area network.

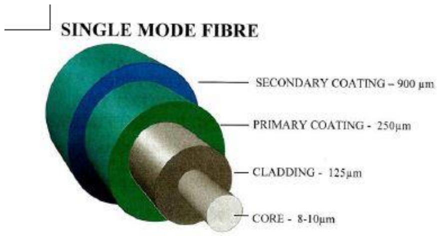




2.1.1 Single-mode and multimode optical fibres

- Multimode is 50/125 or 62.5/125
- 50 micron is the CORE
- 125 micron is the Cladding





Single mode is 8-10/125

- 8-10 micron is the CORE
- 125 micron is the Cladding

2.1.2 Operational Parameters

- **1st Window** – 850 nm allows cheap LED‘s to operate over reasonable distances (km)
- **2nd Window** – 1300nm more expensive LED‘s and Lasers operate over longer distances (10‘s of Km). Fiber attenuation at this level is less than at 850nm
- **3rd Window** – 1550nm employs expensive sophisticated laser /detected systems. Long distance without repeaters (100‘s of Km)

Multimode optical fibers are dielectric waveguides which can have many propagation modes. Light in these modes follows paths that can be represented by rays as shown in Figure 1-1a and 1-1b, where regions 1, 2 and 3 are the core, cladding and coating, respectively. The cladding glass has a refractive index, a parameter related to the dielectric constant, which is slightly lower tha n the refractive index of the core glass.

The fiber in Figure is called ―step index‖ because the refractive index changes abruptly from cladding to core. As a result, all rays within a certain angle will be totally reflected at the core-cladding boundary. Rays striking the boundary at angles greater than this critical

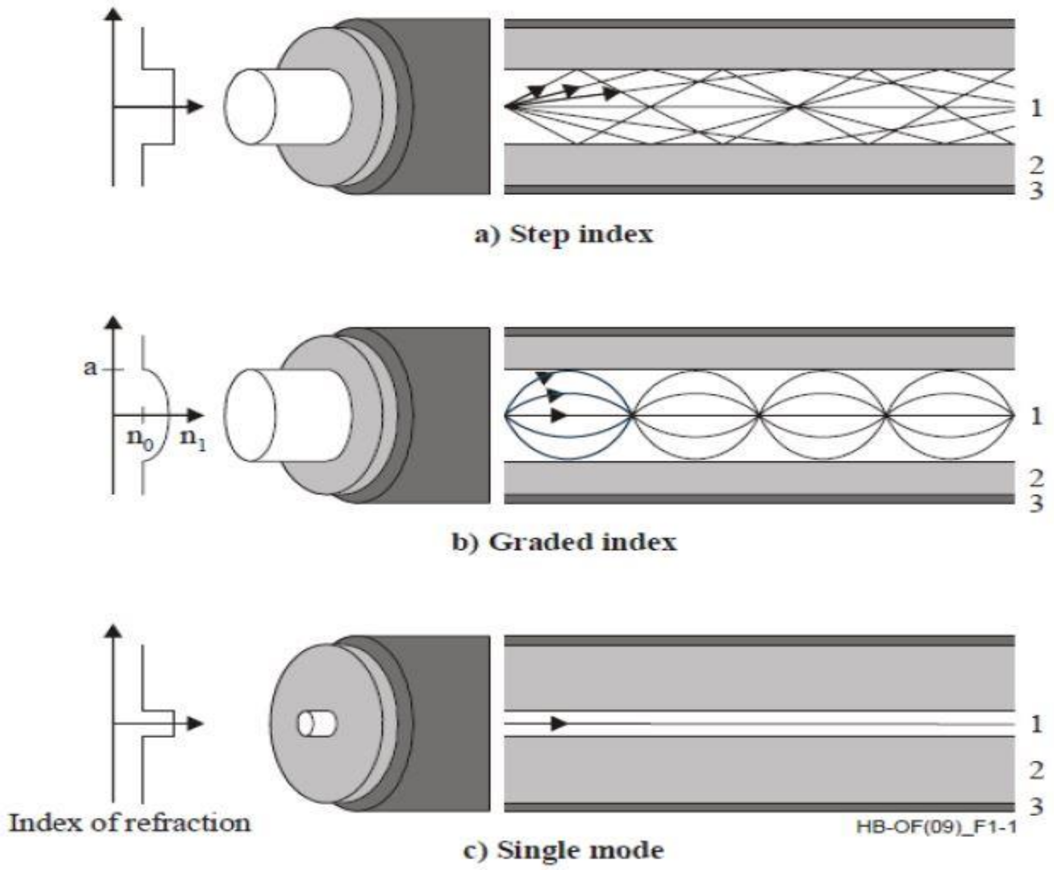


Figure – The three principal types of fibres

angle will be partially reflected and partially transmitted out through the boundary towards the cladding and coating. After many such reflections, the energy in these rays will eventually be lost from the fibre. Region 3, the coating, is a plastic which protects the glass from abrasion.

The paths along which the rays (modes) of this step-index fibre travel differ depending on their angle relative to the axis. As a result, the different modes in a pulse arrive at the far end of the fibre at different times, resulting in pulse spreading, which limits the bit rate of a digital signal that can be transmitted.

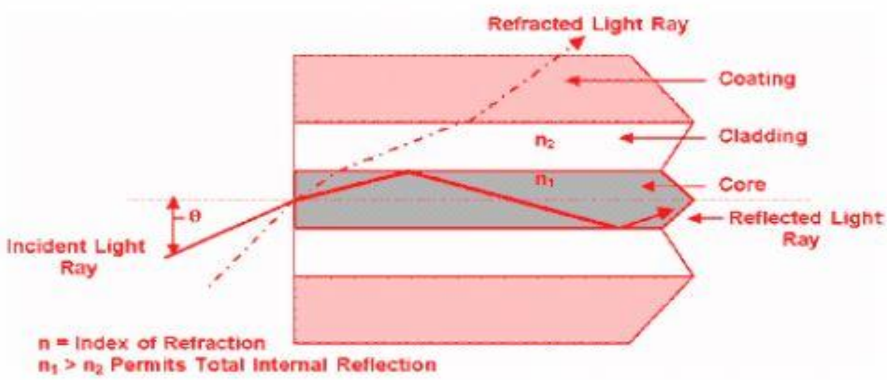
The different mode velocities can be nearly equalized by using a —graded-index|| fibre as shown in Figure 1-1b. Here the refractive index changes smoothly from the centre out in a way that causes the end-to-end travel time of the different rays to be nearly equal, even though they traverse different paths. This velocity equalization can reduce pulse spreading by a factor of 100 or more. By

reducing the core diameter and the refractive index difference between the core and the cladding only one mode (the fundamental one) will propagate and the fibre is then ―single-mode‖ (Figure 1-1c). In this case there is no pulse spreading at all due to the different propagation time of the various modes.
The cladding diameter is 125 µm for all the telecommunication types of fibres. The core diameter of the multimode fibres is 50 µm, whereas that of the single-mode fibres is 8 to 10 µm.

2.1.3 The Design of Fiber Core and Cladding :

An optical fiber consists of two different types of highly pure, solid glass, composed to form the core and cladding. A protective acrylate coating (see *Figure 1*) then surrounds the cladding. In most cases, the protective coating is a dual layer composition.

Figure 1. Core, Cladding, and Coating



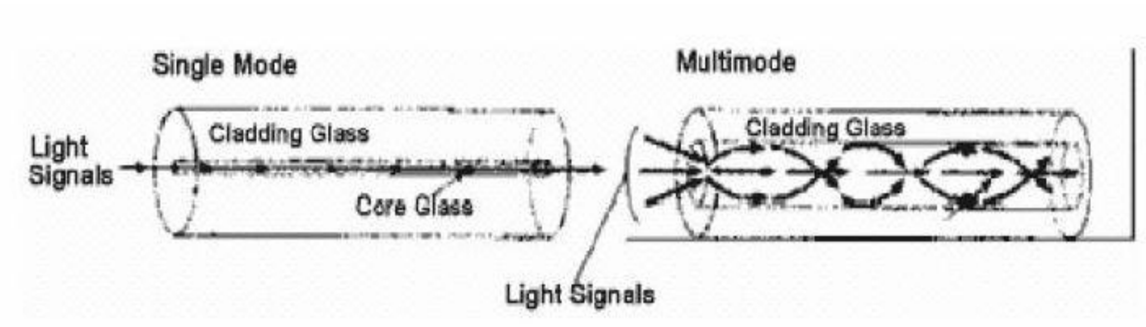
A protective coating is applied to the glass fiber as the final step in the manufacturing process. This coating protects the glass from dust and scratches that can affect fiber strength. This protective coating can be comprised of two layers: a soft inner layer that cushions the fiber and allows the coating to be stripped from the glass mechanically and a harder outer layer that protects the fiber during handling, particularly the cabling, installation, and termination processes.

2.1.4 Single-Mode and Multimode Fibers

Multimode fiber was the first type of fiber to be commercialized. It has a much larger core than single-mode fiber, allowing hundreds of modes of light to propagate through the fiber simultaneously.

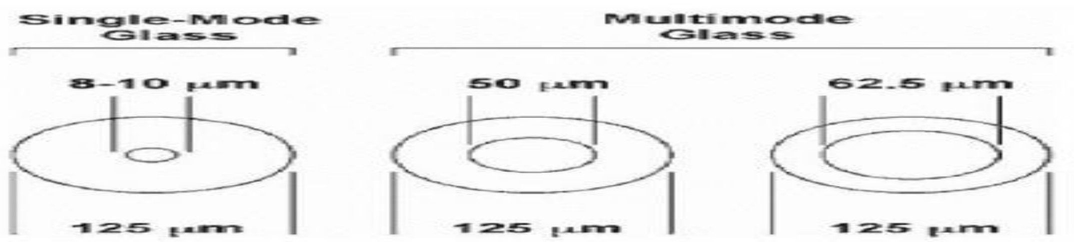
Additionally, the larger core diameter of multimode fiber facilitates the use of lower-cost optical transmitters or vertical cavity surface emitting lasers [VCSELs]) and connectors.

Single-mode fiber, on the other hand, has a much smaller core that allows only one mode of light at a time to propagate through the core. While it might appear that multimode fibers have higher capacity, in fact the opposite is true. Single mode fibers are designed to maintain spatial and spectral integrity of each optical signal over longer distances, allowing more information to be transmitted. Its tremendous information-carrying capacity and low intrinsic loss have made single-mode fiber the ideal transmission medium for a multitude of applications. Single-mode fiber is typically used for longer-distance and higher-bandwidth applications (see *Figure 3*). Multimode fiber is used primarily in systems with short transmission distances (under 2 km), such as premises communications, private data networks, and parallel optic applications.



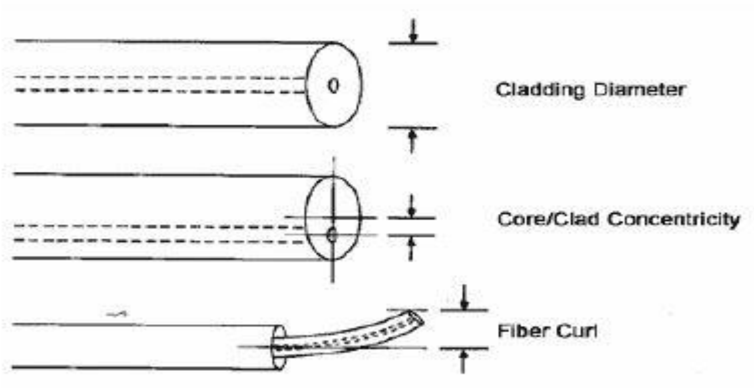
2.1.5 Optical Fiber Sizes

The international standard for outer cladding diameter of most single-mode optical fibers is 125 microns (µm) for the glass and 245 µm for the coating. This standard is important because it ensures compatibility among connectors, splices, and tools used throughout the industry.
Standard single-mode fibers are manufactured with a small core size, approximately 8 to 10 µm in diameter. Multimode fibers have core sizes of 50 to 62.5 µm in diameter.



2.2 Fiber Geometry Parameters

The three fiber geometry parameters that have the greatest impact on splicing performance include the following:



- **core/clad concentricity (or core-to-cladding offset):** how well the core is centered in the cladding glass region.

Fiber curl: The amount of curvature over a fixed length of fiber These parameters are determined and controlled during the fiber-manufacturing process. As fiber is cut and spliced according to system needs, it is important to be able to count on consistent geometry along the entire length of the fiber and between fibers and not to rely solely on measurements made.

2.2.1 Cladding Diameter

The cladding diameter tolerance controls the outer diameter of the fiber, with tighter tolerances ensuring that fibers are almost exactly the same size. During splicing, inconsistent cladding diameters can cause cores to misalign where the fibers join, leading to higher splice losses. The drawing process controls cladding diameter tolerance, and depending on the manufacturer‘s skill level, can be very tightly controlled.

2.2.2 Core/Clad Concentricity

Tighter core/clad concentricity tolerances help ensure that the fiber core is centered in relation to the cladding. This reduces the chance of ending up with cores that do not match up precisely when two fibers are spliced together. A core that is precisely centered in the fiber yields lower-loss splices more often.

Core/clad concentricity is determined during the first stages of the manufacturing process, when the fiber design and resulting characteristics are created. During these laydown and consolidation processes, the dopant chemicals that make up the fiber must be deposited with precise control and symmetry to maintain consistent core/clad concentricity performance throughout the entire length of fiber.

2.2.3 Fiber Curl

Fiber curl is the inherent curvature along a specific length of optical fiber that is exhibited to some degree by all fibers. It is a result of thermal stresses that occur during the manufacturing process. Therefore, these factors must be rigorously monitored and controlled during fiber manufacture. Tighter fiber-curl tolerances reduce the possibility that fiber cores will be misaligned during splicing, thereby impacting splice loss. Some mass fusion splicers use fixed v-grooves for fiber alignment, where the effect of fiber curl is most noticeable .

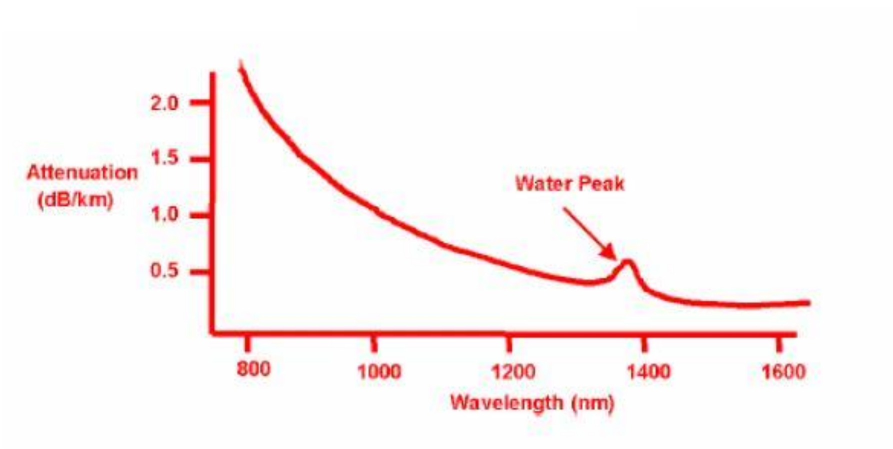
2.2.4 Single-Mode Fiber Performance Characteristics

The key optical performance parameters for single-mode fibers are attenuation, dispersion, and mode-field diameter. Optical fiber performance parameters can vary significantly among fibers from different manufacturers in ways that can affect your system‘s performance. It is important to understand how to specify the fiber that best meets system requirements.

2.2.5 Attenuation

Attenuation is the reduction of signal strength or light power over the length of the light-carrying medium. Fiber attenuation is measured in decibels per kilometer (dB/km). Optical fiber offers superior performance over other transmission media because it combines high bandwidth with low attenuation. This allows signals to be transmitted over longer distances while using fewer regenerators or amplifiers, thus reducing cost and improving signal reliability.
Attenuation of an optical signal varies as a function of wavelength (see *Figure 9*). Attenuation is very low, as compared to other transmission media (i.e., copper, coaxial cable, etc.), with a typical value of 0.35 dB/km at 1300 nm for standard single-mode fiber. Attenuation at 1550 nm is even lower, with a typical value of 0.25 dB/km. This gives an optical signal, transmitted through fiber, the ability to travel more than 100 km without regeneration or amplification. Attenuation is caused by several different factors, but primarily scattering and absorption. The scattering of light from molecular level irregularities in the glass structure leads to the general shape of the attenuation curve (see *Figure 9*). Further attenuation is caused by light absorbed by residual materials, such as metals or water ions, within the fiber core and inner cladding. It is these water ions that cause the ―water peak‖ region on the attenuation curve, typically around 1383 nm. The removal of water ions is of particular interest to fiber manufacturers as this ―water peak‖ region has a broadening effect and contributes to attenuation loss for nearby wavelengths. Some manufacturers

now offer low water peak single-mode fibers, which offer additional bandwidth and flexibility compared with standard single-mode fibers. Light leakage due to bending, splices, connectors, or other outside forces are other factors resulting in attenuation.



2.2.6 Dispersion

Dispersion is the time distortion of an optical signal that results from the time o flight differences of different components of that signal, typically resulting in pulse broadening (see *Figure 10*). In digital transmission, dispersion limits the maximum data rate, the maximum distance, or the information-carrying capacity of a single-mode fiber link. In analog transmission, dispersion can cause a waveform to become significantly distorted and can result in unacceptable levels of composite second-order distortion (CSO).

2.3 OPTICAL FIBRE COMMUNICATION

2.3.1 Historical perspective of optical communication

The use of light for transmitting information from one place to another place is a very old technique. In 800 BC., the Greeks used fire and smoke signals for sending information like victory in a war, alertting against enemy, call for help, etc. Mostly only one type of signal was conveyed. During the second century B.C. optical signals were encoded using signaling lamps so that any message could be sent. There was no development in optical communication till the end of the 18th century. The speed of the optical communication link was limited due to the requirement of line of sight transmission paths, the human eye as the receiver and unreliable nature of transmission paths affected by atmospheric effects such as fog and rain. In 1791, Chappe from France developed the semaphore for telecommunication on land. But that was also with limited information transfer.

In 1835, Samuel Morse invented the telegraph and the era of electrical communications started throughout the world. The use of wire cables for the transmission of Morse coded signals was implemented in 1844. In 1872, Alexander Graham Bell proposed the photo phone with a diaphragm giving speech transmission over a distance of 200 m. But within four years, Graham Bell had changed the photophone into telephone using electrical current for transmission of speech signals. In 1878, the first telephone exchange was installed at New Haven. Meanwhile, Hertz discovered radio waves in 1887. Marconi demonstrated radio communication without using wires in 1895. Using modulation techniques, the signals were transmitted over a long distance using radio waves and microwaves as the carrier.

During the middle of the twentieth century, it was realized that an increase of several orders of magnitude of bit rate distance product would be possible if optical waves were used as the carrier.

In the old optical communication system, the bit rate distance product is only about 1 (bit/s)-km due to enormous transmission loss (105 to 107 dB/km). The information carrying capacity of telegraphy is about hundred times lesser than a telephony. Even though the high-speed coaxial systems were evaluated during 1975, they had smaller repeater spacing. Microwaves are used in modern communication systems with the increased bit rate distance product. However, a coherent optical carrier like laser will have more information carrying capacity. So the communication engineers were interested in optical communication using lasers in an effective manner from 1960 onwards. A new era in optical communication started after the invention of laser in 1960 by Maiman. The light waves from the laser, a coherent source of light waves having high intensity, high monochromaticity and high directionality with less divergence, are used as carrier waves capable of carrying large amount of information compared with radio waves and microwaves. Subsequently H M Patel, an Indian electrical engineer designed and fabricated a CO_2 laser.

2.3.2 The birth of fiber optic systems

To guide light in a waveguide, initially metallic and non-metallic wave guides were fabricated. But they have enormous losses. So they were not suitable for telecommunication. Tyndall discovered that through optical fibers, light could be transmitted by the phenomenon of total internal reflection. During 1950s, the optical fibers with large diameters of about 1 or 2 millimeter were used in endoscopes to see the inner parts of the human body.

Optical fibers can provide a much more reliable and versatile optical channel than the atmosphere, Kao and Hockham published a paper about the optical fiber communication system in 1966. But the fibers produced an enormous loss of 1000 dB/km. But in the atmosphere, there is a loss of few dB/km. Immediately Kao and his fellow workers realized that these high losses were a result of impurities in the fiber material. Using a pure silica fiber these losses were reduced to 20 dB/km in 1970 by Kapron, Keck and Maurer. At this attenuation loss, repeater spacing for optical fiber links become comparable to those of copper cable systems. Thus the optical fiber communication system became an engineering reality.

2.3.3 Basic optical fiber communication system

Figure 2 shows the basic components in the optical fiber communication system. The input electrical signal modulates the intensity of light fromthe optical source. The optical carrier can be modulated internally or externally using an electro-optic modulator (or) acousto-optic modulator. Nowadays electro-optic modulators (KDP, LiNbO3 or beta barium borate) are widely used as external modulators which modulate the light by changing its refractive index through the given input electrical signal. In the digital optical fiber communication system, the input electrical signal is in the form of coded digital pulses from the encoder and these electric pulses modulate the intensity of the light from the laser diode or LED and convert them into optical pulses. In the receiver stage, the photo detector like avalanche photodiode (APD) or positive-intrinsic negative (PIN) diode converts the optical pulses into electrical pulses. A decoder converts the electrical pulses into the original electric signal.

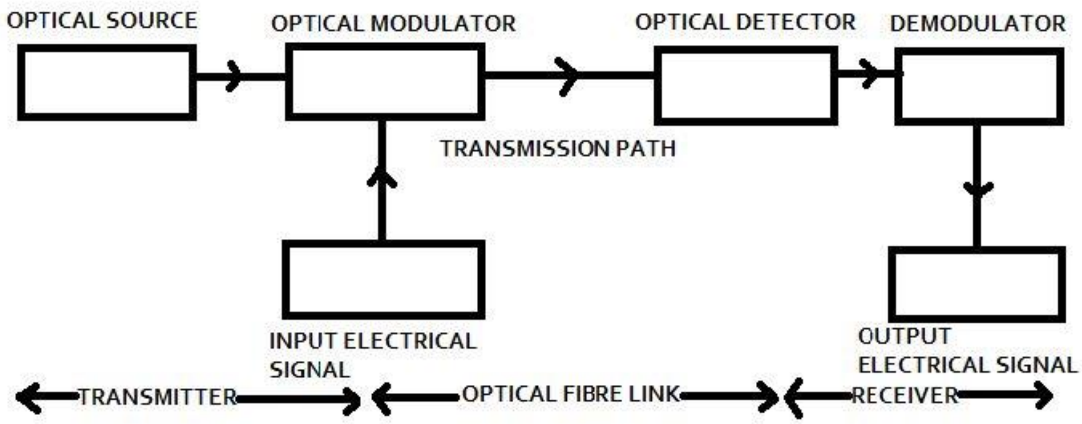


Figure Basic analog optical fiber communication system.

2.3.4 Advantages of optical fiber communication

1. ***Wider bandwidth*:** The information carrying capacity of a transmission system is directly proportional to the carrier frequency of the transmitted signals. The optical carrier frequency is in the range 1013 to 1015 Hz while the radio wave frequency is about 106 Hz and the microwave frequency is about 1010 Hz. Thus the optical fiber yields greater transmission bandwidth than the conventional communication systems and the data rate or number of bits per second is increased to a greater extent in the optical fiber communication system. Further the wavelength division multiplexing operation by the data rate or information carrying capacity of optical fibers is enhanced to many orders of magnitude.

2. ***Low transmission loss*:** Due to the usage of the ultra-low loss fibers and the erbium doped silica fibers as optical amplifiers, one can achieve almost lossless transmission. In the modern optical fiber telecommunication systems, the fibers having a transmission loss of 0.002 dB/km are used. Further, using erbium doped silica fibers over a short length in the transmission path at selective points, appropriate optical amplification can be achieved. Thus the repeater spacing is more than 100 km. Since the amplification is done in the optical domain itself, the distortion produced during the strengthening of the signal is almost negligible.

3. ***Dielectric waveguide*:** Optical fibers are made from silica which is an electrical insulator. Therefore they do not pickup any electromagnetic wave or any high current lightning. It is also suitable in explosive environments. Further the optical fibers are not affected by any interference originating from power cables, railway power lines and radio waves. There is no cross talk between the fibers even though there are so many fibers in a cable because of the absence of optical interference between the fibers.

4. ***Signal security*:** The transmitted signal through the fibers does not radiate. Further the signal cannot be tapped from a fiber in an easy manner. Therefore optical fiber communication provides hundred per cent signal security.

5. ***Small size and weight*:** Fiber optic cables are developed with small radii, and they are flexible, compact and lightweight. The fiber cables can be bent or twisted without damage. Further, the optical fiber cables are superior to the copper cables in terms of storage, handling, installation and transportation, maintaining comparable strength and durability.

2.4 PULSE CODE MODULATION

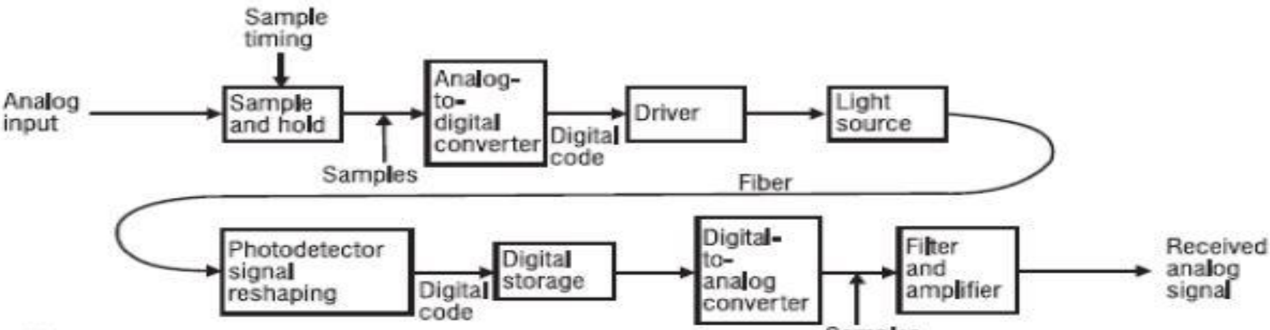
Pulse code modulation (PCM) is the process of converting an analog signal into a 2*n*-digit binary code. Consider the block diagram shown in Figure 8-9. An analog signal is placed on the input of a *sample and hold*. The *sample and hold* circuit is used to —capture‖ the analog voltage long enough for the conversion to take place. The output of the sample and hold circuit is fed into the *analog-*

to-digital converter (A/D). An A/D converter operates by taking periodic discrete samples of an analog signal at a specific point in time and converting it to a 2*n*-bit binary number. For example, an 8-bit A/D converts an analog voltage into a binary number with 28 discrete levels (between 0 and 255). For an analog voltage to be successfully converted, it must be sampled at a rate at least *twice* its maximum frequency. This is known as the *Nyquist sampling rate*. An example of this is the process that takes place in the telephone system.

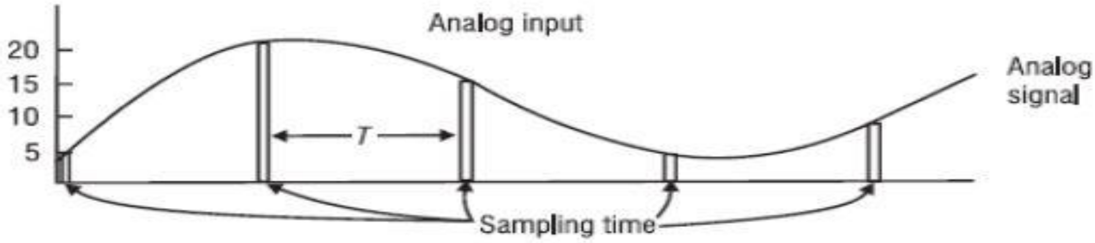
Standard telephone has a bandwidth of 4 kHz. When you speak into the telephone, your 4-kHz bandwidth voice signal is sampled at twice the 4-kHz frequency or 8 kHz. Each sample is then converted to an 8-bit binary number. This occurs 8000 times per second. Thus, if we multiply

8 k samples/s × 8 bits/sample = 64 kbits/s

Temporarily store the digital codes during the conversion process. The DAC accepts an *n*-bit digital number and outputs a continuous series of discrete voltage —steps.‖ All that is needed to smooth the stair-step voltage out is a simple low-pass filter with its cutoff frequency set at the maximum signal frequency.



(a)



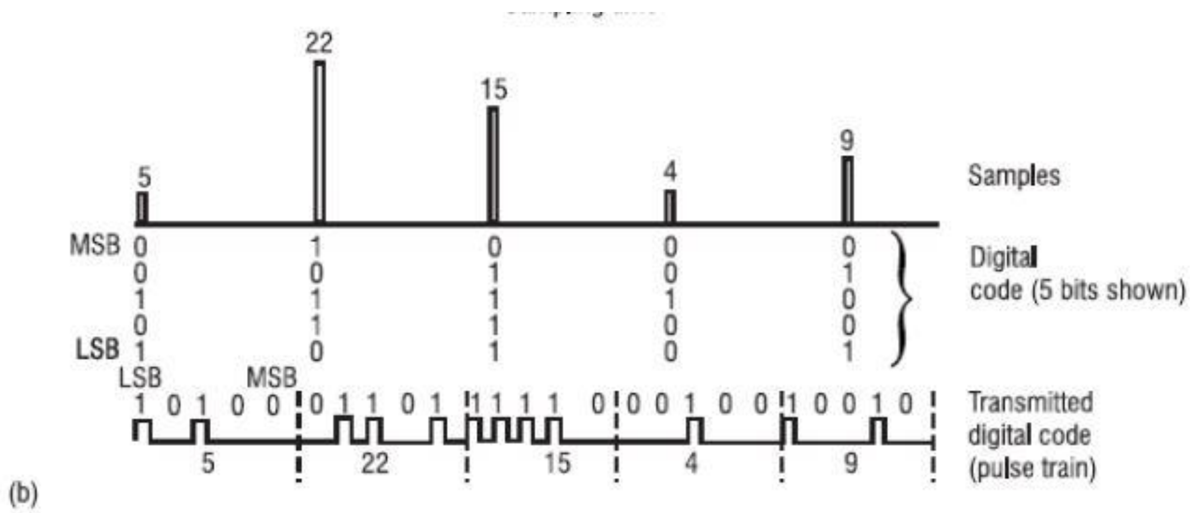


Figure PCM (a) *Block diagram* (b) *Digital waveforms*

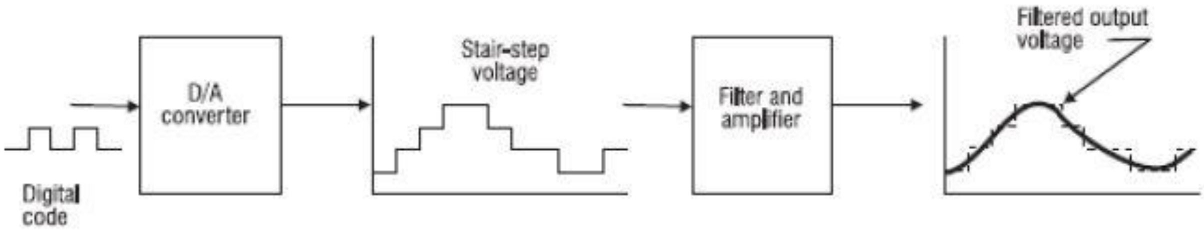


Figure *D/A output circuit*

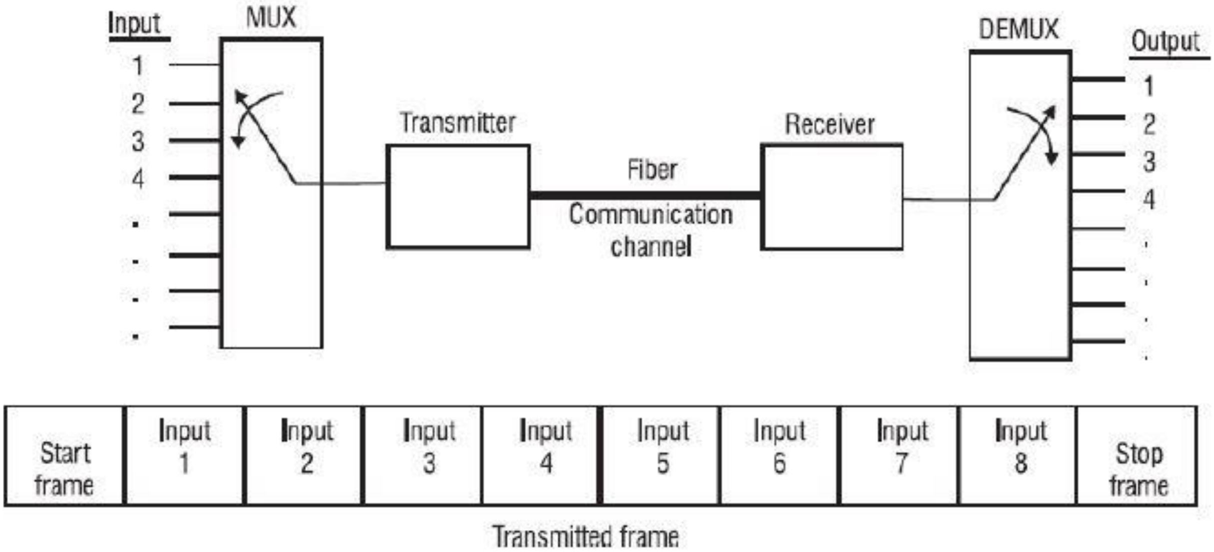
2.5 MULTIPLEXING

The purpose of multiplexing is to share the bandwidth of a single transmission channel among several users. Two multiplexing methods are commonly used in fiber optics:

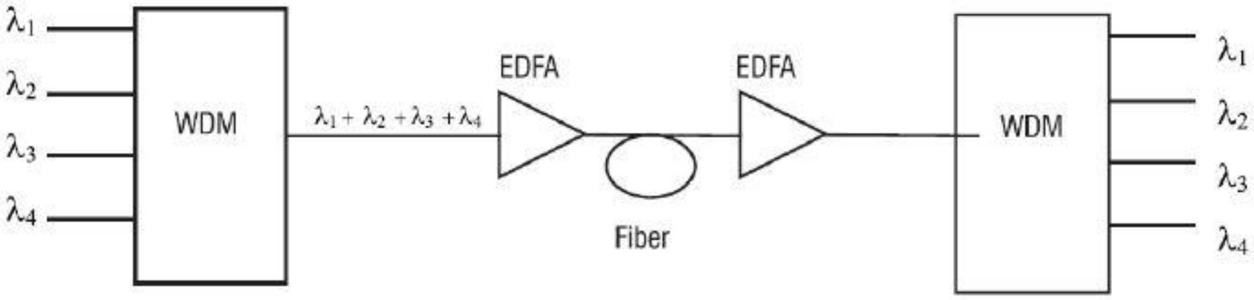
1. Time-division multiplexing (TDM)
2. Wavelength-division multiplexing (WDM)

2.5.1 Time-Division Multiplexing (TDM)

In time-division multiplexing, time on the information channel, or fiber, is shared among the many data sources. The multiplexer MUX can be described as a type of ―rotary switch,‖ which rotates at a very high speed, individually connecting each input to the communication channel for a fixed period of time. The process is reversed on the output with a device known as a demultiplexer, or DEMUX. After each channel has been sequentially connected, the process repeats itself. One complete cycle is known as a *frame*. To ensure that each channel on the input is connected to its corresponding channel on the output, start and stop frames are added to synchronize the input with the output. TDM systems may send information using any of the digital modulation schemes described (analog multiplexing systems also exist). This is illustrated in Figure 8-15.



2.5.2 Wavelength-division multiplexing (WDM)



In wavelength-division multiplexing, each data channel is transmitted using a slightly different wavelength (different color). With use of a different wavelength for each channel, many channels can be transmitted through the same fiber without interference. This method is used to increase the capacity of existing fiber optic systems many times. Each WDM data channel may consist of a single data source or may be a combination of a single data source and a TDM (time-division multiplexing) and/or FDM (frequency-division multiplexing) signal. Dense wavelength-division multiplexing (DWDM) refers to the transmission of multiple closely spaced wavelengths through the same fiber. For any given wavelength λ and corresponding frequency f, the International Telecommunications Union (ITU) defines standard frequency spacing Δf as 100 GHz, which translates into a Δλ of 0.8-nm wavelength spacing. This follows from the relationship $\Delta\lambda = \lambda \, \Delta f / f$.

DWDM systems operate in the 1550-nm window because of the low attenuation characteristics of glass at 1550 nm and the fact that erbium-doped fiber amplifiers (EDFA) operate in the 1530-nm–1570-nm range. Commercially available systems today can multiplex up to 128 individual wavelengths at 2.5 Gb/s or 32 individual wavelengths at 10 Gb/s (see Figure 8-17). Although the ITU grid specifies that each transmitted wavelength in a DWDM system is separated by 100 GHz, systems currently under development have been demonstrated that reduce the channel spacing to 50 GHz and below (< 0.4 nm). As the channel spacing decreases, the number of channels that can be transmitted increases, thus further increasing the transmission capacity of the system.

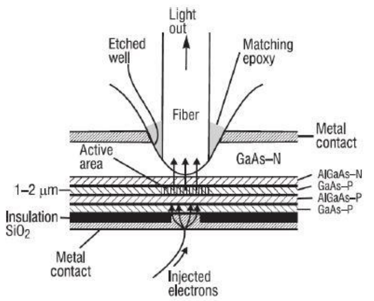
2.6 FIBER OPTIC SOURCES

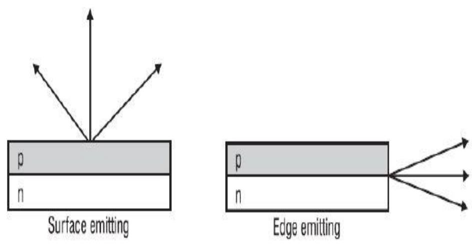
Two basic light sources are used for fiber optics: laser diodes (LD) and light-emitting diodes (LED). Each device has its own advantages and disadvantages as listed in Table.

Fiber optic sources must operate in the low-loss transmission windows of glass fiber. LEDs are typically used at the 850-nm and 1310-nm transmission wavelengths, whereas lasers are primarily used at 1310 nm and 1550 nm.

LEDs are typically used in lower-data-rate, shorter-distance multimode systems because of their inherent bandwidth limitations and lower output power. They are used in applications in which data rates are in the hundreds of megahertz as opposed to GHz data rates associated with lasers.

Two basic structures for LEDs are used in fiber optic systems: *surface-emitting* and *edge emitting.*

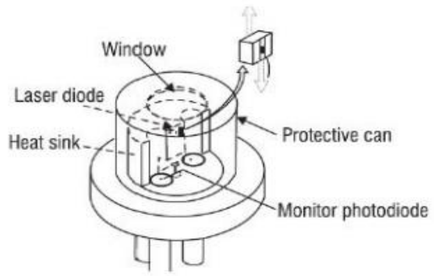




In surface-emitting LEDs the radiation emanates from the surface. An example of this is the Burris diode as shown in Figure 8-21. LEDs typically have large numerical apertures, which makes light coupling into single-mode fiber difficult due to the fiber's small N.A. and core diameter. For this reason LEDs are most often used with multimode fiber. LEDs are used in lower-data-rate, shorter-distance multimode systems because of their inherent bandwidth limitations and lower output power. The output spectrum of a typical LED is about 40 nm, which limits its performance because of severe chromatic dispersion. LEDs operate in a more linear fashion than do laser diodes. This makes them more suitable for analog modulation. Figure 8-22 shows a graph of typical output power versus drive current for LEDs and laser diodes. Notice that the LED has a more linear output power, which makes it more suitable for analog modulation. Often these devices are pigtailed, having a fiber attached during the manufacturing process. Some LEDs are available with connector-ready housings that allow a connectorized fiber to be directly attached. They are also relatively inexpensive. Typical applications are local area networks, closed-circuit TV, and transmitting information in areas where EMI may be a problem.

Laser diodes (LD) are used in applications in which longer distances and higher data rates are required. Because an LD has a much higher output power than an LED, it is capable of transmitting information over longer distances. Consequently, and given the fact that the LD has a much narrower spectral width, it can provide high-bandwidth communication over long distances. The LD's smaller N.A. also allows it to be more effectively coupled with single-mode fiber. The difficulty with LDs is that they are inherently nonlinear, which makes analog transmission more difficult. They are also very sensitive to fluctuations in temperature and drive current, which causes their output wavelength to drift. In applications such as wavelength division multiplexing in which several wavelengths are being transmitted down the same fiber, the stability of the source becomes critical. This usually requires complex circuitry and feedback mechanisms to detect and correct for drifts in wavelength. The benefits, however, of high-speed transmission using LDs typically outweigh the drawbacks and added expense.

Laser diodes can be divided into two generic types depending on the method of confinement of the lasing mode in the lateral direction.



- *Gain-guided* laser diodes work by controlling the width of the drive-current distribution; this limits the area in which lasing action can occur. Because of different confinement mechanisms in the lateral and vertical directions, the emitted wavefront from these devices has a different curvature in the two perpendicular directions. This astigmatism in the output beam is one of the unique properties of laser-diode sources. Gain-guided injection laser diodes usually emit multiple longitudinal modes and sometimes multiple transverse modes. The optical spectrum of these devices ranges up to about 2 nm in width, thereby limiting their coherence length.

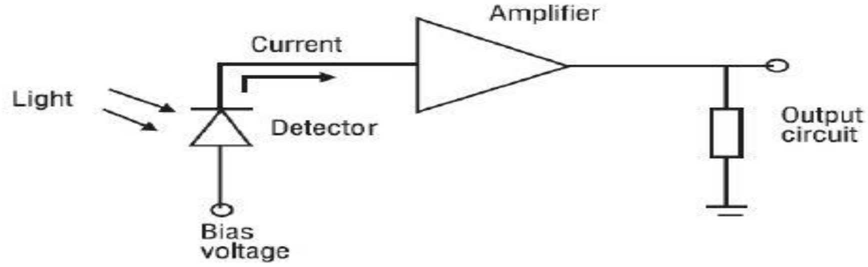
- *Index-guided* laser diodes use refractive index steps to confine the lasing mode in both the transverse and vertical directions. Index guiding also generally leads to both single transverse mode and single longitudinal-mode behavior. Typical linewidths are on the order of 0.01 nm. Index-guided lasers tend to have less difference between the two perpendicular divergence angles than do gain-guided lasers.

Single-frequency laser diodes are another interesting member of the laser diode family. These devices are now available to meet the requirements for high-bandwidth communication. Other advantages of these structures are lower threshold currents and lower power requirements. One variety of this type of structure is the *distributed-feedback (DFB)* laser diode . With introduction of a corrugated structure into the cavity of the laser, only light of a very specific wavelength is diffracted and allowed to oscillate. This yields output wavelengths that are extremely narrow—a characteristic required for DWDM systems in which many closely spaced wavelengths are transmitted through the same fiber. Distributed-feedback lasers have been developed to emit light at fiber optic communication wavelengths between 1300 nm and 1550 nm.

2.7 FIBER OPTIC DETECTORS

The purpose of a fiber optic detector is to convert light emanating from the optical fiber back into an electrical signal. The choice of a fiber optic detector depends on several factors including wavelength, responsively, and speed or rise time. Figure 8-30 depicts the various types of detectors and their spectral responses.

The process by which light is converted into an electrical signal is the opposite of the process that produces the light. Light striking the detector generates a small electrical current that is amplified by an external circuit. Absorbed photons excite electrons from the valence band to the conduction band, resulting in the creation of an electron-hole pair. Under the influence of a bias voltage these carriers move through the material and induce a current in the external circuit. For each electron-hole pair created, the result is an electron flowing in the circuit. Typical current levels are small and require some amplification as shown in Figure.



The most commonly used photo detectors are the PIN and avalanche photodiodes (APD). The material composition of the device determines the wavelength sensitivity. In general, silicon devices are used for detection in the visible portion of the spectrum; InGaAs crystal are used in the near-infrared portion of the spectrum between 1000 nm and 1700 nm, and germanium PIN and APDs are used between 800 nm and 1500 nm.

2.10 Fiber optic splicing

Optical fibres have to be joined together to make longer lengths of fibre or existing fibre lengths which have been broken have to be repaired. Also the ends of the fibre have to be fitted with convenient connectors (terminations) to allow them to be easily plugged into equipment such as power meters, data transmitters, etc. Unlike electrical cables where all that is needed is to solder lengths of cable together, the process of joining two fibres (splicing) or terminating the end of a fibre is more complex and requires special equipment. Splicing is the process of joining the two bare ends of two fibres together. The ends of the fibre must be precisely lined up with each other, otherwise the light will not be able to pass from one fibre across the gap to the other fibre. There are four main alignment errors and any splicing technique is designed to deal with ends of these errors.

2.10.1 Possible alignment errors during splicing

There four alignment errors in splicing optical fibres. These are:-
Lateral, Axial, Angular, Poor End Finish.

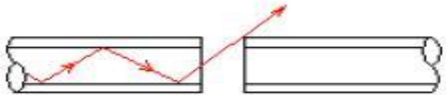


Figure Lateral Misalignment

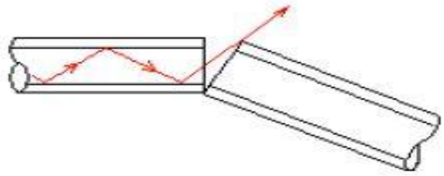


Figure Angular Misalignment

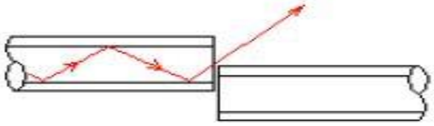


Figure Axial Misalignment

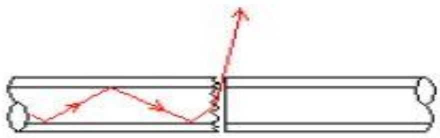


Figure Poor End Finnish

There are two main types of splicing:

- Fusion Splicing
- Mechanical Splicing

2.10.2 Fusion Splicing

In fusion splicing the ends of the fibres are aligned either manually using micro-manipulators and a microscope system for viewing the splice, or automatically either using cameras or by measuring the light transmitted through the splice and adjusting the positions of the fibres to optimise the transmission The ends of the fibres are then melted together using a gas flame or more commonly an electric arc. Near perfect splices can be obtained with losses as low as 0.02 dB (best mechanical splice 0.2 dB)

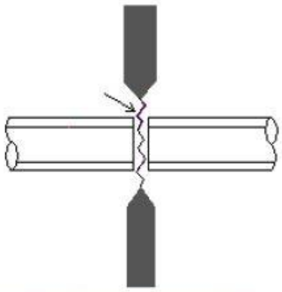


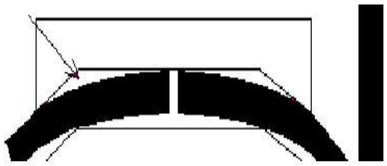
Figure Fusion Splicing

Fusion Splicer

One of the systems in top of the range fusion splicers is called a Profile Alignment System (PAS). This system uses a TV camera to view the splice before it is fused. The image is sent to a microcomputer inside the splicer which is programmed to recognise when the cores of the two fibres form a continuous straight line. An adjustment is made to bring the fibres form a continuous straight line. An adjustment is made to bring the fibres into alignment in that plane. The camera then moves to a new position to view the splice in an orthogonal plane. The same process aligns the fibres in this plane too. The camera then goes back to the original view and starts to make fine adjustments in that plane. It goes to the second plane and makes fine adjustments in that plane too. This goes on until the alignment is as close as possible. At this point the arc is fired and the heat form the arc melts the fibres together locally.

2.10.3 Mechanical Splicing

In mechanical splicing the two fibre ends are held together in a splice. This consists of some device usually made of glass which by its internal design automatically brings the two fibres into alignment. The openings at each end of the device are usually fluted to allow the fibres to be guided into the capillary where the alignment takes place. The splice is fist filled with optical cement whose refractive index is the same as that of the core of the fibre. After the fibres have been entered into the splice they are adjusted to give the optimum transmission of light. At this point they are clamped in position and the whole assembly is exposed to ultra-violet light which cures the cement.Mechanical splices are best used for multimode fibre. Some splices now exist which are suitable SM fibre, but have a loss of 0.1dB. This is five times the loss of the best



fusion splice.

Figure Mechanical Splice

2.10.4 Benefits of Fusion Splicing

- Low Back Reflectance
- Low Insertion Loss
- High Reliability
- Repeatable
- Permanent
- Flexible
- Simple
- COST

There are Six Steps of preparation for fiber:

- Prepare the work area
- Clean Fibre
- Strip Fibre
- Clean Fibre
- Cleave Fibre
- Fuse Fiber

When preparing the work area make sure you have the following items:

- Fusion Splicer
- Precision Cleaver
- Cinbin
- Lint free tissues
- Isopropyl alcohol - IPA
- Miller Strippers
- Splice Protectors

Chapter 3 VOIP- INTRODUCTION AND BACKGROUND

The technology of Voice over Internet Protocol (VoIP) involves using the technology of the Internet Network to deliver voice communications and multimedia session as packets over the network. Because VoIP is a telephony service, it is also referred to as broadband phone service, internet telephony, IP telephony, and broadband telephony. Due to the affordances of Internet-ready phones, and the fact that the IP is the communication protocol of most devices, VoIP is best positioned to be the service platform for next-generation application. The Public Switched Transfer Network (PSTN) on the other hand is a connection-oriented, circuit-switched network that uses dedicated channels for transmission. The PSTN had switched to transmitting digital signals to solve the problems associated with its original analog transmission using Pulse Code Modulation (PCM) to convert all analog signals into digital transmissions at the calling and receiving ends. However, the PSTN suffers two significant disadvantages: high cost resulting from the expensive bandwidth and an inefficient use of networking channels. VoIP unlike its predecessor, the PSTN which is currently built on a closed infrastructure; is built on an open infrastructure and several vendors can provide applications and access. While the PSTN technology involves vendors only building applications specific for their equipment and its current architecture has not made it possible for many vendors to write new applications for it; VoIP allows the development of more creative solutions and applications as well as the convergence of data, voice and video in one channel.

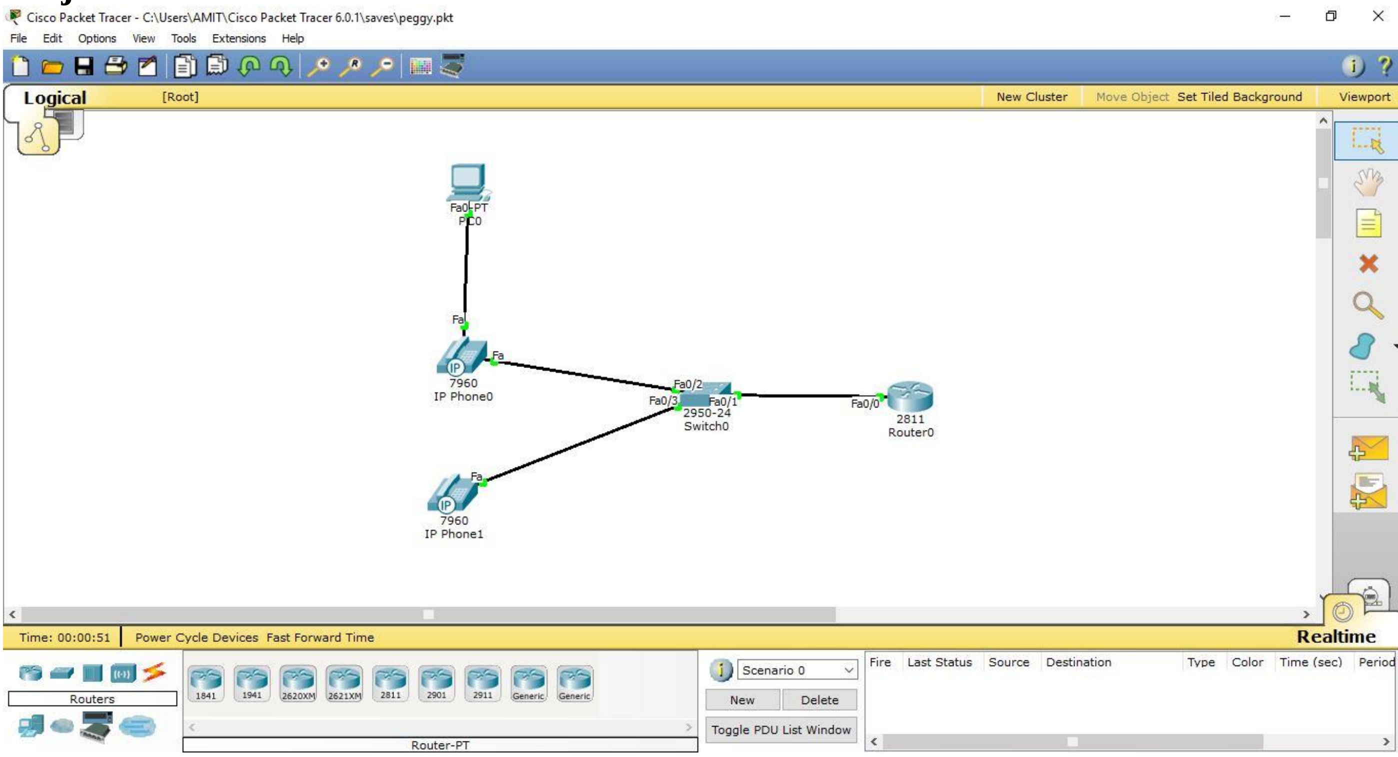
This research is aimed at simulating a VoIP-based telephony service using a university communication system. We believe that if we can successfully implement the simulation, and given the advantages of VoIP over the traditional PSTN technology, a modern telephony system can be implemented for the campus. The researchers aimed at reducing cable clusters around offices, facilitating in-office communication and enabling conference calling at any point where the IP phone or VoIP phone is being installed. The project covered the interconnection of different offices and the researchers, with the help of simulation showed that it was possible to make cheaper calls using the desk IP phone and video streaming on the Soft Phones and interfaces installed on Personal Computers (PC).

PROJECT DESCRIPTION

Components Used:

There are 1 computers, 2 IP phones, 1 Router (2811 series), 1 Switch (2960-24TT series) used in the project. The Router is connected to the Switch through straight wire which is then connected to the 2 IP phones which are further connected through straight wire to the 1 Computers.

Project Interface



For Switch 1:

Switch>

Switch>en

Switch# conf t

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#int range fa0/1-24

Switch(config-if-range)#switchport mode access

Switch(config-if-range)#switchport voice vlan 1

Switch(config-if-range)#do wr

Building configuration...

[OK]

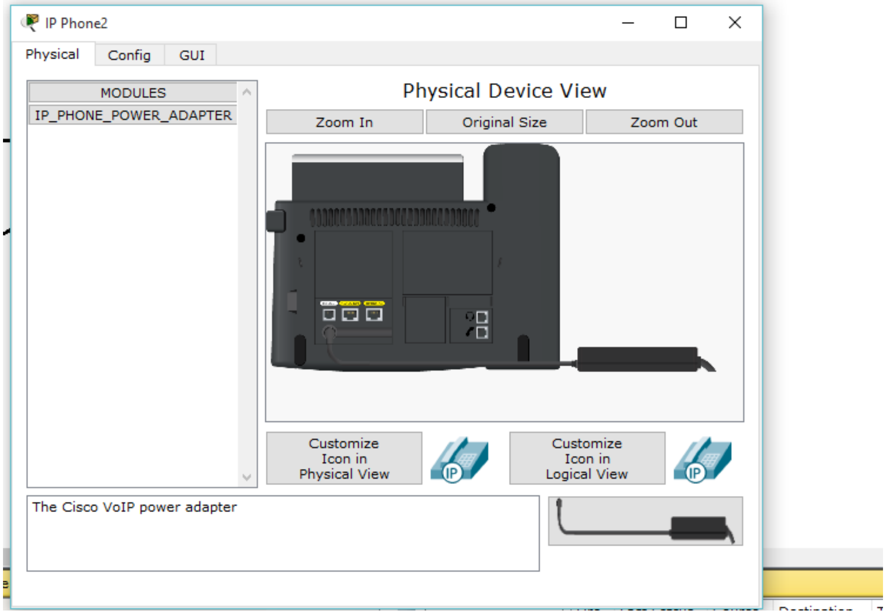
Switch(config-if-range)#ex

Switch(config)#

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state

Now connecting the IP phones



Switch(config)#int range fa0/2-4

Switch(config-if-range)#switchport access vlan 10

Switch(config-if-range)#switchport voice vlan 20

Switch(config-if-range)#no shut

Switch(config-if-range)#exit

For Router 1:

Router>en

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#int fa0/0

Router(config-if)#ip add 10.0.0.1 255.0.0.0

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

do wr

Building configuration...

[OK]

Router(config-if)# ex

Router(config)#

Router(config)#

Router(config)#int fa0/0

Router(config-if)#do wr

Building configuration...

[OK]

Router(config-if)#ex

Router(config)#

Router(config)#ip dhcp pool phone

Router(dhcp-config)#default-router 10.0.0.1

Router(dhcp-config)#network 10.0.0.0 255.0.0.0

Router(dhcp-config)#option 150 ip 10.0.0.1

Router(dhcp-config)#do wr

Building configuration...

[OK]

Router(dhcp-config)#ex

Router(config)#telephony-service

Router(config-telephony)#max-ephones 5

Router(config-telephony)#max-dn 5

Router(config-telephony)#ip source-address 10.0.0.1 port 2000

Router(config-telephony)#auto assign 1 to 5

Router(config-telephony)#ex

Router(config)#ephone-dn 1

Router(config-ephone-dn)#%LINK-3-UPDOWN: Interface ephone_dsp DN 1.1, changed state to up

Router(config-ephone-dn)#number 00001

Router(config-ephone-dn)#do wr

Building configuration...

[OK]

Router(config-ephone-dn)#ex

Router(config)#ephone-dn 2

Router(config-ephone-dn)#%LINK-3-UPDOWN: Interface ephone_dsp DN 2.1, changed state to up

Router(config-ephone-dn)#number 00002

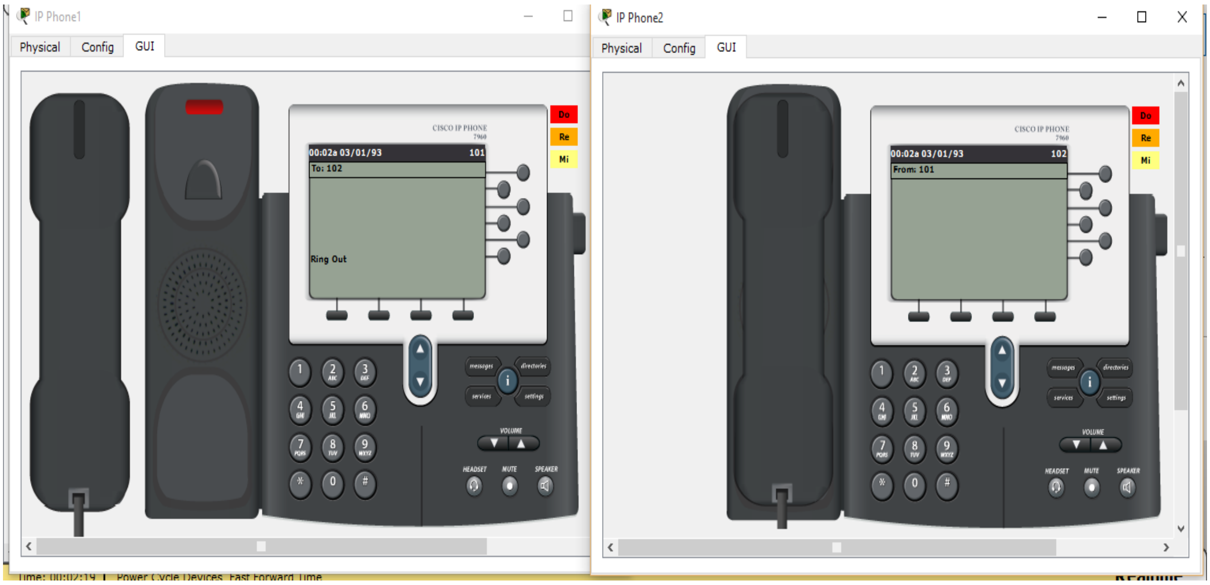
Router(config-ephone-dn)#do wr

Building configuration...

[OK]

Router(config-ephone-dn)#ex

Router(config)#



Significance of Project:

The project simply points out the working of a Voice over IP phone (VoIP) and how it is configured to be used in a real time business organization.

VoIP is important because, for the first time in more than 100 years, there is an opportunity to bring about significant change in the way that people communicate. In addition to being able to use the telephones we have today to communicate in real-time, we also have the possibility of using pure IP-based phones, including desktop and wireless phones. We also have the ability to use videophones, much like those seen in science fiction movies. Rather than calling home to talk to the family, a person can call home to see the family.

One of the more interesting aspects of VoIP is that we also have the ability to integrate a stand-alone telephone or videophone with the personal computer. One can use a computer entirely for voice and video communications (softphones), use a telephone for voice and the computer for video, or can simply use the computer in conjunction with a separate voice/video phone to provide data conferencing functions, like application sharing, electronic whiteboarding, and text chat. VoIP allows something else: the ability to use a single high-speed Internet connection for all voice, video, and data communications. This idea is commonly referred to as convergence and is one of the primary drivers for corporate interest in the technology. The benefit of convergence should be fairly obvious: by using a single data network for all communications, it is possible to reduce the overall maintenance and deployment costs. The benefit for both home and corporate customers is that they now have the opportunity to choose from a much larger selection of service providers to provide voice and video communication services. Since the VoIP service provider can be located virtually anywhere in the world, a person with Internet access is no longer geographically restricted in their selection of service providers and is certainly not bound to their Internet access provider.

In short, VoIP enables people to communicate in more ways and with more choices. Hence the project has been made to bring about the widespread scope of the VoIP.