Telcom-Switching Projects

ABSTRACT Project Code No.01

Next Generation Networks: A Future Communication System - Architecture

In Current Generation, different networks are used for providing different services like

1. PSTN (Public Switched Telephone Network) for voice communication
2. PSPDN (Packed Switched public data network) for data communication
3. PLMN (Public land mobile network) for mobile communication.

But by maintaining these different networks lead to problems like expensive upgrades, slow to develop new features and facilities, proprietary vendor troubles, more power and cooling requirements etc., So cost effective solution to provide different services is the Convergence.

NGN is a single converged network working on packet switching supports all telecom services like voice, data, video etc. with open interfaces and make use of multiple broad band services.

Objective:

This project involves analysis of NGN concept, Layered Architecture of NGN, protocols used in NGN and implementation of NGN

ITU-T's Definition of NGN

A Next Generation Network (NGN) is a packet-based network able to provide Telecommunication Services to users and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent of the underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and services of their choice. It supports generalized mobility, which will allow consistent and ubiquitous provision of services to users.

< ITU-T Recommendation Y.2001 (12/2004) - General overview of NGN>.

Current Generation Networks

In NGN basically the call control (i.e. signaling) and the switching is separated out in different layers and between these layers open interfaces are used. The call control functionality is realized by the component which is called call server or soft-switch or media gateway controller and the interfaces to the existing PSTN switches is done with the help of media gateways for voice transport and by signaling gateways for signaling transport. For switching and transport of the packets existing IP/MPLS backbone is used. With NGN architecture the new and innovative services can be given very fast and cost effectively. Also the capital expenditure and operational expenditure come down drastically.

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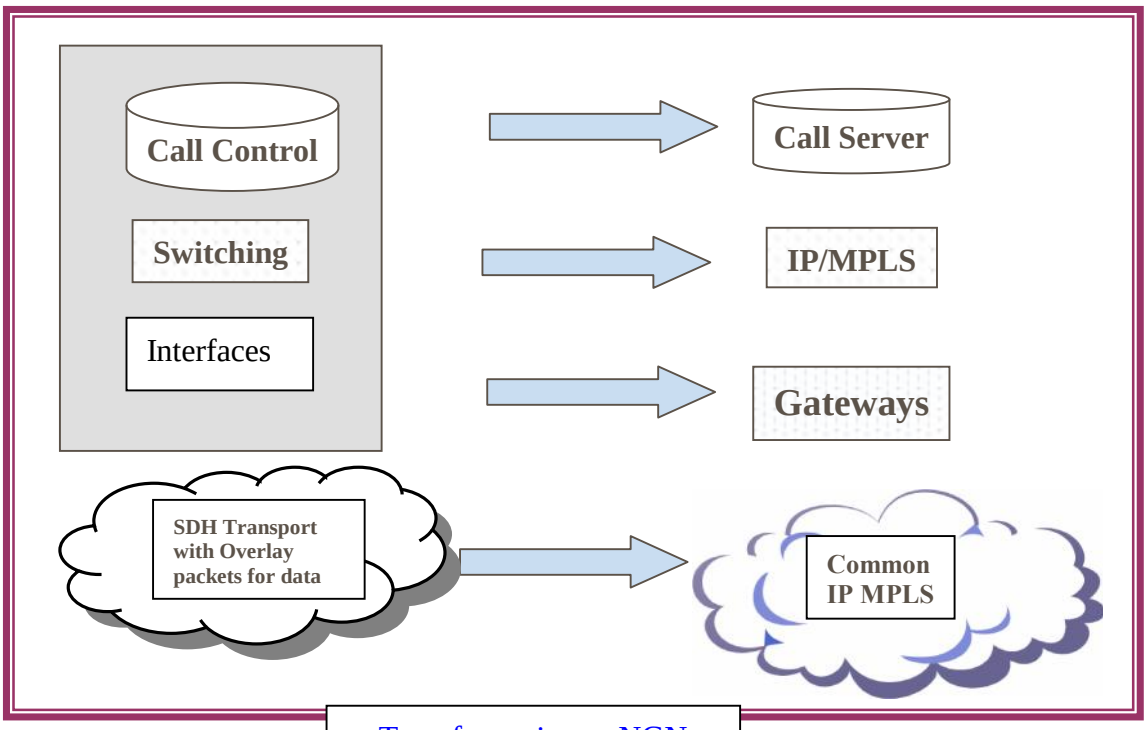

Transformation to NGN

The NGN is characterized by the following fundamental aspects:

- Packet-based transfer
- Separation of control functions among bearer capabilities, call/session, and application/service
- Decoupling of service provision from transport, and provision of open interfaces
- Support for a wide range of services, applications and mechanisms based on service building blocks (including real time/streaming/non-real time services and multi-media)
- Broadband capabilities with end-to-end QoS and transparency
- Inter-working with legacy networks via open interfaces
- Generalized mobility
- Unfettered access by users to different service providers
- A variety of identification schemes which can be resolved to IP addresses for the purposes of routing in IP networks
- Unified service characteristics for the same service as perceived by the user
- Converged services between Fixed and Mobile networks
- Independence of service-related functions from underlying transport technologies
- Support of multiple last mile technologies
- Compliant with all Regulatory requirements, for example concerning emergency communications and security/privacy, etc.

PROTOCOLS:

1. SIP
2. MEGACO/H.248
3. H.343
4. RTP

Conclusion:

In this project we analyze the concept of NGN, detailed architecture, protocols, and its implementation in current scenario of maintaining different individual networks like PSTN, PSPDN and PLMN and finally we will establish NGN, a future communication network will be very much useful to both end-users as well as network provides.

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ABSTRACT Project Code No.02

Configuration of IP-TAX over NGN platform

IPTAX is Internet Protocol Trunk Automatic Exchange. IPTAX configuration is based NGN platform. NGN means Next Generation Networks. In Current Generation different networks are being used for providing different services like

1. PSTN (Public Switched Telephone Network) for voice communication
2. PSPDN (Packed Switched public data network) for data communication
3. PLMN (Public land mobile network) for mobile communication.

But by maintaining these different networks lead to problems like expensive upgrades, slow to develop new features and facilities, proprietary vendor troubles, more power and cooling requirements etc., So cost effective solution to provide different services is the Convergence.

NGN is a single converged network working on packet switching supports all telecom services like voice, data, video etc. with open interfaces and make use of multiple broad band services.

In PSTN network, presently we have layered architecture like local exchange, level-II TAX, level-I TAX (TAX-Trunk Automatic Exchange). This lead to heavy maintenance and especially this Level-II and Level-I layer architecture is suitable for carry only TDM (Time Division Multiplexing Traffic). But many limitations are there in this TDM switching technology. Hence now switching viz., IP based switching has evolved to overcome these limitations and to provide converged network using NGN platform. So TDM TAXes will be replaced by IPTAX.

Objective:

This project involves NGN concept, Detailed Architecture of NGN, protocols used in NGN and implementation of IPTAX over NGN.

ITU-T's Definition of NGN

A Next Generation Network (NGN) is a packet-based network able to provide Telecommunication Services to users and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent of the underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and services of their choice. It supports generalized mobility, which will allow consistent and ubiquitous provision of services to users.

< ITU-T Recommendation Y.2001 (12/2004) - General overview of NGN>.

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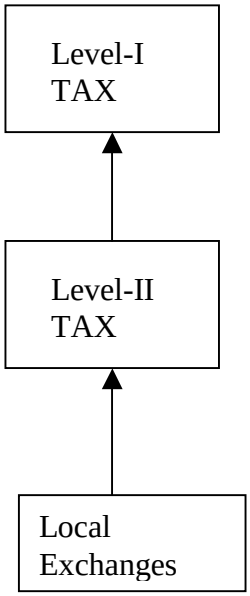
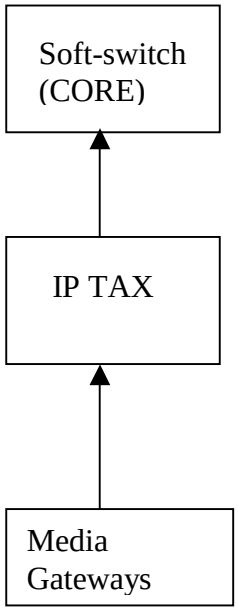
TDM TAX Network



NGN TAX Network



In NGN basically the call control (i.e. signaling) and the switching is separated out in different layers and between these layers open interfaces are used. The call control functionality is realized by the component which is called call server or soft-switch or media gateway controller and the interfaces to the existing PSTN switches is done with the help of media gateways for voice transport and by signaling gateways for signaling transport. For switching and transport of the packets existing IP/MPLS backbone is used. With NGN architecture the new and innovative services can be given very fast and cost effectively. Also the capital expenditure and operational expenditure come down drastically.

PROTOCOLS:

1. SIP
2. MEGACO/H.248
3. H.343
4. RTP

Conclusion:

In this project we analyze the concept of NGN, its detailed architecture, protocols, and IPTAX implementation with NGN platform in current scenario of TDM TAX network we will establish NGN based IPTAX is very much useful to both end-users as well as network provides.

continued…

ABSTRACT Project Code No.03

SS7: An efficient signaling system and its implementation in CDOT MAX-XL switching system

A telecommunication network establishes and realizes temporary connections, in accordance with the instructions and information received from subscriber lines and inter exchange trunks, in form of various signals. Therefore, it is necessary to interchange information between an exchange and it external environment i.e. between subscriber lines and exchange, and between different exchanges. Though these signals may differ widely in their implementation they are collectively known as telephone signals.

A signaling system uses a language, which enables two switching equipments to converse for the purpose of setting up calls. Like any other language it possesses a vocabulary of varying size and varying precision, i.e., a list of signals, which may also vary in size and syntax in the form of a complex set of rules governing the assembly of these signals.

The ITU has, therefore, specified the common channel signaling system no.7(SS-7). SS-7 is optimized for application in digital networks. The following main features characterize it:

- Internationally standardized (national variations possible).
- Suitable for the national, international and intercontinental network level.
- Suitable for various communication services such as telephony, text services, data services digital network (ISDN).
- High performance and flexibility along with a future-oriented concept, which will meet new requirements.
  - High reliability for message transfer.
  - Processor-friendly structure of messages (signal units of multiples of 8 bits).
  - Signaling on separate signaling links; the bit rate of the circuits is, therefore, exclusively for communication.
  - Signaling links always available, even during existing calls.
  - Use of the signaling links for transferring user data also.
  - Used on various transmission media
    - Cable (copper, optical fiber)
    - Radio relay
    - Satellite (up to 2 satellite links)
  - Use of the transfer rate of 64 Kbit/s typical in digital networks.
  - Used also for lower bit rates and for analog signaling links if necessary.

Automatic supervision and control of the signaling network

Objective:

In this project we establish SS7 signaling is more efficient signaling system than previous signaling schemes and analyze its detailed layer architecture compared to OSI 7 layer format and understand the different terminology used is SS7 network like SP, SPC, LS, LSB etc., and finally we will implement SS7 configuration in CDOT MAX-XL switching system.

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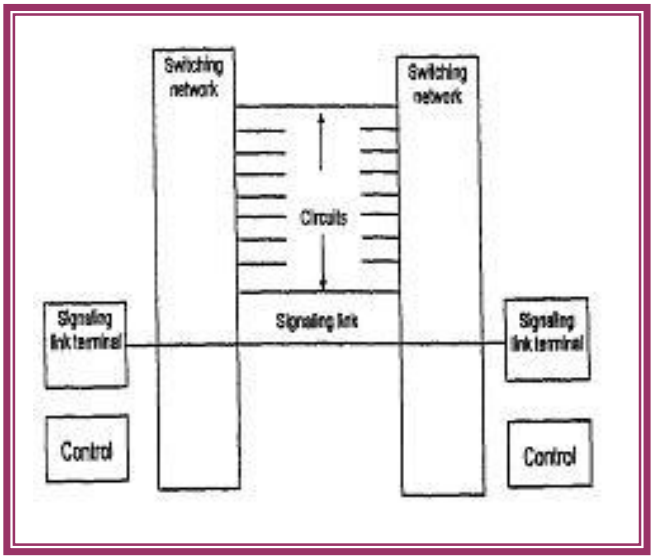
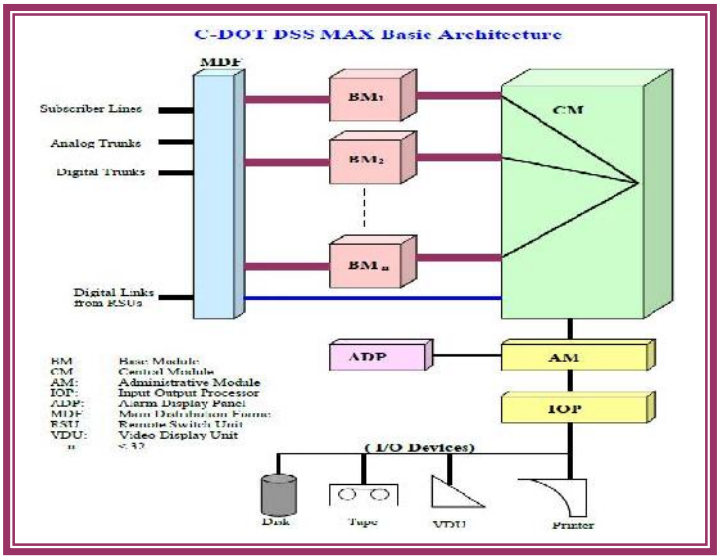
SS7 Concept:



Block Diagram



C-DOT - HISTORY

The Center for Development of Telematics (C-DOT) is the telecom technology development center of the government, it was established in August 1984 as an autonomous body. It was vested with full authority and total flexibility to develop state-of-the-art telecommunication technology to meet the needs of the Indian telecommunication network. The key objective was to build a center for excellence in the area of telecom technology.

C-DOT DSS MAX is a universal digital switch which, can be configured for different applications as local, transit, or integrated local and transit switch. High traffic/load handling capacity up to 8,00,000 BHCA with termination capacity of 40,000 Lines as Local Exchange or 15,000 trunks as Trunk Automatic Exchange, the C-DOT DSS family is ideally placed to meet the different requirements of any integrated digital network.

C-DOT DSS MAX exchanges can be configured using four basic modules

- Base Module
- Central Module
- Administrative Module
- Input Output Module

Inputs:

1. Hardware Equipment
2. Parameters, Characteristics list of different SS7 parameters different route characteristics and parameters of CAS, SS7
3. Telephone Instruments

Conclusion:

Practically configuration of SS7 network in CDOT MAX-XL switching system with various routes and Trunk groups to provide communication between different exchanges

continued…

ABSTRACT Project Code No.04

Intelligent Network Architecture – Implementation of IN services

Overview of Intelligent Network Architecture

Over the last thirty years, one of the major changes in the implementation of Public Switched Telephone Networks （PSTNs） has been the migration from analogue to digital switches. Coupled with this change has been the growth of intelligence in the switching nodes. From a customer's and network provider's point of view this has meant that new features could be offered and used.

Since the feature handling functionality was resident in the switches, the way in which new features were introduced into the network was by introducing changes in all the switches. This was time consuming and fraught with risk of malfunction because of proprietary feature handling in the individual switches.

To overcome these constraints the Intelligent Network architecture was evolved both as network and service architecture.

In the IN architecture, the service logic and service control functions are taken out of the individual switches and centralized in a special purpose computer. The interface between the switches and the central computer is standardized. The switches utilize the services of the specialized computer whenever a call involving a service feature is to be handled. The call is switched according to the advice received by the requesting switch from the computer. For normal call handling, the switches do not have to communicate with the central computer.

Objectives of the Intelligent Network

The main objectives of the IN are the introduction and modification of new services in a manner that leads to substantial reduction in lead times and hence development costs, and to introduce more complex network functions.

An objective of IN is also to allow the inclusion of the additional capabilities and flexibility to facilitate the provisioning of services independent of the underlying network's details. Service independence allows the service providers to define their own services independent of the basic call handling implementation of the network owner.

The key needs that are driving the implementation of IN are :

- **Rapid Service Deployment**
- **Reduced Deployment Risk**
- **Cost Reduction**
- **Customization**
- **IN Architecture:**

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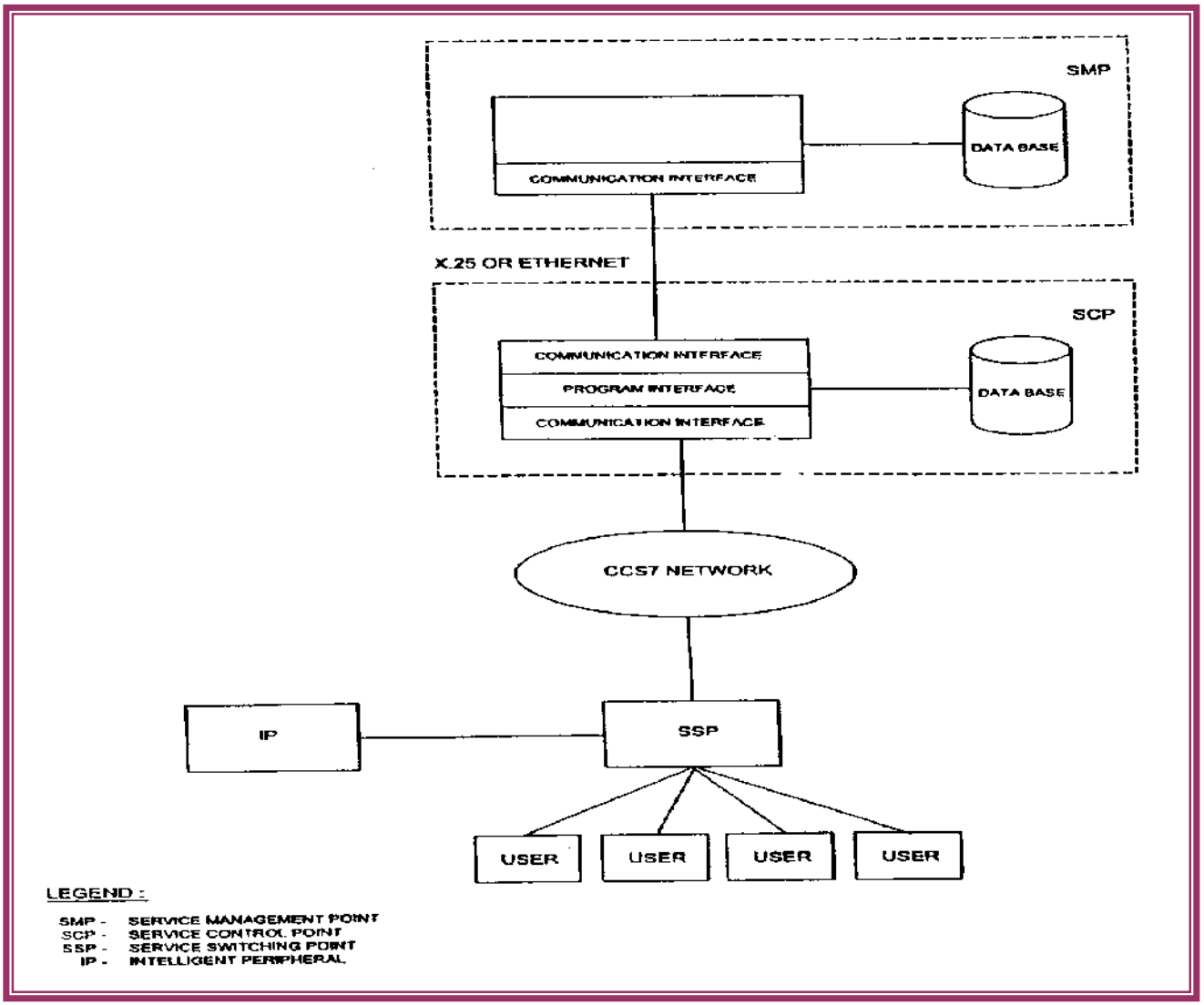
The service logic is concentrated in a central node called the Service Control Point (SCP).

The switch with basic call handling capability and modified call-processing model for querying the SCP is referred to as the Service Switching Point (SSP).

Intelligent Peripheral (IP) is also a central node and contains specialized resources required for IN service call handling. It connects the requested resource towards a SSP upon the advice of the SCP.

Service Management Point (SMP) is the management node, which manages services logic, customers data and traffic and billing data. The concept of SMP was introduced in order to prevent possible SCP malfunction due to on-the-fly service logic or customer data modification. These are first validated at the SMP and then updated at the SCP during lean traffic hours. The user interface to the SCP is thus via the SMP.



CONCLUSION:

In this project we analyze the concept of IN, its detailed architecture and practically configure some IN services like Free Phone Service, Virtual Card Calling, Televoting etc.

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ABSTRACT Project Code No.05

Analysis of PSTN network setup & call flow in CDOT MAX-XL switching system

The public switched telephone network (PSTN) is the network of the world's public circuit-switched telephone networks. It consists of telephone lines, fiber optic cables, microwave transmission links, cellular networks, communications satellites, and undersea telephone cables, all inter-connected by switching centers, thus allowing any telephone in the world to communicate with any other. Originally a network of fixed-line analog telephone systems, the PSTN is now almost entirely digital in its core and includes mobile as well as fixed telephones.

The technical operation of the PSTN utilizes standards created by the ITU-T. These standards allow different networks in different countries to interconnect seamlessly. There is also a single global address space for telephone numbers based on the E.163 and E.164 standards. The combination of the interconnected networks and the single numbering plan make it possible for any phone in the world to dial any other phone.

Network topology

The PSTN network architecture had to evolve over the years to support increasing numbers of subscribers, calls, connections to other countries, direct dialing and so on. The model developed by the US and Canada was adopted by other nations, with adaptations for local markets.

The original concept was that the telephone exchanges are arranged into hierarchies, so that if a call cannot be handled in a local cluster, it is passed to one higher up for onward routing. This reduced the number of connecting trunks required between operators over long distances and also kept local traffic separate. However, in modern networks the cost of transmission and equipment is lower and, although hierarchies still exist, they are much flatter, with perhaps only two layers.

Most automated telephone exchanges now use digital switching rather than mechanical or analog switching. The trunks connecting the exchanges are also digital, called circuits or channels. However analog two-wire circuits are still used to connect the last mile from the exchange to the telephone in the home (also called the local loop). To carry a typical phone call from a calling party to a called party, the analog audio signal is digitized at an 8 kHz sample rate with 8-bit resolution using a special type of nonlinear pulse code modulation known as G.711. The call is then transmitted from one end to another via telephone exchanges. The call is switched using a call set up protocol (usually ISUP) between the telephone exchanges under an overall routing strategy. The call is carried over the PSTN using a 64 kbit/s channel, originally designed by Bell Labs. The name given to this channel is Digital Signal 0(DS0). The DS0 circuit is the basic granularity of circuit switching in a telephone exchange. A DS0 is also known as a timeslot because DS0s are aggregated in time-division multiplexing (TDM) equipment to form higher capacity communication links.

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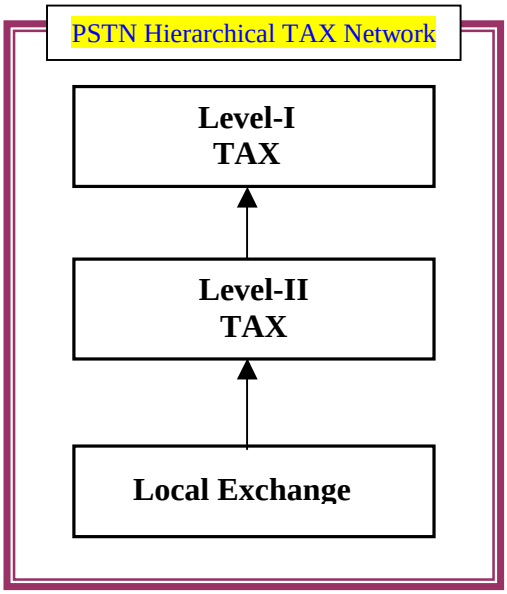
A Digital Signal 1 (DS1) circuit carries 24 DS0s on a North American or Japanese T-carrier (T1) line, or 32 DS0s (30 for calls plus two for framing and signaling) on an E-carrier (E1) line used in most other countries. In modern networks, the multiplexing function is moved as close to the end user as possible, usually into cabinets at the roadside in residential areas, or into large business premises. And most of PSTN switches are based on CDOT (Centre for Development of Telematics switching technology.



C-DOT HISTORY :

The Center for Development of Telematics (C-DOT) is the telecom technology development center of the government, it was established in August 1984 as an autonomous body. It was vested with full authority and total flexibility to develop state-of-the-art telecommunication technology to meet the needs of the Indian telecommunication network. The key objective was to build a center for excellence in the area of telecom technology.

C-DOT DSS MAX is a universal digital switch, which can be configured for different applications as local, transit, or integrated, local, and transit switch. High traffic/load handling capacity up to 8,00,000 BHCA with termination capacity of 40,000 Lines as Local Exchange or 15,000 trunks as Trunk Automatic Exchange, the C-DOT DSS family is ideally placed to meet the different requirements of any integrated digital network.

The design of C-DOT DSS MAX has envisaged a family concept. The advantages of family concept are standardized components, commonality in hardware, documentation, training, installation and field support for all products and minimization of inventory of spares. In fact this modular design has been consciously achieved by employing appropriate hardware, software, and equipment practices.

The equipment practices provide modular packaging. Common cards and advanced components have been used in the system hardware in order to reduce the number and type of cards. Standard cards, racks, frames, cabinets and distribution frames are used which facilitate flexible system growth. Interconnection technology has been standardized at all levels of equipment packaging. All these features, together with rugged design, make C-DOT DSS MAX easy to maintain and highly reliable. Another important feature of the design is the provision of both local and centralized operation and maintenance. Beginning with local operation and maintenance, with the installation of similar digital switches in the network, centralized operation and maintenance will provide maintenance and administration services very economically. All these services are provided through a simple, interactive man-machine interface. Centre for Development of Telematics (C-DOT) is the telecom technology development centre of the Government of India. C-DOT develops telecom technologies, solutions and applications for the fixed-line, mobile and packet-based converged networks and services

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OBJECTIVES of CDOT :

- Work on telecom technology products and services.
- Provide solutions for current and future requirements of telecommunication and converged networks including those required for rural application.
- Provide market orientation to R&D activities & sustain C-DOT as center of excellence.
- Build partnerships and joint alliances with industry, solution provides, telcos and other development organizations to offer cost effective solution.
- Support telcos and service provides in the introduction of new technologies, features and services by optimal utilization of installed network.

The C-DOT DSS MAX design follows an evolutionary approach in order to:

- Introduce new services to the users
- Meet service requirements of the network operators
- Take advantage of the technological advancements
- Taking place in telecom
- Provide value additions
- Provide cost-effective incremental capacity expansion

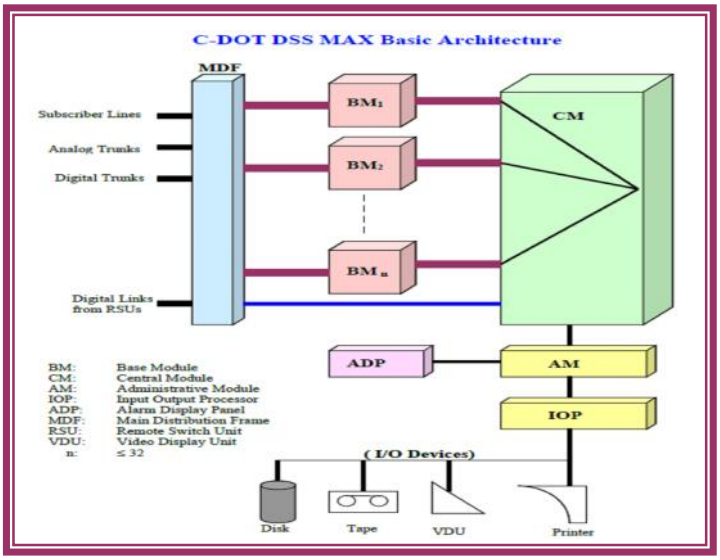
Objective:

This project involves study of PSTN network setup using CDOT MAX-XL switching system. Practically observing different Hardware Architectures of CDOT Main Automatic Exchange-XL type switching system and analyzing the various diagnosis reports by testing of different hardware units through Man- Machine Interface commands C-DOT's current focus is on development of state-of-the-art technologies that are market-oriented, commercially viable and meet fast changing technical requirements.

Inputs:

1) CDOT Hardware Equipment.
2) Terminals for testing and analysis of different types of faults.

Block Diagram



C-DOT DSS MAX exchanges can be configured using four basic modules

- Base Module
- Central Module
- Administrative Module
- Input Output Module

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ABSTRACT Project Code No.06

Design of remote exchange using V5.2 protocols and connecting to parent exchange in CDOT MAX-XL switching system Implementation of IN services

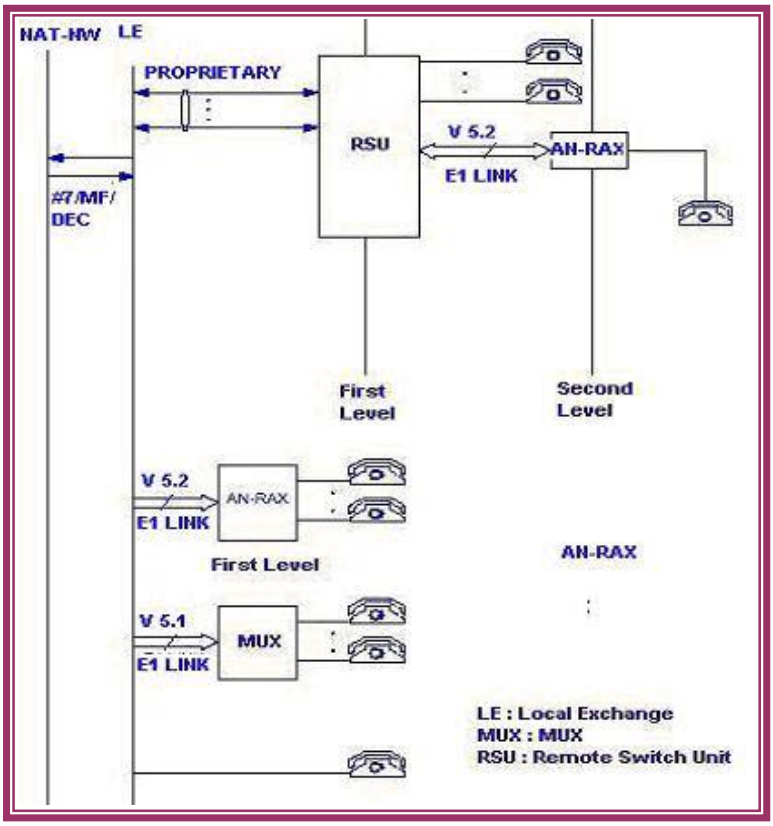
This project involves overview of Access Network Rural Automatic Exchange (ANRAX) connecting to local exchange CDOT module for remote control. The product AN-RAX is basically a Subscriber line concentrator, used for remoting. There are three levels of remoting the first level; 'Remote Switch Unit' (RSU) provides the functionality of first level of remoting. All the Subscribers connected to RSU can access each other and also the subscribers, in the 'National Network' (NAT-NW).

RSU in this case will, perform the functionality of a complete switch (with both intra exchange and upto NAT-NW Switching). It will handle the 'Call Processing' (CP), charging and billing functionality, but would itself be a part of the LE. The 'C-DOT Access Network - RAX' (AN-RAX) will provide the second level of remoting. AN-RAX might be connected to a RSU or directly to the LE. The AN-RAX supports V5.2 protocol, and handles the functionality of second level of remoting

The second level of remoting has its scope and role clearly defined. At this level there would neither be any intra switching or call processing activities, nor the AN-RAX would handle the charging, billing and administration functions of subscribers.
AN-RAX provides a transparent link between the subscriber and LE. It handles the various subscriber events, the BORSCHT functionalities.

Third level of remoting handles the front-end functions but does not provide any concentration. The various subscriber ports of MUX have nailed up (fixed) slots in the link towards LE. The MUX may be connected directly to LE or to a unit of a higher level of remoting.

Levels of Remoting



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Mainly this project deals the following:

Objective :

This project involves overview of configuration of Access Network Rural Automatic Exchange with V5.2 protocols

Inputs:

1) CDOT Hardware Equipment of ANRAX

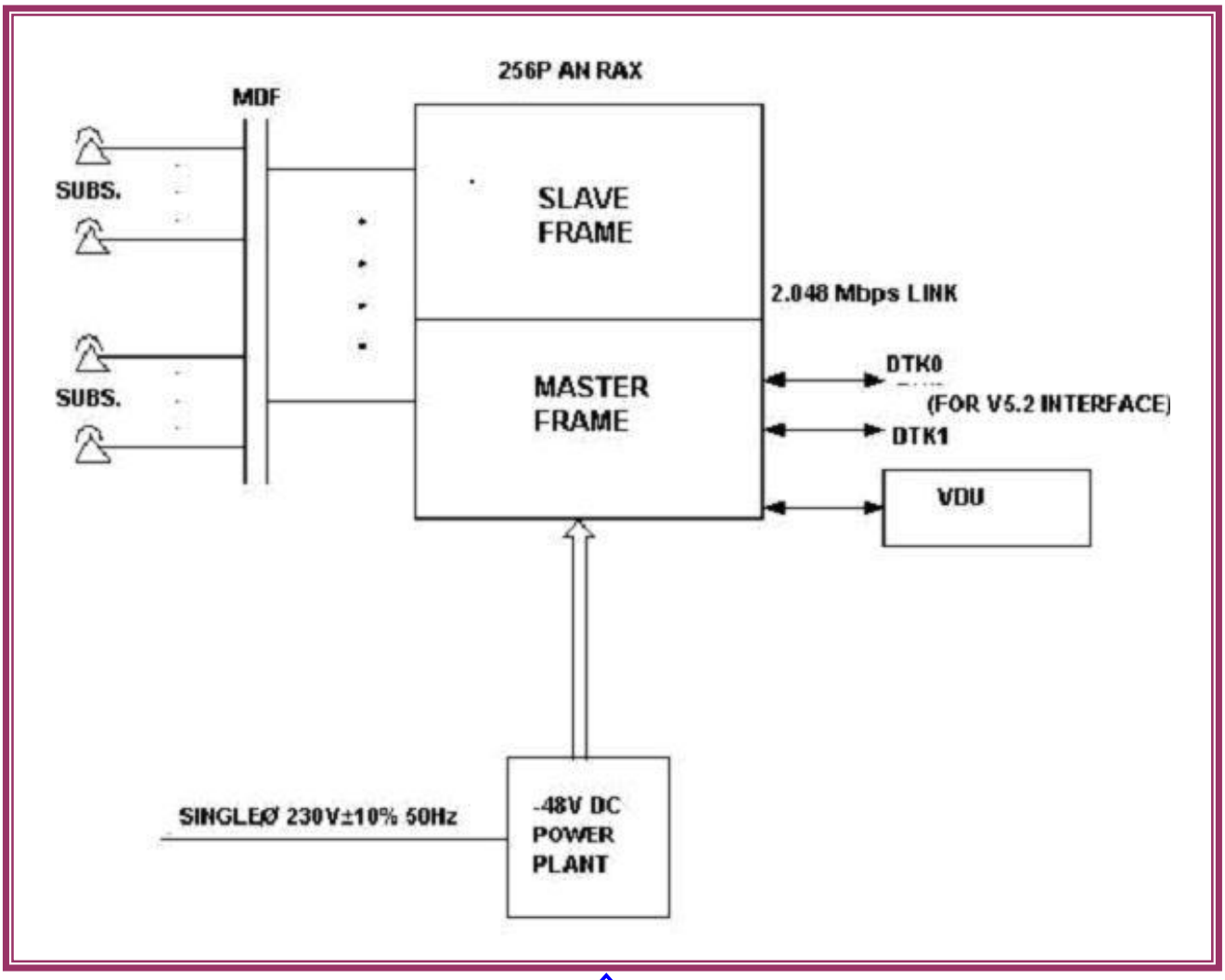
2) Different connecting cables

Practical :

Practically identification of ANRAX hardware elements

Report :

Final Report preparation.



System Overview

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ABSTRACT Project Code No.07

Establishment of CUG(Closed User Group) in CDOT MAX-XL switching system

C-DOT :

Brief History:

The Center for Development of Telematics (C-DOT) is the telecom technology development center of the government, it was established in August 1984 as an autonomous body. It was vested with full authority and total flexibility to develop state-of-the-art telecommunication technology to meet the needs of the Indian telecommunication network. The key objective was to build a center for excellence in the area of telecom technology.

C-DOT DSS MAX is a universal digital switch, which can be configured for different applications as local, transit, or integrated, local, and transit switch. High traffic/load handling capacity up to 8,00,000 BHCA with termination capacity of 40,000 Lines as Local Exchange or 15,000 trunks as Trunk Automatic Exchange, the C-DOT DSS family is ideally placed to meet the different requirements of any integrated digital network.

The design of C-DOT DSS MAX has envisaged a family concept. The advantages of family concept are standardized components, commonality in hardware, documentation, training, installation and field support for all products and minimization of inventory of spares. In fact this modular design has been consciously achieved by employing appropriate hardware, software, and equipment practices.

The equipment practices provide modular packaging. Common cards and advanced components have been used in the system hardware in order to reduce the number and type of cards. Standard cards, racks, frames, cabinets and distribution frames are used which facilitate flexible system growth. Interconnection technology has been standardized at all levels of equipment packaging. All these features, together with rugged design, make C-DOT DSS MAX easy to maintain and highly reliable.

Another important feature of the design is the provision of both local and centralized operation and maintenance. Beginning with local operation and maintenance, with the installation of similar digital switches in the network, centralized operation and maintenance will provide maintenance and administration services very economically. All these services are provided through a simple, interactive man-machine interface.

Mainly this project deals the following:

Objective :

This project involves creation of Closed User Group of subscribers in CDOT MAX-XL switching system.

continued…

Inputs:

1) CDOT Hardware Equipment

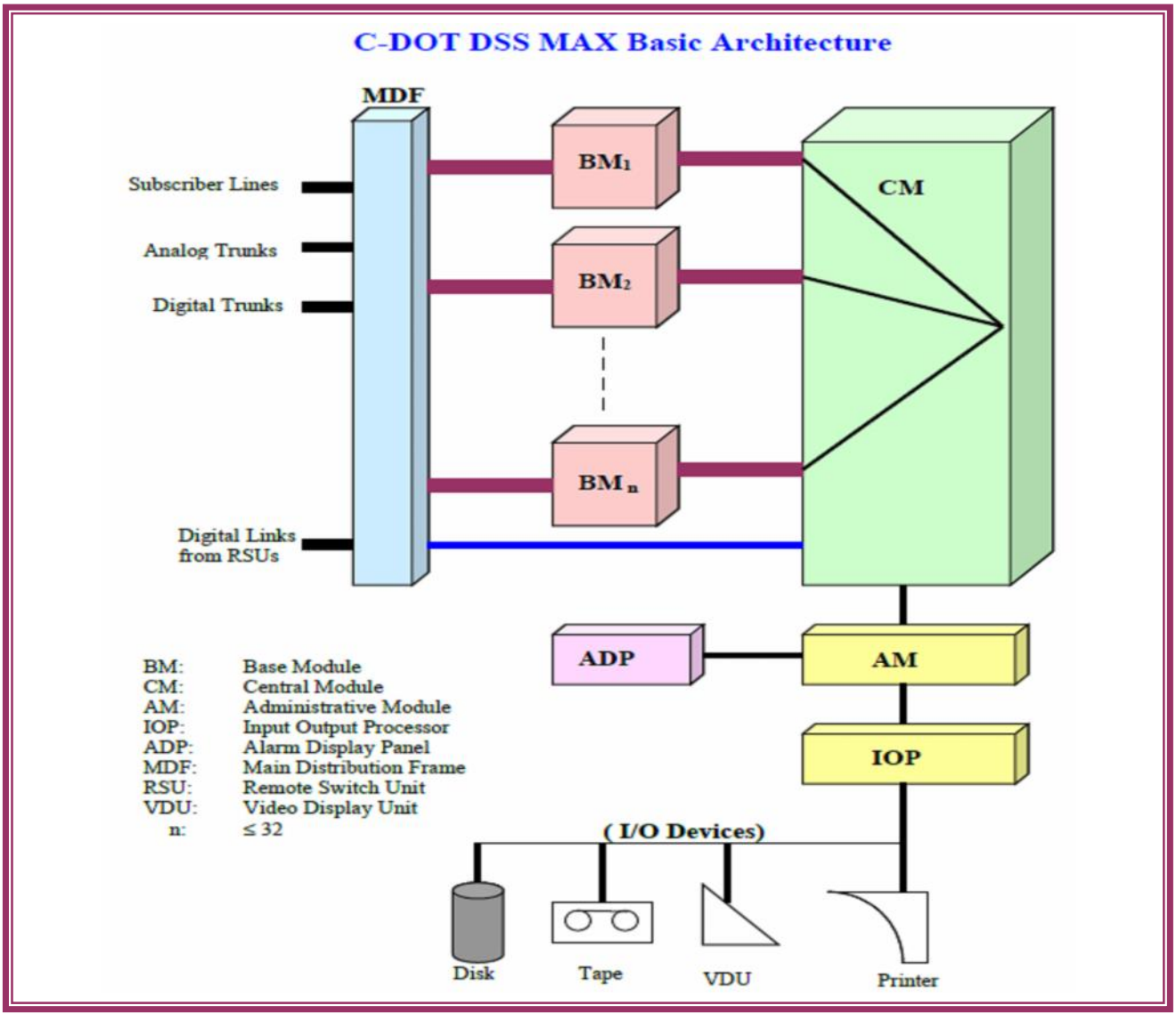
2) Terminals for creation of closed user group of subscribers

3) Telephones for CUG

Observations:

Practical creation of Closed User Group of subscribers in CDOT MAX-XL exchange

Block Diagram



C-DOT DSS MAX exchanges can be configured using four basic modules

- Base Module
- Central Module
- Administrative Module
- Input Output Module

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ABSTRACT Project Code No.08

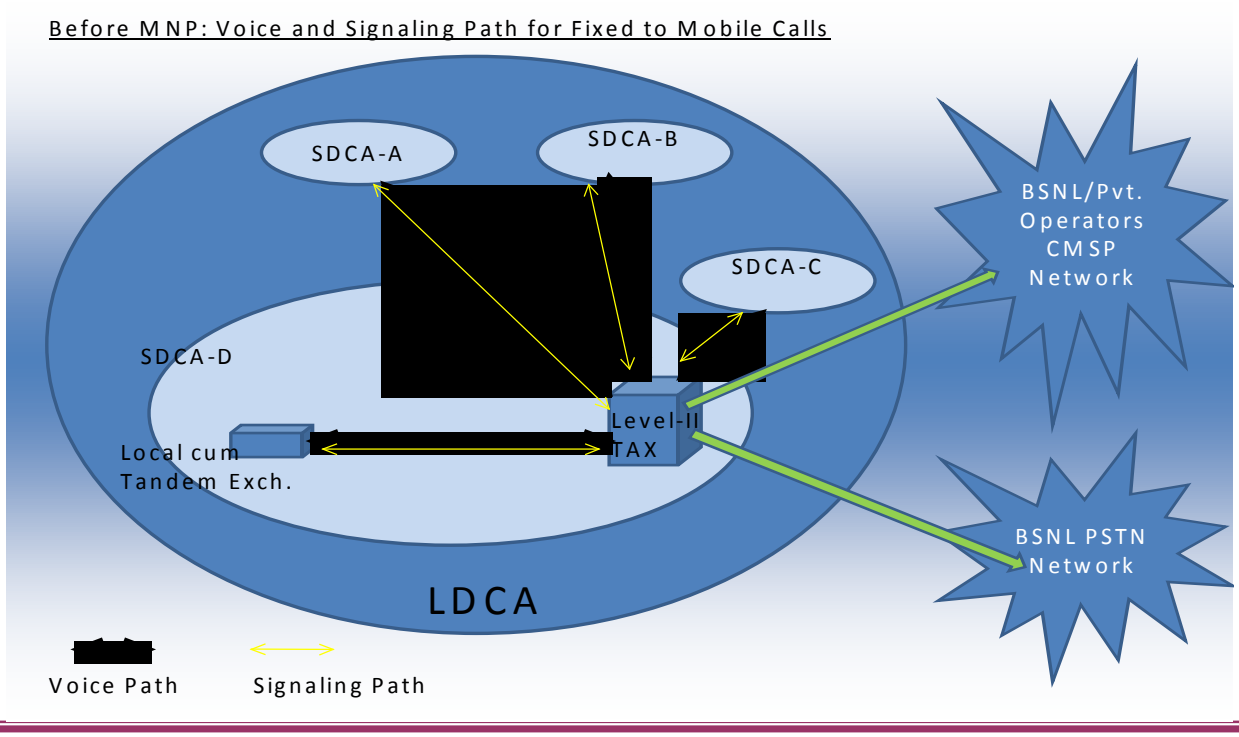
Implementation of MNP in PSTN switch

"Mobile Number Portability" (MNP) means the facility which allows a subscriber of a mobile telephone service to retain his mobile telephone number when he moves from one mobile telephone service provider to another, irrespective of the mobile technology or from one mobile technology to another of the same mobile telephone service provider, within such limits as may be permitted by the licensor"

- Portability of Mobile Numbers between all GSM and CDMA operators within the same Service Area.
- A Mobile subscriber can change his/her operator within the same Service Area without changing his/her number.
- No Portability beyond Service Area.
- Portability between GSM and CDMA network of same operator in same service area possible.

CCS-7 signaling is the main application to implement Mobile Number Portability in PSTN switches. All the TDM exchanges in the network are made compatible to implement MNP irrespective of the vendor type.

In PSTN network, presently we have layered architecture like local exchange, level-II TAX, level-I TAX (TAX-Trunk Automatic Exchange). All these PSTN exchanges in the network are connected to the Stand-alone Signaling Transfer Point (SSTP) for implementation of MNP with CCS-7 signaling concept.



Before MNP: Voice and Signaling Path for fixed to Mobile calls

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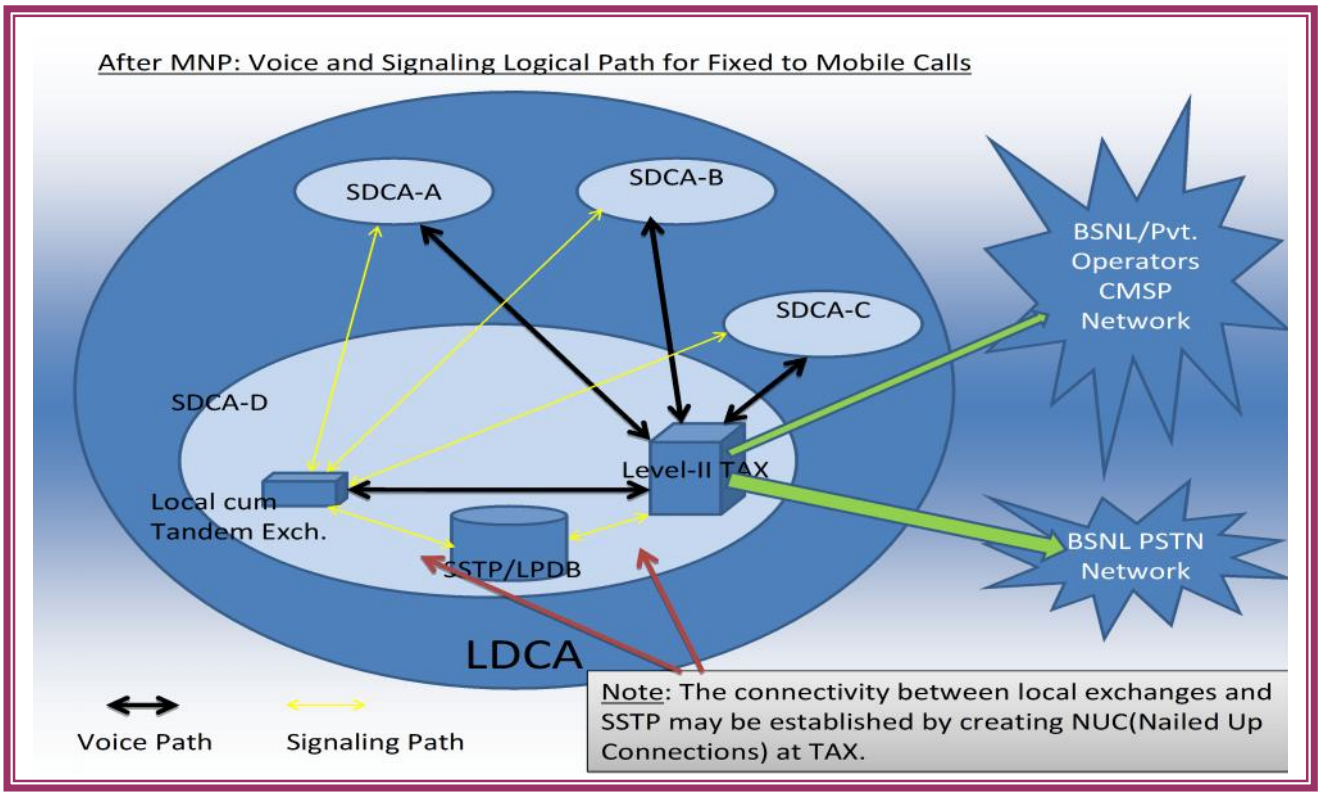
Objective :

This project involves analysis of MNP concept, its implementation in PSTN switches with CCS7 application and the connectivity of database required to the network.

RN for each Mobile Number will be stored in one central Database (NPDB). Associated RN of each Mobile Number will determine the present operator of the number. This RN changes when a mobile number is ported to other Mobile Operator.

"IAM Relay" method is used for implementing MNP in BSNL. In IAM Relay method SSTP must intercept all IAMs for fixed to mobile calls originating from local exchanges and prefix the RN number with B party number in the IAM before sending the same to Level-I/II TAX/Tandems. This RN+B number information is used by Level I/II TAX/Tandems to route the call to correct service provider. Necessary creation of routing and charging information required is to be done at Level I/II TAX. This method requires connecting all the local exchanges with SSTP.



After MNP: Voice and Signaling Logical Path for fixed to Mobile calls

Conclusion:

In this project we analyze the concept of IAM Relay method in SSTP, and concept of CCS7 signaling implementation in all the TDM local/Tax exchanges in the network by connecting it to SSTP and we will establish MNP on CCS-7 platform is useful to both end-users as well as network provides.

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Optical Fibre Comm/ Transmission Projects

Optical Fibre Comm/ Transmission Projects

Introduction for Optical Fiber Communication /Transmission Projects.

(Common for projects No.9 to No.13)

In telecommunications Optical fibers plays an important role because it carries the c from transmitter to the receiver very effectively than other wired networks. Optical fibers can used to transmit light and thus information over long distances at higher bandwidths. communication process involves information generation, transmission, reception and interpretati As needs for various types of communication such as voice, images, video and c communications. In most of the optical networks, silica fibers are used. The capacity of fit for data transmission is huge: a single silica fiber can carry lacks of telephone channels. cost per transported channel can be extremely low. The losses for light propagating in fit are amazingly small: ≈0.25 dB/km for modern single-mode silica fibers, so that many tens kilometers can be bridged without regenerating /amplifying the signals.

Today, optical fibers are not only used in telecommunication links but also used Lo area networks (LAN), Gigabit Ethernet, SDH/SONET, ATM, ESCON, Fiber Channel CATV. Currently the optical fiber used in to access networks. The "last mile" to business home subscribers through FTTH services like IPTV/RF Video, VOIP, High Speed Internet future advanced services with High quality of service, high reliability, flexibility, all in IP, fut proof and using the network resources effectively.

To develop multimedia telecommunication networks as an infrastructure, it is necessary install the highly reliable optical fiber cable network architecture along with traditional SDH, N Generation SDH, and Dense Wave Length Division Multiplexing (DWDM) Systems. Waveler Division Multiplexing (WDM) is an effective technique for utilizing the large bandwidth of optical fiber.

The thrust of this project is on OFC/SDH/DWDM technology and it will create awaren to the service provider network architecture, principles of OFC, different SDH systems nam STM-4/16 of vendor name Tejas and DWDM 40 Channel 10 G system. In this project real time environment with hands on exposure to readily install and working OFC/STM-4/ST 16 and DWDM systems along with necessary Testing Instruments is covered. This project gi the complete details about the theoretical and practical background to various OFC/SDH DWDM system technologies.

If desired to build awareness in telecom and enhance career prospects in Telecom industry especially in transmission specialization, this is the best-suited proj

continued…

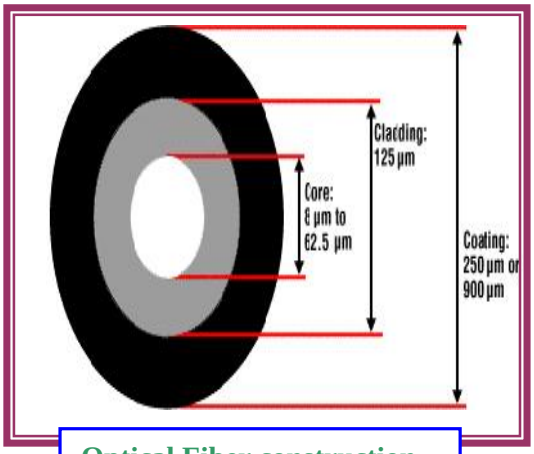
ABSTRACT Project Code No.09

Localisation and rectification of cable faults in Optical Fibre

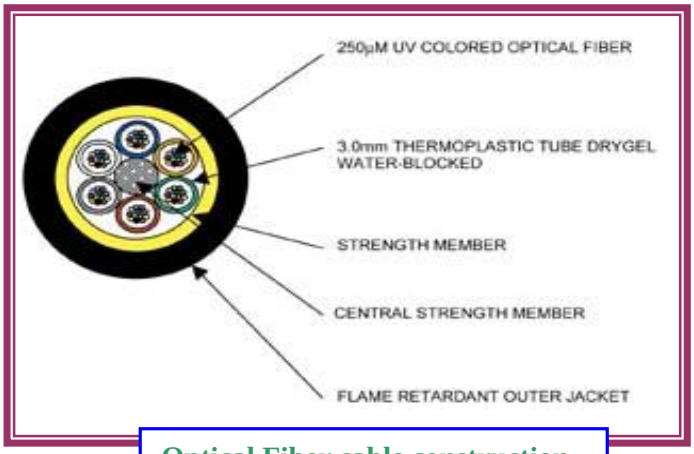
Objective

This project involves the study and practical familiarization of Optical fibre cable (OFC) components and materials used, analyzing different types of OFC faults, study of Optical fibre testing instruments used for localizing OFC faults i.e., with OTDR (Optical time domain reflecto meter), basic principal of OTDR and block diagram of OTDR along with the rectification of OFC fault using splicing. The project also focus on operating different optical Measuring instruments, Optical power meter, stabilized light source, splicing techniques, steps involved in splicing and study of working principal of Fusion type splicing machine.

The following diagrams describe the Optical fibre construction, optical fibre cable, splicing machine, OTDR, optical power meter, stabilized light source etc,



Optical Fiber construction



Optical Fiber cable construction

Practical:

Practical on localization of optical fibre cable fault by using OTDR Traces and rectifying the fault by using Fusion type Optical fibre Splicing.

Observations:

1. Practical observations of optical fibre Splicing and testing.
2. Settings and operation of testing instruments.

continued…

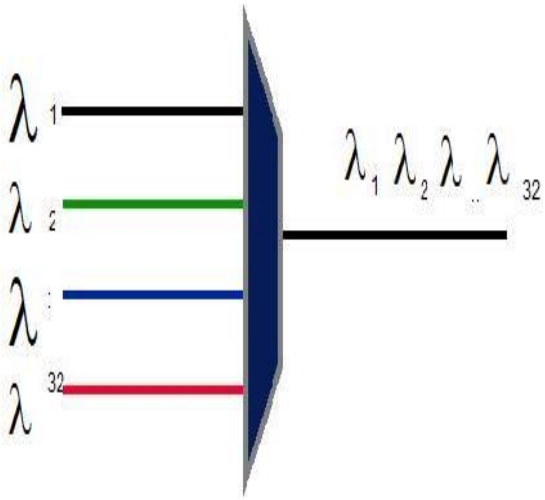
ABSTRACT Project Code No.10

Measurement of Network parameters in 40 Channel (10 Gbps) DWDM Network.

Objective

The emergence of **Dense Wavelength Division Multiplexing** (DWDM) is one of the most recent and important phenomena in the development of fiber optic transmission technology. One of the major issues in the networking industry today is tremendous demand for more and more bandwidth. However, with the development of optical networks and the use of DWDM technology, a new technology is developed to utilize the maximum bandwidth of optical fiber. The existing SONET/SDH network architecture is best suited for voice traffic rather than today's high-speed data traffic. Since it is very expensive to upgrade the system to handle this kind of traffic there is a need for the development of an intelligent **All-optical network** (AON). Such a network will bring intelligence and scalability to the optical domain by combining the intelligence and functional capability of SONET/SDH, the tremendous bandwidth of DWDM and innovative networking software to spawn a variety of optical transport, switching and management related products. DWDM is expected to be the central technology in the AON of the future.

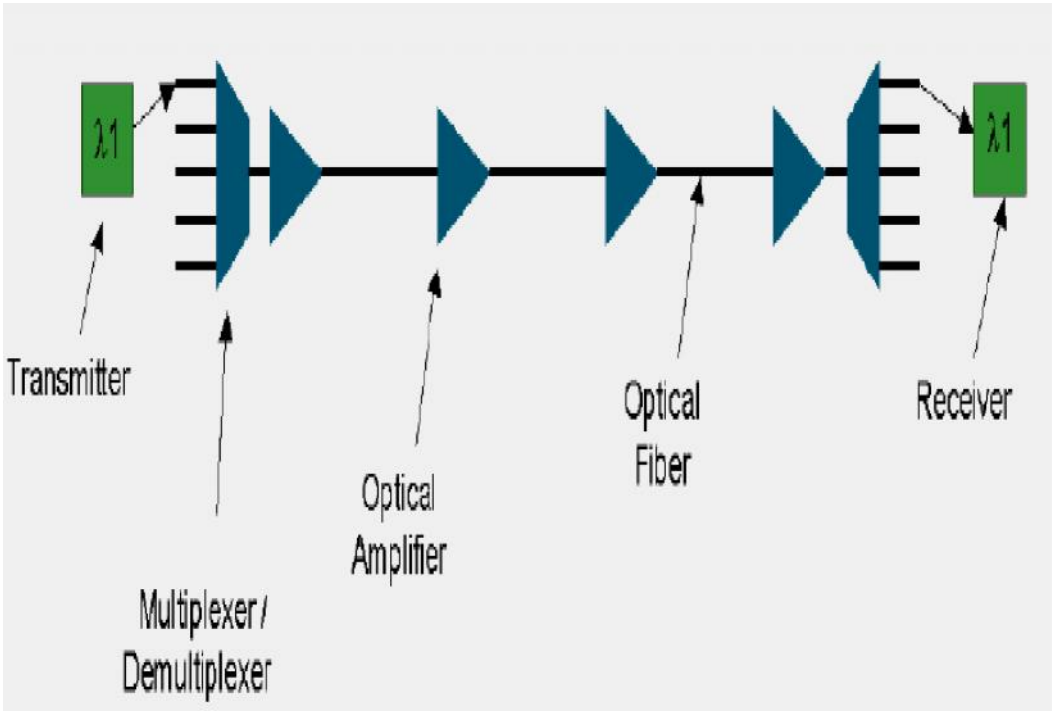
This project involves the familiarization of DWDM technology and its network elements. Optical Spectrum Analyzer is most important measurement tool to measure various parameters of DWDM network. Optical power meter measures the Optical power.



DWDM Principle

DWDM System

continued…



DWDM System Components

Objective:

This project involves the measurement of various DWDM network performance parameters i.e., Wave length, Transmit power of each channel, optical power at various levels of 40λ (40 Channel), 10G (each channel capacity) DWDM system and familiarization of its hardware.

Practical:

Measurement of various DWDM network performance parameters by using Optical Spectrum analyzer, Optical power meter. i.e., Wave length, Transmit power of each channel, optical power at various levels of 40λ (40 Channel), 10G (each channel capacity) DWDM system and familiarization of its hardware.

Observations:

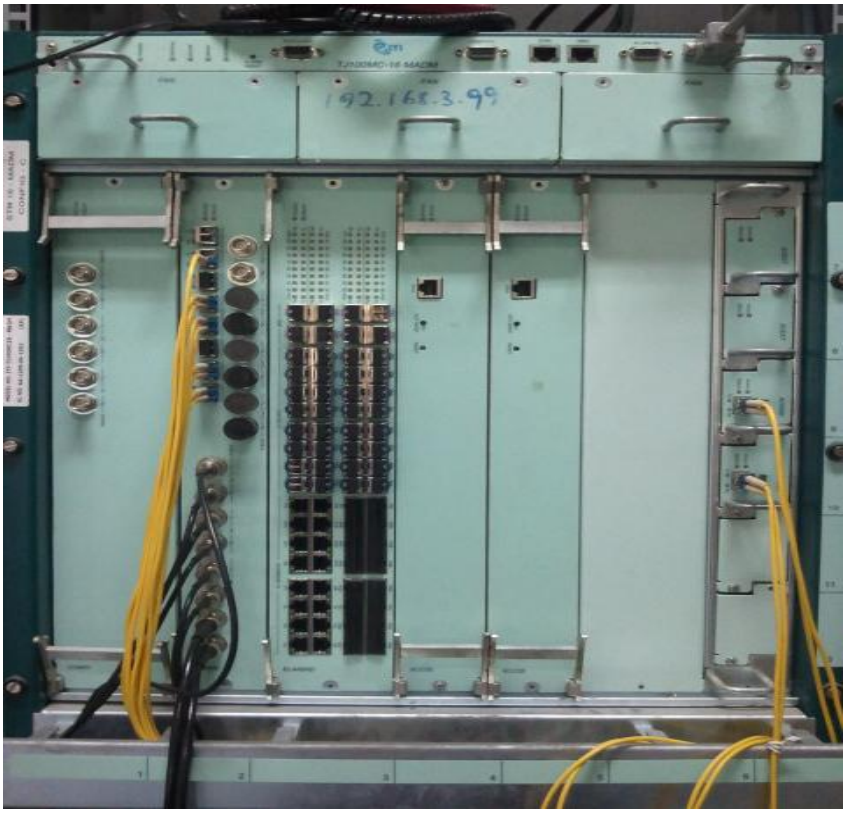
1. Familiarization of DWDM 40λ, 10 G system.
2. Familiarization of Optical Spectrum analyzer and Power meter.
3. Measurement of Various DWDM network performance parameters.

continued…

ABSTRACT Project Code No.11

Configuration of 155 Mbps bandwidth between Two stations using STM-16 (SDH) systems along with protection path and testing with BER meter

Synchronous Digital Hierarchy (SDH) is a standard for telecommunications transport formulated by the International Telecommunication Union (ITU). It is deployed at all levels of the network infrastructure including the access network and the long-distance trunk network. It is based on synchronous multiplexed signal onto a light stream transmitted over Optical fiber. SDH is also defined for the use of Radio relay links, satellite links, and at electrical interfaces between equipment. SDH improves the configuration flexibility and bandwidth availability over the conventional Telecom transmission system.



DWDM System Components

The thrust of this project is on SDH technology and to create the awareness to the service provider's network architecture, principles of OFC, concept on SDH. This project involves the study of SDH technology and STM-16 Tejas SDH system as shown in figure. This project gives the complete details about the theoretical background to various SDH system technologies.

In this project the student have the exposure to the real time environment with hands on practice to readily installed working STM-16 SDH system, configuration of 155 Mbps bandwidth between two stations along with protection and Testing with SDH Analyzer/BER Meter (**Bit error ratio**).

continued…

Objective:

This project involves practical familiarization to STM-16 Tejas Equipment and Configuration of 155 Mbps bandwidth between Two stations with STM-16 (SDH) systems along with protection path.

Practical:

Practical configuration of STM-16 Tejas Equipment, 155 Mbps bandwidth and its protection path. Testing of 155 Mbps path on STM-16 systems between two stations in local & through mode with SDH analyzer.

Observations:

Various steps in configuration of STM-16 Tejas Equipment, 155 Mbps bandwidth and its protection path. Testing of 155 Mbps path on STM-16 systems between two stations in local & through mode with SDH analyzer.

 continued…

ABSTRACT Project Code No.12

Planning and Design of STM-16 OFC lines, configuration of E1's, Bandwidth and BER measurements.

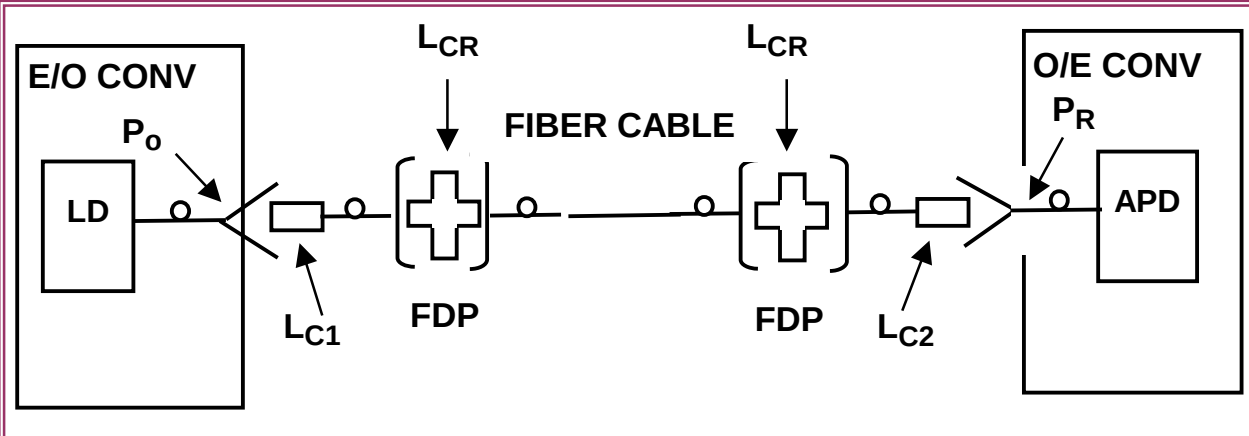
Synchronous Digital Hierarchy (SDH) is a standard for telecommunications transport formulated by the International Telecommunication Union (ITU). It is deployed at all levels of the network infrastructure including the access network and the long-distance trunk network. It is based on synchronous multiplexed signal onto a light stream transmitted over Optical fiber. SDH is also defined for the use of Radio relay links, satellite links, and at electrical interfaces between equipment. SDH improves the configuration flexibility and bandwidth availability over the conventional Telecom transmission system.

The thrust of this project is on SDH technology and to create the awareness to the service provider's network architecture, principles of OFC, concept on SDH. This project involves the study of SDH technology and STM-16 Tejas SDH system as shown in figure. This project gives the complete details about the theoretical background to various SDH system technologies.

The main objective of this project is the designing of link budget between two STM-16 SDH terminals.

This project involves practical design of a OFC link by testing the OF Cable using the measuring instruments like Optical Time Domain Reflect meter (OTDR), Optical Source, Optical Power meter and variable attenuator. Hands on measurement of Transmit power of Sources (LASERS) and receiver sensitivity (APD) of STM-16 terminals with the help of Variable attenuator and power meters. Configuration of E1's between two STM-16 SDH terminals and Testing with BER (bit error ratio) meter.

The basic block diagram of the fibre optic transmission link engineering is shown in figure.



Fibre Optics Transmission Line Engineering

$L_{C1,2}$	=	Connection Loss of Connector
$L_{C1} + L_{C2}$	=	LCE, Connection Loss in the EQPL.
L_{CR}	=	Connection Loss at Receiver Input Connector of FDP.
L_{CT}	=	Connection Loss at Transmitter Output FDP.
LOD	=	Connection Loss in the FDP [$L_{CR} + L_{CT}$]

continued…

STM-16 SDH Equipment

Objective:

This project involves Link budget analysis of Optical Fibre. Practical familiarization to STM-16 Tejas Equipment and Configuration of E1's between Two STM-16 terminals. Testing E1's with BER meter.

Practical:

Practical Measurement of Transmit power of Sources (LASERS) and receiver sensitivity (APD) of STM-16 terminals with the help of Variable attenuator and power meters. Configuration of E1's between two STM-16 SDH terminals and Testing with BER (bit error ratio) meter.

Observations:

Various steps in link budget analysis, Configuration of STM-16 Tejas Equipment and E1's. Testing of E1's between two stations with BER meter.

continued…

ABSTRACT Project Code No.13

Configuration of path protection mechanism in STM-4 SDH OFC Links.

Synchronous Digital Hierarchy (SDH) is a standard for telecommunications transport formulated by the International Telecommunication Union (ITU). It is deployed at all levels of the network infrastructure including the access network and the long-distance trunk network. It is based on synchronous multiplexed signal onto a light stream transmitted over Optical fiber. SDH is also defined for the use of Radio relay links, satellite links, and at electrical interfaces between equipment. SDH improves the configuration flexibility and bandwidth availability over the conventional Telecom transmission system.

The thrust of this project is on SDH technology and to create the awareness to the service provider's network architecture, principles of OFC, concept on SDH. This project involves the study of SDH technology and STM-16 Tejas SDH system as shown in figure. This project gives the complete details about the theoretical background to various SDH system technologies.

STM-16 SDH Equipment

In this project the student have the exposure to the real time environment with hands on practice to readily installed working STM-4 SDH system, configuration of E1's between two stations along with protection and Testing with SDH Analyzer/BER Meter (**Bit error ratio**).

Objective:

This project involves practical familiarization to STM-4 Tejas Equipment and Configuration of E1's along with protection mechanism between Two STM-4 SDH systems. Measurement of Performance parameters of E1 link with G.821 ITU-T recommendation.

Practical:

Practical Configuration of STM-4 Tejas Equipment, E1's and its protection path. Testing of E1 link between two STM-4 SDH systems in through mode with BER meter.

Observations:

Various steps in configuration of STM-16 Tejas Equipment, E1's and its protection path. Testing of E1's between two stations in through mode with BER meter. Measurement of Performance parameters of E1 link with G.821 ITU-T recommendation.

continued…

Mobile/ GSM Projects

Mobile/ GSM Projects

ABSTRACT Project Code No.14

Performance acceptance testing of Huawei GSM Base Transceiver station site

Objective:

This project involves hands-on exercise on conducting quality / performance acceptance testing of a Huawei BTS site. The project member will understand the hardware design and architecture of BTS and also will be able to configure BTS site. It also involves the testing of all the peripheral equipment connected to BTS equipment.

Inputs:

1. Huawei BTS Hardware Equipment
2. VSWR Tester, Power meter
3. VSWR Tester, Power meter

Parameters Used:

TRX Power, Power control / Handover parameters, RF Logical channels, Cell Site Database- Site Configuration, Latitude & Longitude of the site location, BSIC, CGI, LAC, Hopping Frequencies, Non-Hopping Frequencies; MAIO, HSN, Antenna Parameters – Type, Tilt, Pattern, Gain, Azimuth/Orientation, etc.

Software Used:

Huawei Proprietary LMT Software ***Inputs:***

Practical:

Practically testing the BTS configuration and all the parameters of BTS site, SMPS power plant, VRLA battery set such as RF Tx power of transceiver hardware units, E1 loop back test, VSWR, power input / output, etc.

Observations:

Verification of telecom services extended to subscribers in BTS cell area by making the test calls, checking handovers / mobility and verifying the different value added services such as SMS, caller tunes, Internet, etc.

Report:

Final Report preparation

continued…

ABSTRACT Project Code No.15

3G UMTS Benchmarking of network key performance indicators in mobile service urban area by conducting drive testing

Objective:

This project involves hands-on exercise on conducting drive testing of existing mobile network, obtaining test log files and exporting to excel sheets for benchmark analysis. It also involves formulation and calculation of network KPIs and perform benchmark analysis.

Inputs:

1. Drive test tool software & Laptop
2. GPS
3. Rx Scaneer
4. Test Handsets
5. Cell site database
6. Digital Maps

Parameters Used:

Received signal strength indicator (RSSI), Received signal code power (RSCP), Ec/Io, Active set, uplink throughput, downlink throughput, Cell Site Database- Site Configuration, Latitude & Longitude of the site location, scrambling code, CI, LAC, Antenna Parameters - Tilt, Pattern, Gain, Azimuth/Orientation, etc.

Software Used:

Agilent / JDSU Drive test tool

Practical:

Practical conduction of drive testing in a sample route in Gachibowli by using Agilent DT tool and capturing drive test log files of RF network.

Observations:

Network performance will be gauged with the help of drive test log values. RF network KPIs are calculated and comparative analysis will be done.

Report:

Final Report preparation

continued…

ABSTRACT Project Code No.16

Planning of GSM radio network using planning simulation software

Objective:

This project involves exercise on planning of GSM RF network with the help of Planning simulation software tool. The main aim of radio network planning is to provide a cost-effective solution in terms of coverage, capacity and quality.

Inputs:

1. PC
2. Cell site database
3. Antenna Characteristics
4. Propagation Model
5. Planning simulation software tool

Parameters Used:

RX Coverage, Rx Quality, C/I, Propagation model parameters, Cell Site Database- Site Configuration, Latitude & Longitude of the site location, BSIC, CI, LAC, ARFCNs - BCCH & TCH, Antenna Parameters – EIRP, Tilt, Pattern, Gain, Azimuth/Orientation, losses, etc.

Software Used:

Planning simulation software tool

Practical:

Practical simulation of RF network on planning tool, planning of RF frequencies, BTS parameters by verifying coverage and C/I values.

Observations:

The final radio plan consists of the RF coverage plans, capacity estimations, radio frequency plans, etc. of a mobile network area.

Report:

Final Report preparation

continued…

ABSTRACT Project Code No.17

Planning of 3.5G HSDPA mobile radio networks using planning simulation software

Objective:

This project involves simulation exercise on planning of 3.5G HSDPA Radio network with the help of planning simulation software tool

Inputs:

1. PC
2. Cell site database
3. Antenna Characteristics
4. Propagation Model
5. Planning simulation software tool

Parameters Used:

Eb/Nt, Ec/Io, RSCP, Pilot Pollution, Scrambling codes, OVSF codes, Propagation model parameters, Cell Site Database- Site Configuration, Latitude & Longitude of the site location, CI, Antenna Parameters, etc.

Software Used:

Planning simulation software tool

Practical:

Practical simulation of HSDPA radio network on Planning simulation software tool, planning of scrambling codes, Node-B antenna parameters by verifying coverage and quality parameters.

Observations:

The final radio plan consists of the Radio network coverage & quality plans, capacity estimations, scrambling code plans, etc. of a 3.5G mobile network area.

Report:

Final Report preparation

 continued…

ABSTRACT Project Code No.18

Performance acceptance testing of Motorola GSM/GPRS Base Transceiver station site

Objective:

This project involves hands-on exercise on conducting quality / performance acceptance testing of a Motorola BTS site. The project member will understand the hardware design and architecture of BTS and also will be able to configure BTS site. It also involves the testing of all the peripheral equipment connected to BTS equipment.

Inputs:

1. Motorola BTS Hardware Equipment
2. VSWR Tester, Power Meter
3. Radio Parameters

Parameters Used:

TRX Power, Power control / Handover parameters, RF Logical channels, Cell Site Database- Site Configuration, Latitude & Longitude of the site location, BSIC, CGI, LAC, Hopping Frequencies, Non-Hopping Frequencies; MAIO, HSN, Antenna Parameters – Type, Tilt, Pattern, Gain, Azimuth/Orientation, etc.

Software Used:

Motorola Proprietary BSS MMI Software

Practical:

Practically testing the BTS configuration and all the parameters of BTS site, SMPS power plant, VRLA battery set such as RF Tx power of transceiver hardware units, E1 loop back test, VSWR, power input / output, etc.

Observations:

Checking the existence of telecom services extended to subscribers in BTS cell area by making the calls, checking handovers / mobility and verifying the different value added services such as SMS, caller tunes, Internet, etc.

Report:

Final Report preparation

 continued…

ABSTRACT Project Code No.19

Benchmarking of GPRS network key performance indicators in mobile service urban area by conducting drive testing

Objective:

This project involves hands-on exercise on conducting drive testing of existing mobile network, obtaining test log files and exporting to excel sheets for benchmark analysis. It also involves formulation and calculation of network KPIs and perform benchmark analysis.

Inputs:

1. Drive test tool software & Laptop
2. GPS
3. Rx Scanner
4. Test Handsets
5. Cell Site Database
6. Digital Maps

Parameters Used:

Received signal strength (Rxlev), Throughput (Kbps), C/I or SNR,TA, RLT, Frame Error Rate, Cell Site Database- Site Configuration, Latitude & Longitude of the site location, BSIC, CI, LAC, Antenna Parameters - Tilt, Pattern, Gain, Azimuth/Orientation, etc.

Software Used:

Agilent / JDSU Drive test tool

Practical:

Practical conduction of drive testing in a sample route in Gachibowli by using Agilent DT tool and capturing drive test log files of RF network.

Observations:

Network performance will be gauged with the help of drive test log values. RF network KPIs are calculated and comparative analysis will be done with TRAI benchmark values.

Report:

Final Report preparation

continued…

ABSTRACT Project Code No.20

Measuring and analyzing call failures due to signaling link failure in Mobile Services Core network using SS#7 Protocol Analyser

Objective:

This project involves hands-on exercise on determining and analyzing call failures in mobile core network mainly in MSC, VLR, HLR, etc. by using protocol analyzer.

Inputs:

1. Live MSC (Mobile Switching Centre) – Nortel / Huawei make
2. Protocol Analyser

Parameters Used:

SS#7 Protocol messages, MAP, CCR – Call Completion rate, Call Drop rate, Call Congestion, Network traffic, Bit error ratio, Grade of Service (GOS), etc.

Software Used:

OMC-S, SS#7 Protocol Analyzer software

Practical:

Practical measurement and analysis of call drops and poor CCR in mobile core network.

Observations:

This will improve the quality of the service by analyzing the reasons for failure of the call failures and taking the necessary remedial actions.

Report:

Final Report preparation

continued…

Networking/ Broadband Projects

Networking/ Broadband Projects

ABSTRACT Project Code No.21

Implementation of IPsec VPN's & its configuration on ISP network.

Internet Protocol Security (IPsec) is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a communication session. IPsec also includes protocols for establishing mutual authentication between agents at the beginning of the session and negotiation of cryptographic keys to be used during the session. IPsec is an end-to-end security scheme operating in the Internet Layer of the Internet Protocol Suite. It can be used in protecting data flows between a pair of hosts (host-to-host), between a pair of security gateways (network-to-network), or between a security gateway and a host (network-to-host). IPsec is officially specified by the Internet Engineering Task Force (IETF) in a series of Request for Comments documents addressing various components and extensions. It specifies the spelling of the protocol name to be IPsec.

A **virtual private network** (VPN) is a technology for using the Internet or another intermediate network to connect computers to isolated remote computer networks that would otherwise be inaccessible. A VPN provides security so that traffic sent through the VPN connection stays isolated from other computers on the intermediate network. VPNs can connect individual users to a remote network or connect multiple networks together. For example, a user may use a VPN to connect to their work computer terminal from home and access their email, files, images, etc.

Through VPNs, users are able to access resources on remote networks, such as files, printers, databases, or internal websites. VPN remote users get the impression of being directly connected to the central network via a point-to-point link.

Trainee will be learning the detailed information about the IPSec based VPN, its standards, functionality and internetworking issues in the networking domain. Trainee will have hands on sessions in the lab how the IPSec VPN is implemented in the ISP networks. Trainees will be able to troubleshoot the problems in the inter-network connectivity in the Lab using the routers CISCO 3640, CISCO 2811 and end devices.

continued…

ABSTRACT Project Code No.22

Implementation of "Dual Stack strategy" for Migration of IPv4 to IPv6

IPv6 (Internet Protocol version 6) is a revision of the Internet Protocol (IP) developed by the Internet Engineering Task Force (IETF). IPv6 is intended to succeed IPv4, which is the dominant communications protocol for most Internet traffic as of 2012. IPv6 was developed to deal with the long-anticipated problem of IPv4 running out of addresses. IPv6 implements a new addressing system that allows for far more addresses to be assigned than with IPv4.

Each device on the Internet, such as a computer or mobile telephone, must be assigned an IP address in order to communicate with other devices. With the ever-increasing number of new devices being connected to the Internet, there is a need for more addresses than IPv4 can accommodate. IPv6 uses 128-bit addresses, allowing for 2^128, or approximately 3.4×10^38 addresses - more than 7.9×10^28 times as many as IPv4, which uses 32-bit addresses. The deployment of IPv6 is accelerating, with a World IPv6 Launch having taken place on 6 June 2012, in which major internet service providers, especially in countries that had been lagging in IPv6 adoption, deployed IPv6 addresses to portions of their users.

Migrating from IPv4 to IPv6 in an instant is impossible because of the huge size of the Internet and of the great number of IPv4 users. Moreover, many organizations are becoming more and more dependent on the Internet for their daily work, and they therefore cannot tolerate downtime for the replacement of the IP protocol. As a result, there will not be one special day on which IPv4 will be turned off and IPv6 turned on because the two protocols can coexist without any problems. The migration from IPv4 to IPv6 must be implemented node by node by using auto-configuration procedures to eliminate the need to configure IPv6 hosts manually. This way, users can immediately benefit from the many advantages of IPv6 while maintaining the possibility of communicating with IPv4 users or peripherals. Consequently, there is no reason to delay updating to IPv6!

Some IPv6 characteristics are explicitly designed to simplify the migration. For example, IPv6 addresses can be automatically derived from IPv4 addresses, IPv6 tunnels can be built on IPv4 networks, and at least in the initial phase, all IPv6 nodes will follow the "Dual stack approach; i.e., they will support both IPv4 and IPv6 at the same time".

Trainee will be learning the detailed information about the present day IPv4 networks, and know the how IPv6 solve the problems in IPv4 networks. Trainee will have hands on sessions in the lab how "Migration technology - Dual stack" is implemented on the routers in IPv4 and IPv6 domain. Trainees will be able to troubleshoot the problems in the inter-network connectivity in the Lab using the routers CISCO 2811 and solving the issues.

continued…

ABSTRACT Project Code No.23

Implementation of "Tunneling Strategy" for Migration of IPv4 to IPv6

IPv6 (**Internet Protocol version 6**) is a revision of the Internet Protocol (IP) developed by the Internet Engineering Task Force (IETF). IPv6 is intended to succeed IPv4, which is the dominant communications protocol for most Internet traffic as of 2012. IPv6 was developed to deal with the long-anticipated problem of IPv4 running out of addresses. IPv6 implements a new addressing system that allows for far more addresses to be assigned than with IPv4.

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Some IPv6 characteristics are explicitly designed to simplify the migration. For example, IPv6 addresses can be automatically derived from IPv4 addresses, IPv6 tunnels can be built on IPv4 networks, and at least in the initial phase, all IPv6 nodes will follow the dual stack approach i.e., they will support both IPv4 & IPv6 at the same time. Because not all networks support dual-stack, tunneling is used for IPv4 networks to talk to IPv6 networks (and vice-versa). Many current Internet users do not have IPv6 dual-stack support, and thus cannot reach IPv6 sites directly. Instead, they must use IPv4 infrastructure to carry IPv6 packets. This is done using a technique known as tunneling, which encapsulates IPv6 packets within IPv4, in effect using IPv4 as a link layer for IPv6. Conversely, on IPv6-only Internet links, when access to IPv4 network facilities is needed, tunnelling of IPv4 over IPv6 protocol occurs, using the IPv6 as a link layer for IPv4.

Trainee will be learning the detailed information about the present day IPv4 networks, and know the how IPv6 solve the problems in IPv4 networks. Trainee will have hands on sessions in the lab how "Migration Strategy - Tunneling" is implemented on the routers in IPv4 and IPv6 domain. Trainees will be able to troubleshoot the problems in the inter-network connectivity in the Lab using the routers CISCO 2811 and the end devices.

 continued…

ABSTRACT Project Code No.24

Implementation of BGP in IPv4 networks.

Internet is a network of networks that consists of millions of private, public, academic, business, and government networks of local to global scope that are linked by a broad array of electronic and optical networking technologies. The Internet carries a vast array of information resources and services.

Different Network elements such as routers, switches, hubs etc., have been interconnected together for communication of data over the transmission media. The routers are connecting the WAN interfaces through the serial ports for data transmission and forwarding the packets using routing tables where as switches and hubs are connecting the LAN.

Border Gateway Protocol (BGP) is the protocol, which makes core routing decisions on the Internet. It maintains a table of IP networks or 'prefixes' which designate network reach-ability among autonomous systems (AS). It is described as a path vector protocol. BGP does not use traditional Interior Gateway Protocol (IGP) metrics, but makes routing decisions based on path, network policies and/or rule-sets. For this reason, it is more appropriately termed a reach-ability protocol rather than routing protocol.

Most Internet service providers must use BGP to establish routing between one another (especially if they are multi homed). Therefore, even though most Internet users do not use it directly, BGP is one of the most important protocols of the Internet. Compare this with Signaling System 7 (SS7), which is the inter-provider core call setup protocol on the PSTN. Very large private IP networks use BGP internally. An example would be the joining of a number of large OSPF (Open Shortest Path First) networks where OSPF by itself would not scale to size. Another reason to use BGP is multi homing a network for better redundancy either to multiple access points of a single ISP (RFC 1998) or to multiple ISPs.

Trainee will be learning the detailed information about the BGP protocol, its standards, functionality and internetworking issues in the networking domain. Trainee will have hands on sessions in the lab how the protocol is implemented in the ISP networks. Trainees will be able to troubleshoot the problems in the inter-network connectivity in the Lab using the routers CISCO 3640, CISCO 2811 and end devices.

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ABSTRACT Project Code No.25

Implementation of Dynamic routing protocols (EIGRP,OSPF) In IPv6 Network

Internet is a network of networks that consists of millions of private, public, academic, business, and government networks of local to global scope that are linked by a broad array of electronic and optical networking technologies. The Internet carries a vast array of information resources and services. Different Network elements such as routers, switches, hubs etc., have been interconnected together for communication of data over the transmission media. The routers are connecting the WAN interfaces through the serial ports for data transmission and forwarding the packets using routing tables where as switches and hubs are connecting the LAN.

IPv6 (**Internet Protocol version 6**) is a revision of the Internet Protocol (IP) developed by the Internet Engineering Task Force (**IETF**). IPv6 is intended to succeed IPv4, which is the dominant communications protocol for most Internet traffic as of 2012. IPv6 was developed to deal with the long-anticipated problem of IPv4 running out of addresses. IPv6 implements a new addressing system that allows for far more addresses to be assigned than with IPv4.

Each device on the Internet, such as a computer or mobile telephone, must be assigned an IP address in order to communicate with other devices. With the ever-increasing number of new devices being connected to the Internet, there is a need for more addresses than IPv4 can accommodate. IPv6 uses 128-bit addresses, allowing for 2^128, or approximately 3.4×10^38 addresses - more than 7.9×10^28 times as many as IPv4, which uses 32-bit addresses. The deployment of IPv6 is accelerating, with a World IPv6 Launch having taken place on 6 June 2012, in which major Internet service providers, especially in countries that had been lagging in IPv6 adoption, deployed IPv6 addresses to portions of their users.

Routers forwarding and switching the packets based on routing table, project clearly explains how the routing tables are prepared using different routing techniques, dynamic rouiting protocols like OSPF, EIGRP, etc., which are performing the job of updating the routing tables with different algorithms and different metric calculations, in the IPv6 domain.

Project mainly deals with the introduction to the next generation protocol IPv6, its necessity, IPv6 addressing, the neighbor router discovery process and configuration of the dynamic routing Protocols (OSPF, EIGRP) protocol on CISCO 2811 routers.

Trainee will have hands on sessions in the lab how an ISP scenario this protocols are implemented in IPv6 domain. Trainees will be able to troubleshoot the problems in the inter-network connectivity in the Lab using CISCO 2811 routers and end devices.

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ABSTRACT Project Code No.26

Redistribution of Dynamic Routing Protocols in IPv4 domain

Internet is a network of networks that consists of millions of private, public, academic, business, and government networks of local to global scope that are linked by a broad array of electronic and optical networking technologies. The Internet carries a vast array of information resources and services. Different Network elements such as routers, switches, hubs etc., have been interconnected together for communication of data over the transmission media. The routers are connecting the WAN interfaces through the serial ports for data transmission and forwarding the packets using routing tables where as switches and hubs are connecting the LAN.

A router performs redistribution when it uses a routing protocol to advertise routes that were learned by some other means. Those "other means" might be another routing protocol, static routes, or a direct connection to the destination network. For example, a router might be running both an Open Shortest Path First （OSPF） process and a Routing Information Protocol （RIP） process. If the OSPF process is configured to advertise routes learned by the RIP process, it is said to be "redistributing RIP."

Running a single routing protocol throughout the entire IP network is usually more desirable than running multiple protocols, both from a configuration management perspective and from a fault management perspective. However, the realities of modern networking frequently force the acceptance of multi protocol IP routing domains.

In most cases, the networks that are to be consolidated were implemented differently and have evolved differently, to meet different needs or merely as the result of different design philosophies. This diversity can make the migration to a single routing protocol a complex undertaking. In some cases, corporate politics can force the use of multiple routing protocols. And in a few cases, multiple routing protocols might be the result of network administrators who do not work and play well together.

Multi-vendor environments are another factor that can necessitate redistribution. For example, a network running the Cisco EIGRP might be merged with a network using another manufacturer's routers, which support only RIP or OSPF. Without redistribution, either the Cisco routers would have to be reconfigured to an open protocol, or the non-Cisco routers would have to be replaced with Cisco routers.

Trainee will be learning the detailed information about the Dynamic protocols such as RIP, OSPF, EIGRP etc.., its standards, functionality and internetworking issues in the networking domain. Trainee will have hands on sessions in the lab how the protocols are implemented in the ISP networks and their redistribution phenomenon. Trainees will be able to troubleshoot the problems in the inter-network connectivity in the Lab using the routers CISCO 3640, CISCO 2811 and end devices.

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ABSTRACT Project Code No.27

Implementation of VLAN, STP and their features in CISCO catalyst switches

In computer networking, **virtual local area network, virtual LAN or VLAN** is a concept of partitioning a physical network, so that distinct broadcast domains are created. This is usually achieved on switch or router level. Simpler devices only support partitioning on a port level (if at all), so sharing VLANs across devices requires running dedicated cabling for each VLAN. More sophisticated devices can mark packets through tagging, so that a single interconnect (trunk) may be used to transport data for various VLANs.

Grouping hosts with a common set of requirements regardless of their physical location by VLAN can greatly simplify network design. A VLAN has the same attributes as a physical local area network (LAN), but it allows for end stations to be grouped together more easily even if not on the same network switch. VLAN membership can be configured through software instead of physically relocating devices or connections. Most enterprise-level networks today use the concept of virtual LANs (VLAN). Without VLANs, a switch considers all interfaces on the switch to be in the same broadcast domain.

To physically replicate the functions of a VLAN would require a separate, parallel collection of network cables and equipment separate from the primary network. However, unlike a physically separate network, VLANs must share bandwidth; two separate one-gigabit VLANs that share a single one-gigabit interconnection can suffer reduced throughput and congestion. It virtualizes VLAN behaviors (configuring switch ports, tagging frames when entering VLAN, lookup MAC table to switch/flood frames to trunk links, and un-tagging when exit from VLAN.)

The **Spanning Tree Protocol (STP)** is a network protocol that ensures a loop-free topology for any bridged Ethernet local area network. The basic function of STP is to prevent bridge loops and the broadcast radiation that results from them. Spanning tree also allows a network design to include spare (redundant) links to provide automatic backup paths if an active link fails, without the danger of bridge loops, or the need for manual enabling/disabling of these backup links.

Spanning Tree Protocol (STP) is standardized as IEEE 802.1D. As the name suggests, it creates a spanning tree within a mesh network of connected layer-2 bridges (typically Ethernet switches), and disables those links that are not part of the spanning tree, leaving a single active path between any two-network nodes.

Trainee will be learning the detailed information about the basics of Switching, VLAN, STP its features, functionality and internetworking issues in the networking domain. Trainee will have hands on sessions in the lab how the VLAN's and STP are implemented in the ISP networks. Trainees will be able to troubleshoot the problems in the Lab using the CISCO 3400 catalyst switches and end devices.

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ABSTRACT Project Code No.28

Configuration of ZTE make Manageable Switches in the ISP domain

Internet is a network of networks that consists of millions of private, public, academic, business, and government networks of local to global scope that are linked by a broad array of electronic and optical networking technologies. The Internet carries a vast array of information resources and services.

The poor quality of the narrow band Internet over PSTN that connects us to the Internet cloud, the speed at which information (web pages, images etc) appears on your screen is slow compared to the latest technology available. Ultimately, Broadband will be the solution that will provide us all with a connection 100 times faster than the speed at which information arrives to you with a regular modem. Broadband Access technologies which encompass all evolving high speed digital technologies that provide consumers an integrated access to voice, high speed data, video on demand and interactive delivery services which are fundamental components of communication revolution. DSL technology is the best-suited technology for the existing copper cable network for home users as well as commercial users. Presently the major portion of Indian broadband connections relay on the DSL technology.

The Manageable switch ZTE make (Digital Subscriber Line Access Multiplexer) being the last mile and most vital element in the Broadband network and which acts as DSL multiplexer.

Trainee will be learning the detailed information about the basics of Broadband & DSL technology. This project will give exposure to BSNL broadband network elements like Manageable switches. Activities with ZTE DSLAM like loading software, creation of VLAN's, updating of routing tables, creation of uplink to Tier2, creation of customer profiles & trouble shooting the problems. It also covers the measurement of bandwidth from the end customer.