Empirical Study on Transmission System of Gazi Networks Ltd.(ICX)

By

Soumittra Roy
151-19-1725

This Internship Report is presented in partial fulfillment of the requirements of the Degree of Bachelor of Science in Electronics and Telecommunication Engineering .

Supervised By

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DAFFODIL INTERNATIONAL UNIVERSITY
DHAKA-1207, BANGLADESH

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Gazi Networks Limited

A member of **Gazi Group**

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To Whom It May Concern

We have the pleasure to certify **Soumittra Roy**, S/O Birendra Nath Roy is the student of **Daffodil International University** has successfully completed 7 weeks of internship programe at **Technical Department** in **Gazi Networks Limited from** 20 September to 14 November 2018.

During the internship period ,the concerned will given all opportunities tocome across most of the activities of the said department and gathered some practical experience. The internship skill and performance of **Soumittra Roy** was satisfactory during the internship period.

We wish his every success in life.

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APPROVAL

This Internship Report Titled "**Empirical Study on Transmission System of Gazi Networks Ltd.(ICX)**" is submitted by Soumittra Roy to the Department of Information & Communication Engineering, Daffodil International University, has been accepted as fit for the partial fulfillment of the condition for the Degree of B.Sc. (Hon's) in Electronics & Telecommunication Engineering & approved it in full swing. The Presentation will be held on December, 2018.

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DECLARATION

I hereby declare that this Internship Report has been done by me under the supervision of **Engr. Md. Zahirul Islam**, Assistant Professor, Department of ICE, Daffodil International University & Gazi Networks Ltd. I also declare that neither this report nor any part of it has been submitted away for award of BSc. in Electronics & Telecommunication Engineering degree.

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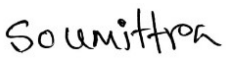

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Firstly, I am greatly thankful to the Almighty God for keep me the right path while observing the whole system.

The conviction spirit of achieving a goal has been completed successfully with the higher attribute & ascetic assiduous.

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I would like to express my heartiest gratitude to **Md. Taslim Arefin, Associate Professor and Head,** Department of Information and Communication Engineering, for his kind help to finish my internship and also to other faculty participants, the staffs of the ICE department of Daffodil International University.

Finally, I must acknowledge with due respect to my parents for supporting me constantly with patience .

Soumittra Roy

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Abstract

Interconnection Exchange (ICX) is a subscriberless telecommunication company which is directly connected with any overseas operator.The concept of Interconnection Exchange (ICX) can be a solution to the higher cost of service,inefficient handing of call,sub-optimal utilization of network problem. ICX is a step towards creation of a modern and efficient telecommunications infrastructure. With the introduction of ICX,operators can combine their services in the most flexible way. Gazi Networks Limited is one of the prominent ICX in Bangladesh. In Gazi Networks Limited good time in learning has been spent which was rewarded for best effort, learned to deal with different situations and experience of co-operate working environment. In this report, the transmission system of Gazi Networks Limited is illustrated. The empirical study and analysis is been mentioned in this report.

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Chapter 1

Introduction

1.1 Introduction

Telecom controller inaugurate an ICX (Interconnection Exchange) based interconnection governance in 2007 and with that proceeding a new period of interconnection in Bangladesh. The ICX has no subscriber and is not straight away connected with any exterior operator. So the operation of IGW's (International Gateway) and ANS's (Access Network Services) is also the passage of ICX's. With the ample data from BTRC and BTTB, it is viewing that the total worldwide traffic (both incoming & outgoing) choices from 35 to 45 million paid minutes per day and the inhume operator traffic is about 45 million per day. There is still specific some latent international operation extending from 3 to 4 million which is careful as proscribed movement. With the synchronous effort among the law applying supports, the new IGW and ICX machinists underneath the guide ranks of BTRC, a substantial volume of barred movement is affected back to the legal channel.It may be understood that international decision can rise abundant per annum because of the themes like growing numbers of Bangladeshi exiles outside the country. This will conjointly facilitate to reinforce the domestic tele-density and increase the business activities.

1.2 About Gazi Networks Ltd

GAZI Networks Limited is the interconnection exchange (ICX) operator licensed by Bangladesh Telecommunications Regulatory Commission (BTRC) for the routing of domestic and international voice traffic to and from ANS & IGW. Gazi Networks Limited will commercially launch in 12-04-2012, now the company is one of the leading ICX operations in Bangladesh. The company has highly skilled, hardworking, professional and talented manpower. The management team has also extensive experience in the telecom sector. GAZI Networks Limited has three exchange. They are located in Dhaka, Khulna, and Bogra .

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1.3 Company Profile

Name:	**Gazi Networks Ltd**
Address:	Head Office 25, Segun Bagicha (1st Floor) Dhaka-1000, Bangladesh
Telephone:	+88-01966604567
Email:	info@gazinetworks.com
Website:	http://www.gazinetworks.com

1.4 Objective of the Report

The main objectives of this report are as follows:

1. To recognize the transmission network architechture of Gazi networks Ltd.
2. To look at the SDH Network that is employed in telecommunication principally.
3. To recognize totally different transmission protocol.
4. Operating And watching Alarms in Tejas NMS System8.

1.5 The GSM Network Architecture

The GSM specification as outlined within the GSM specifications are often sorted into four main areas:

- Mobile station (MS)
- Base-Station Subsystem (BSS)
- Network and Switching Subsystem (NSS)
- Operation and Support Subsystem (OSS)

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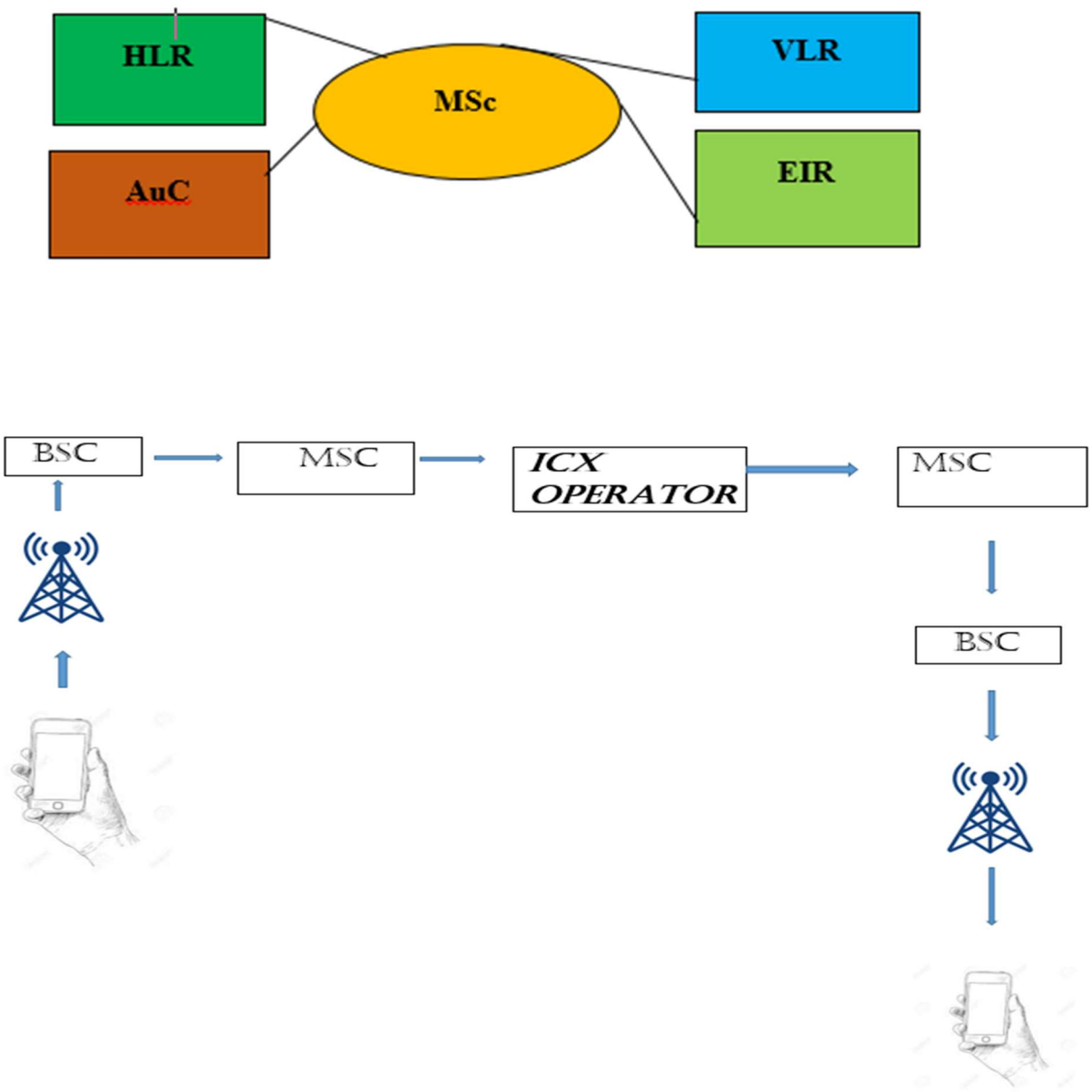

Figure 1.5: GSM Network Architecture (Between Different Operator)

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Mobile station:

Mobile stations (MS), mobile instrumentation (ME) or as they're most generally identified, cell or mobile phones square measure the section of a GSM cellular network that the user sees and operates. In recent years their size has fallen dramatically whereas the amount of practicality has greatly magnified. an additional advantage is that the time between charges has considerably magnified. There square measure variety of components to the mobile phone, though the 2 main components square measure the most hardware and also the SIM. The hardware itself contains the most components of the movable as well as the show, case, battery, and also the physics wont to generate the signal, and method the info receiver and to be transmitted. It additionally contains variety referred to as the International Mobile instrumentation Identity (IMEI). this can be put in within the phone at manufacture and "cannot" be modified. it's accessed by the network throughout registration to test whether or not the instrumentation has been rumored as purloined. The SIM or Subscriber Identity Module contains the knowledge that has the identity of the user to the network. It contains square measure form of info as well as variety referred to as the International Mobile Subscriber Identity (IMSI).

Base Station Subsystem (BSS):

The Base Station scheme (BSS) section of the GSM spec that's essentially related to communication with the mobiles on the network. It consists of 2 elements:

Base Transceiver Station (BTS):

The BTS utilized in a GSM network includes the sender receivers, and their associated antennas that transmit and receive to directly communicate with the mobiles. The BTS is that the shaping part for every cell. The BTS communicates with the mobiles and therefore the interface between the 2 is understood because the Um interface with its associated protocols.

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Base Station Controller (BSC):

The BSC forms the following stage back to the GSM network. It controls a gaggle of BTSs, and is commonly co-located with one in every of the BTSs in its cluster. It manages the radio resources and controls things like relinquishment among the cluster of BTSs, allocates channels and also the like. It communicates with the BTSs over what's termed the Abis interface.

Network Switching Subsystem (NSS):

The GSM system design contains a range of various components, and is commonly termed the core network. It provides the most management and interfacing for the full mobile network. the most important components among the core network include:

Mobile Services Switching Centre (MSC):

The main component at intervals the core network space of the general GSM specification is that the Mobile change Services Centre (MSC). The SM acts sort of a traditional change node at intervals a PSTN or ISDN, however conjointly provides further practicality to modify the wants of a mobile user to be supported. These embody registration, authentication, decision location, inter-MSC handovers and decision routing to a mobile subscriber. It conjointly provides AN interface to the PSTN in order that calls are often routed from the mobile network to a phone connected to a line. Interfaces to different MSCs square measure provided to modify calls to be created to mobiles on completely different networks. As mobile phones move, it is important for the MSC to determine each phone’s location to effectively facilitate routing communications between them. For this task, the MSC works with a large database known as the home location register (HLR), which stores relevant location and other information for each mobile phone. Because accessing the HLR uses many network resources, most operators employ visitor location registers (VLRs). These are relatively smaller databases, which are integrated with the MSC. Some carriers deploy one VLR per MSC, while others set up one VLR to serve multiple MSCs.

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Home Location Register (HLR):

This information contains all the executive data regarding every subscriber together with their last illustrious location. during this manner, the GSM network is in a position to route calls to the relevant base station for the MS. once a user switches on their phone, the phone registers with the network and from this it's attainable to see that BTS it communicates with so incoming calls is routed fittingly. Even once the phone isn't active (but switched on) it re-registers sporadically to confirm that the network (HLR) is alert to its latest position. there's one HLR per network, though it should be distributed across varied sub-centres to for operational reasons.

Visitor Location Register (VLR):

This contains designated data from the HLR that permits the chosen services for the individual subscriber to be provided. The VLR may be enforced as a separate entity, however it's unremarkably accomplished as associate degree integral a part of the MSc, instead of a separate entity. during this method access is created quicker and a lot of convenient.

Equipment Identity Register (EIR):

The EIR is that the entity that decides whether or not a given mobile instrumentation could also be allowed onto the network. every mobile instrumentation includes a variety called the International Mobile instrumentation Identity. This variety, as mentioned higher than, is put in within the instrumentation and is checked by the network throughout registration. Dependent upon the data command within the EIR, the mobile could also be allotted one in every of 3 states - allowed onto the network, barred access, or monitored just in case its issues.

Authentication Centre (AuC):

The AuC is a protected database that contains the secret key also contained in the user's SIM card. It is used for authentication and for ciphering on the radio channel.

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Gateway Mobile Switching Centre (GMSC):

The GMSC is that the purpose to that a Maine terminating decision is ab initio routed, with none data of the MS's location. The GMSC is so responsible of getting the MSRN (Mobile Station Roaming Number) from the HLR supported the MSISDN (Mobile Station ISDN range, the "directory number" of a MS) and routing the decision to the proper visited MS. The "MSC" a part of the term GMSC is dishonest , since the entry operation doesn't need Associate in Nursingy linking to an MS.

SMS Gateway (SMS-G):

The SMS-G or SMS entrance is that the term that's wont to jointly describe the 2 Short Message Services Gateways outlined within the GSM standards. the 2 gateways handle messages directed in several directions. The SMS-GMSC (Short Message Service entrance Mobile shift Centre) is for brief messages being sent to Associate in Nursing American state. The SMS-IWMSC (Short Message Service Inter-Working Mobile shift Centre) is employed for brief messages originated with a mobile on it network. The SMS-GMSC role is comparable thereto of the GMSC, whereas the SMS-IWMSC provides a hard and fast access purpose to the Short Message Service Centre.

Operation and Support Subsystem (OSS):

The OSS or operation support scheme is a component inside the general GSM spec that's connected to parts of the NSS and also the BSC. it's accustomed management and monitor the general GSM network and it's additionally accustomed management the traffic load of the BSS. It should be noted that because the variety of Bachelor of Science will increase with the scaling of the subscriber population a number of the upkeep tasks square measure transferred to the BTS, permitting savings within the price of possession of the system. The OSS is the functional entity from which the network operator monitors and controls the system.

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1.6 Summary of the Report

The objective of this berth is to enhance an efficient information in gear mechanism of Gazi Network. Within the first chapter, I have got termed the main points & objective Associate in Nursing overall read that I am visiting instrument throughout these berth work and that i would describe the background of Gazi Network.

The Second Chapter**,** mainly concerning about Bangladesh Telecom Network Topology,the structure of Network. Then Network topology designate. Although style of ICX (Interconnection exchange)

The Third chapter is concerning, of Transmission System here elaborates of definition, the parameters of data transmission and TDM Transmission and Topology of Transmission. A minimum variety of transmission of IGW and ICX

The Fourth Chapter is Geographical Device Interfaces

The last one is Chapter ***Five*** that is Alarms & Events Function analysis and ***Chapter six*** Conclusion.

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Chapter 2

Network Architecture Of Gazi Networks Ltd.

2.1 Transmission Process of ICX :

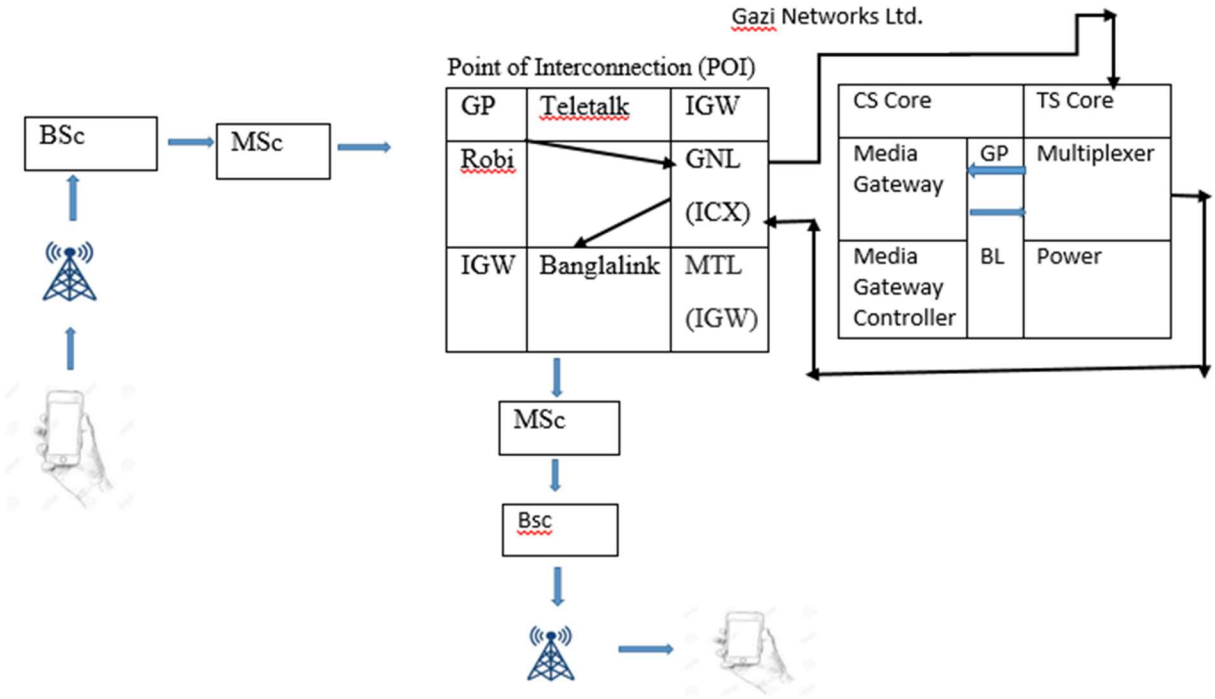

Figure 2.1: Call transmission system in Gazi Networks Limited (GNL)

Point of interconnection in telecommunication means that the physical interface between media gateways of the 2 medium firms.For example, if POI is not consecrated between GP and Banglalink then any person using GP sim will not be able to make voice calls with any person using Banglalink Sim and vice versa. Therefore, POI is important to make voice calls between different operators.In telecommunications some extent of interface (POI) is employed to point out the physical interface between 2 totally different carriers, like a neighborhood exchange carrier

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(LEC) and a wireless carrier, or associate degree LEC associate degreed an IntereXchange Carrier (IXC). This demarcation purpose usually defines responsibility additionally as serving as some extent for testing. In several cases, a dish exists as some extent of demarcation ("DEMARC") at intervals associate degree LEC building, and is established underneath "colocation" agreements. an extended distance, wireless, or competitive native carrier "rents" area at the native phonephone (usually bicycle switch) location.This area is physically a "cage" during which a tool for interconnecting telecommunication services is put in. This device was originally a wire frame with one aspect being accessed by the LEC, and therefore the alternative aspect accessed by the opposite carrier. In recent years, "electronic frames" like digital cross connect systems are used as dish devices. native exchange services are ordered from the native phonephone carrier UN agency delivers the service to their aspect of the dish. the opposite carrier then arranges to its own facilities (fiber, or alternative form of transport) into the dish and transports the service to its own network facilities.

2.2 Telecom Network Topology

Structure:

As term within the National Telecommunication Law 1998 and check Extended Distance Telecommunication Facility (ILDTS) Policy 2007, all mobile employees is to interconnect through Interconnection speak (ICX) and international calls to be same by International Door (IGW) that is to be near the mobile and glued the hands complete the ICXs. The Interconnection Exchange (ICX) can receive all calls from the mobile and static operators whenever the decision is thru to different network and can allow it to the determination network if the decision is proscribed, and can allow to the IGWs the decision is international. ICX also will bring calls received from IGWs wherever the decision is meant. Below demonstrate (fig-2.2) the erection of interconnection between totally different edges.Gazi Networks Ltd had got licensed on 12 April 2012 .

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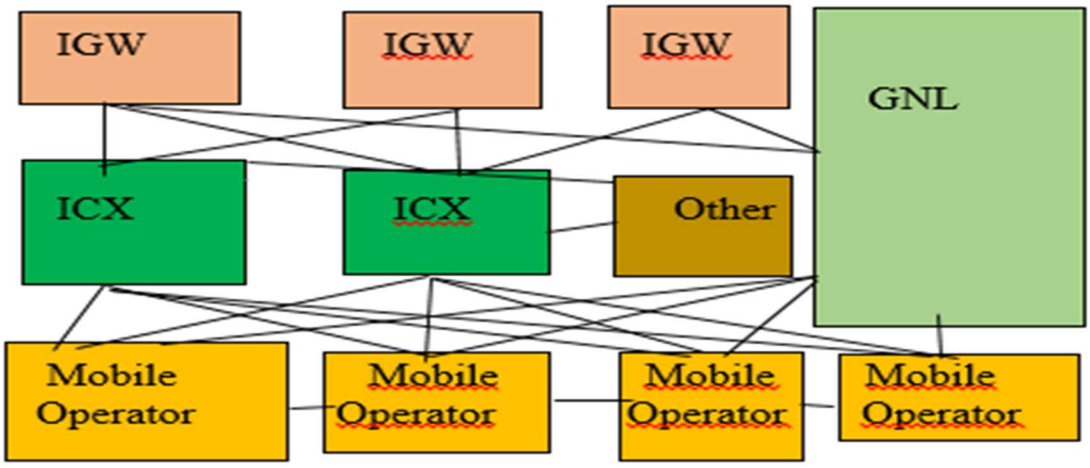

Figure 2.2: Network Topology

This is an ICX (Interconnection Exchange) Telecom Company in Bangladesh. The ICX has no subscriber and is not also directly connected with any overseas operator. So the traffic of IGW's (International Gateway) and ANS's (Access Network Services) is also the traffic of ICX's. There is still some dormant international traffic ranging from 3 to 4 million which is considered as illegal traffic. With the coordinated effort among the law enforcing agencies, the new IGW and ICX operators under the guide lines of BTRC, a considerable volume of illegal traffic can be routed back to the legal channel. It can be assumed that international call will increase considerably every year due to the factors like increasing numbers of Bangladeshi expatriates out side the country. This will also help to enhance the domestic tele-density and increase the business activities.An icx operator undertake Routing all international incoming calls received from International Gateway (IGW) and terminates up to the operator for both mobile and fixed lines. Routing all international outgoing calls received from the operator and terminates up to IGW. Routing all inter-operator calls with in the country for both mobile and fixed lines. On 25 February 2008 the Bangladesh Telecommunications Regulatory Commission awarded licenses for two Interconnection Exchanges (ICX).

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2.3 Network topology:

Network construction shall be supported 3 layers with decorous instrumentality and technologies subject to alteration as and once necessary.The first layer is IGWs, which will be joined to International Long Distance Cable (ILDC) networks and ICX. IGWs will have satellite earth position or VSAT as backup until substitute ILDC is existing. The second layer is the ICX, which will be joined with IGWs and entrance network service (ANS) hands. IPTSPs will be connected to NIX for inter IPTSP for internal voice traffic. International and inter operators internal say traffic will be directed finished ICXs. The third Layer is the ANS operators who provide facilities through end users straight. This layer is to endorse the connectivity between the ICX/NIX and the subscribers.

2.4 Interconnection Exchange (ICX):

"Interconnection Exchange (ICX)" is the moving structure which provides interconnection among telecommunication networks of hands and permits monitoring, lawful interception (LI) services and traveling number convenience. The number of ICX hands are going to be strong-minded by the govt as per scenario of the telecommunication region of Bangladesh. Position of the ICXs can principally be at national capital. additional ICX are going to be setup in different locations liberated on traffic volume and to permit any rural folks to be joined with the network as and once essential. ICXs can have major support property controlled for international setups over ILDC network.IGWs can have bodily link with ICXs. ICXs can improve and conserve interconnection services to tie the IGWs to ICXs and ICXs to ANS hands via their POPs. Belowhere show the figure Overall style .

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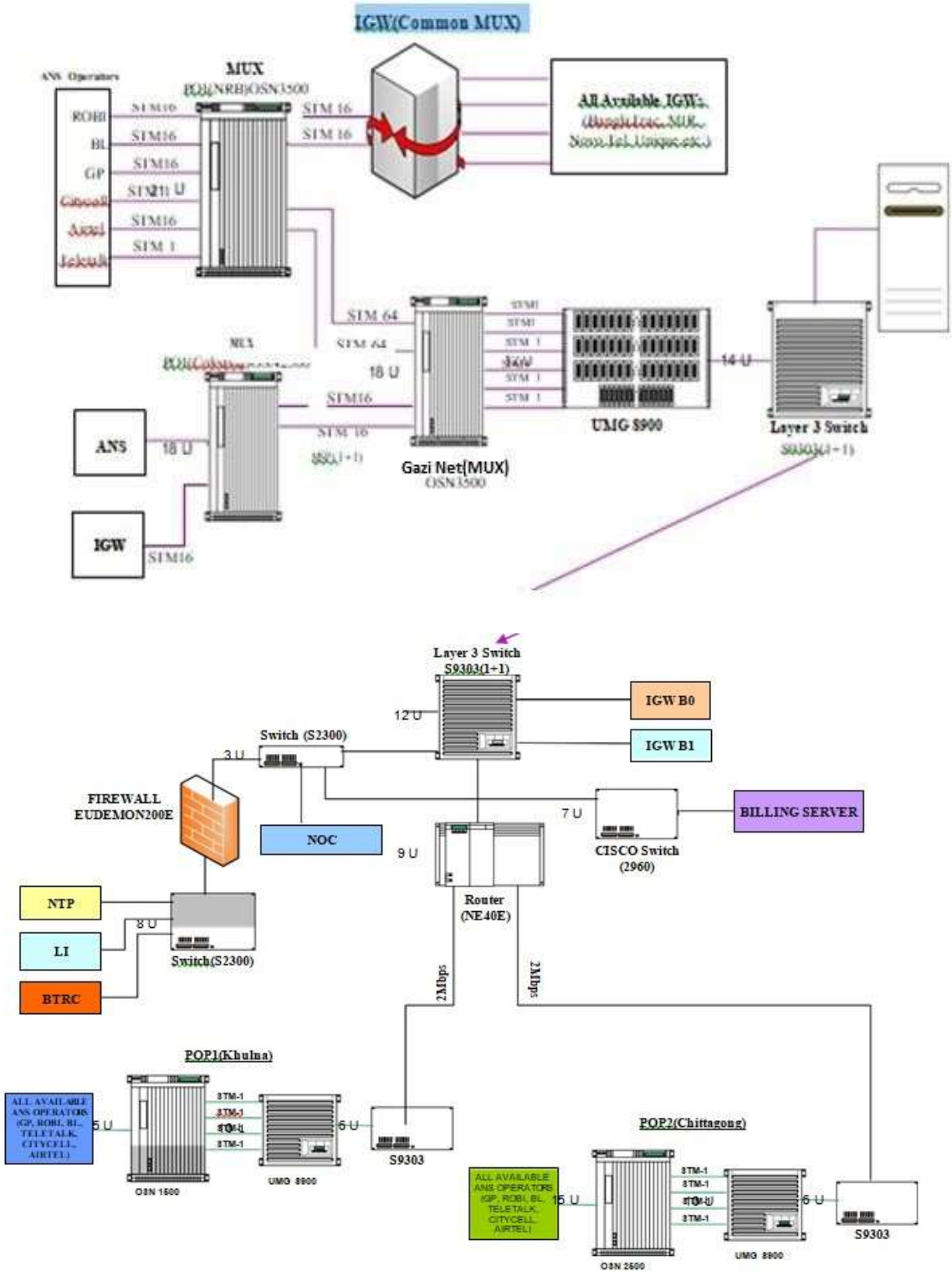

Fig 2.3 Interconnection Exchange

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Chapter 3

Transmission of Telecommunication

3.1 Definition of transmission in all aspects

Transmission:

In telecommunications, transmission (Tx) is that the method of causing associated propagating an equal or digital info surrender a physical steeplechase or point-to- multipoint transmission average, each bound, glass fiber or wireless. Transmission of a pure mathematics message, or of a digitized equivalent signal, is recognized as numerical message.

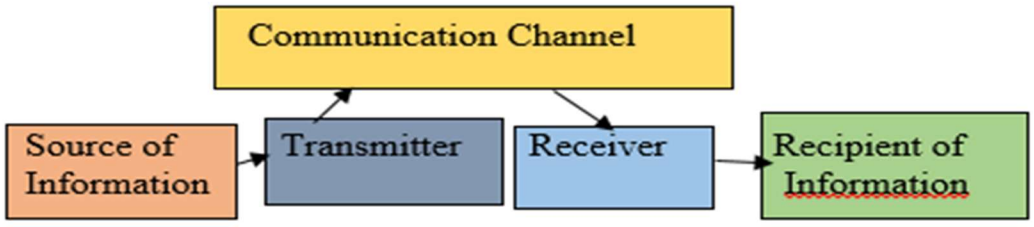

Fig 3.1: Transmission System.

In telecommunications, show (TX) is that the approach of causing and spreading identical or ordinal information signal over a corporal point-to-point or point-to multipoint diffusion average, either certain, visual fiber or wireless.Transmission of a pure mathematics message, or of a digitized alike sign, is recognized as ordinal communication.

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3.2 PDH Basics

Before 1970, world's telecommunication systems were originated on single streak, voice rate, and every one influences were over bent copper pair. Throughout early 1970's ordinal broadcast schemes began to look victimisation Pulse Code Inflection (PCM). PCM permits analogue waveforms like language to be restored into a binary arrangement appropriate transmission over extended distances via digital schemes. PCM everything by sampling the similarity signal at regular breaks, assignment another worth to the instance then transfer this value as a binary stream. This procedure continues to be in use these days and procedures the basis of just about all the transmission schemes that we have a tendency to presently use.

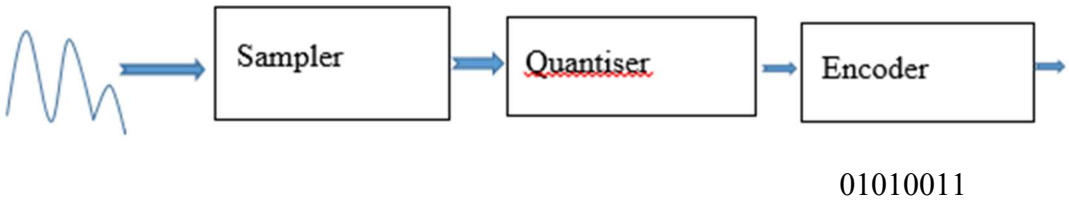

Fig 3.2: Basic PDH

3.3 PDH Networks

PDH signal is organized in such how that, it's terrible to excerpt one two Mbit/s signal from within a better order (say a hundred and forty Mbit/s) torrent. so as to irritated connect two Mbit/s signal among one transmission organization and another, it should be de-multiplexed back sad to its main rate initial. This procedures a electronic devicedrop.

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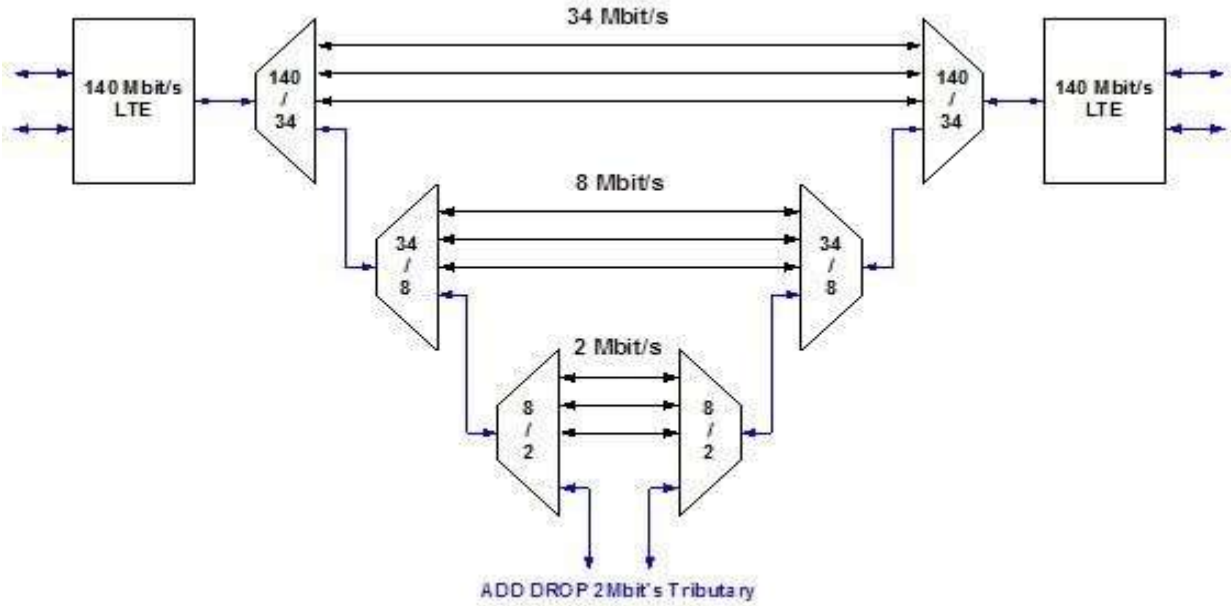

Fig 3.3: PDH Network

More usable area & management is preoccupied in stands in node sites by these gear mountain & cause further maintenance-associated snags. gear in several graded levels synchronic from a varied supply and at a disparate rate, which can cause duration glitches which will reason errors For an easy a pair of one thousand thousand sign, jumping desires to be done the least bit heights, that whole up the separate applied scientist system. This clues to giant totals of bodily large persuade wiring. Effective use of information measure is earned in PDH because of the detail that, it's input little higher than. however this bounds the organization ability of PDH. Involuntary storage of route data isn't obtainable that results in the requirement of precise paper annals to avoid glitches. it's unlikely to remotely prepare gear and therefore the worry nursing is justincomplete to journalism loss of efforts. Guard of the applied scientist methods is often victimization 1+1 guard and existing at the upper PDH levels i.e.140 Mbit/s and overhead solely.

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3.4 Summary of PDH Limitations

Interconnection amongst different nationwide schemes were difficult (European/North American). Clocking in dissimilar hierarchy levels are complete separately, so slips likely. Multiplexer mountain' is expensive and stubborn. Imperfect running functionality. Path Defense obtainable at advanced rates only. While likening to today' values, more Disposed to to liabilities. All these schemes works acceptable in a stand-alone ladder. But it does brand global inter-connection very problematic and expensive. This was the main reason for the growth of a new globally agreed normal. More usable space & power is taken up in racks in node sites by these equipment mountain & cause more maintenance-associated problems. Equipment in different hierarchical levels synchronised from a different source and at a different rate, which may lead to clocking problems that can cause errors. For a simple 2 Meg signal, jumpering needs to be done at all levels, that make up the individual transmission system. This leads to large amounts of physically bulky coax wiring. Efficient use of bandwidth is achieved in PDH due to the fact that, it is having small overhead. But this limits the management ability of PDH. Automatic storage of route information is not available which leads to the requirement of accurate paper records to avoid problems.It is not possible to remotely configure equipment and the alarm monitoring is only limited to reporting loss of inputs. Protection of the transmission paths is generally using 1+1 protection and available at the higher PDH levels i.e.140 Mbit/s and above only. Clocking in different hierarchy levels are done individually, so slips possible. 'Multiplexer mountain' is costly and inflexible.

Origin of SDH :

As gotten from the previous post about PDH, PDH is a practical but faulty scheme. At the start it was the best available technology and was a vast leap forward in telecom broadcast, As a end of development in the field of silicon fries and combined microchips, client request soon delivered the need to current a new and better system

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It was predictable to resolve the current bounds of PDH. As a next stage, Bell core obtainable SYNTRAN (Synchronous Transmission) system. However this was only a evolution system. Soon it was relieved with SONET (Synchronous Optical Network).Initially SONET might only carry the ANSI (American National Standards Organization) bit tolls i.e. 1.5, 6, 45 Mbit/s. Goal of the outline was to deliver easier total interconnection, Hence, SONET was modified to carry the European usual bit rates of 2, 8, 34 & 140Mbit/s. Initial specifications were developed back in 1985 in the USA under the term SONET. As a new digital optic transmission system, SONET was to provide key advantages over plesiochronous digital hierarchy (PDH), while still being able to transport PDH. ITU-T standardised SDH based on SONET. SONET and SDH are interoperable. SDH is suitable as a transmission system for broadband ISDN and for transporting ATM cells, PDH signals, Ethernet aggregations, SAN signals and other communication signals. The acronym SDH stands for Synchronous Digital Hierarchy and refers to a multiplex technology used in telecommunications. SDH allows data streams with low bit rates to be combined into high-rate data streams. Since the entire network is synchronous, individual bit streams can be embedded into and extracted from high-rate data streams relatively easilyOn the physical layer, digital synchronous hierarchy uses connections based on copper lines, fibre optics or satellite and directional radio links. Distorted or muted signals can be refreshed via regenerators. On the superior layer, multiplexers combine the signals into high-bit-rate data streams. Finally, virtual containers transport the individual containers of usable data and control mapping of the various signals of different bit rates.

In 1989 the ITU-T (International Telecommunications CombinationTelecommunication's tuning section), published references which roofed the values for SDH. These stood accepted in North America by ANSI (SONET is now supposed of as a subset of SDH), creation SDH a truly global normal

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3.5 Overview:

The SDH regular defines a quantity of 'Containers' every compliant to AN current PDH input rate. Material from the external PDH signal is settled into the pertinent bottle. every flask then has some director material called the 'Path Overhead' (POH) and artefact bits value-added to that. the trail higher than bytes enable the theme employee to realize finish to finish treatment of areas like error image, alarm sign and presentation nursing knowledge. The ampoule and also the path higher than calm kind a 'Virtual Container' (VC). thanks to clock part vicissitudes, the beginning of the clients' PDH knowledge may not accord with the jump of the SDH edge.

Documentation of the jerk of the PDH data is attained by count a 'Pointer'. The VC and its relevant cane cool form a 'Tributary Unit' (TU) Branch units are then multiplexed together in stages (Tributary User Group 2(TUG-2) - Tributary User Group 3 (TUG-3) - Virtual Container 4 (VC-4)), to form an Executive Unit 4 (AU-4). Extra stuffing, canes and costs are added thru this procedure. This AU4 in effect covers 63 x 2 Mbit/s channels and all the control info that is required. Finally, Section Expenses (SOH) are added to the AU-4.These SOH's cover the control bytes for the STM-1 unit including of inclosing, section exhibition monitoring, keep and operational switch info. An AU-4 plus its SOH's calm form and STM-1 passage edge. SDH combines n signals with a bit rate of b to form data streams with bit rates of n x b on a synchronously clocked network. Unlike PDH, the individual transmission paths have minimal clock discrepancies. The synchronous mode of operation allows low-order multiplex systems, such as communication links for telephone systems, to be inserted in higher hierarchy levels and then removed again via add and drop. In accordance with the levels defined by the standard, SDH recognises different hierarchies such as STM-1, STM-4, STM-16 or STM-64 (155 MBits, 622 MBits, 2,488 MBits, 9,953 MBits) and more. About five per cent of the gross data rate is reserved for OAM tasks (Operations, Administration and Maintenance). The data is transparently transported over the SDH network in containers.

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3.6 Graphical SDH Multiplexer Structure

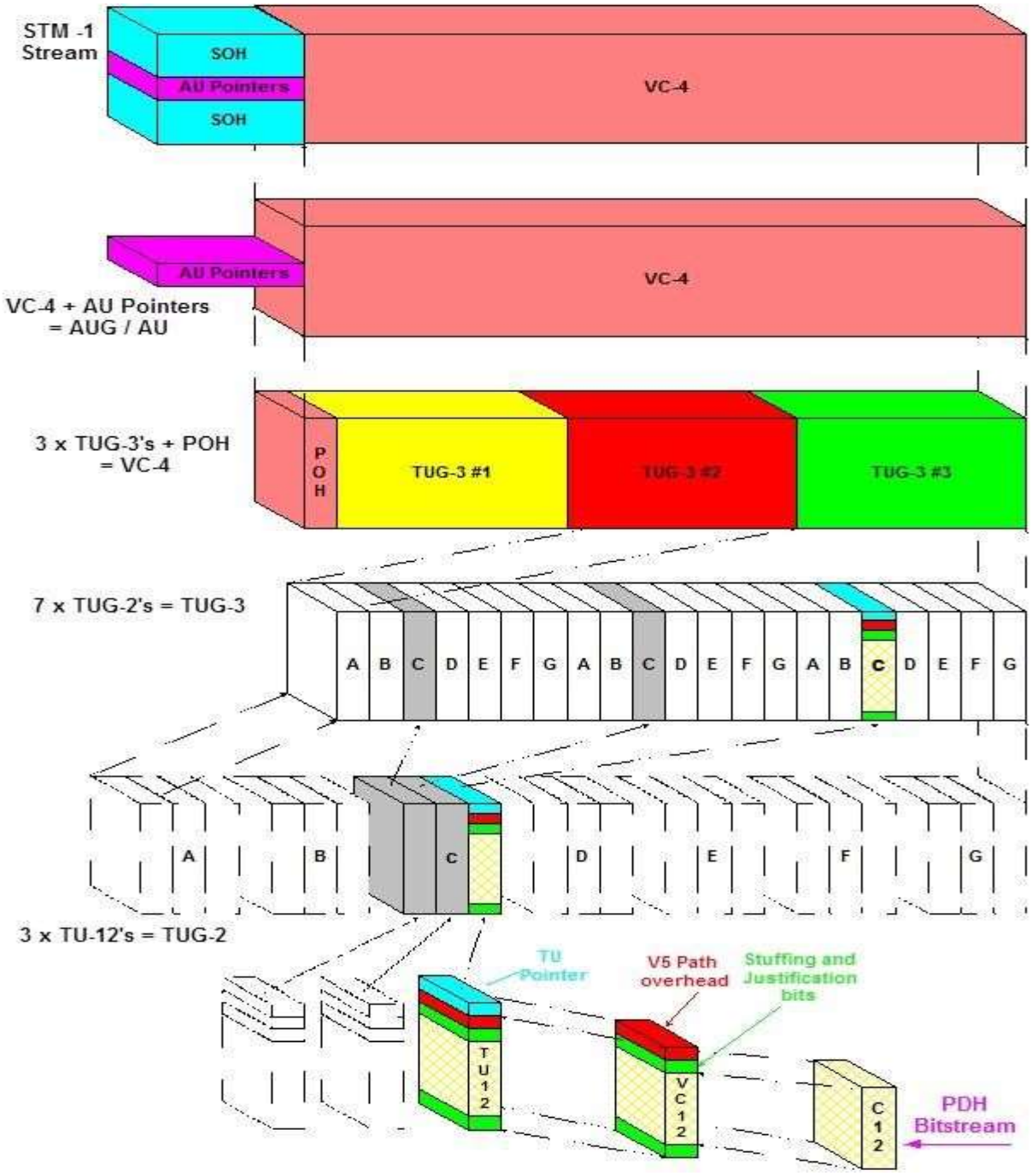

Fig 3.6: Graphical SDH Multiplexer Structure

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3.7 Full SDH Multiplexer Structure

Drawing below complaints full SDH Multiplexing building. PDH signs enter on the precise into the relevant container and development crossways to the left finished the many procedures to procedure the STM edge.

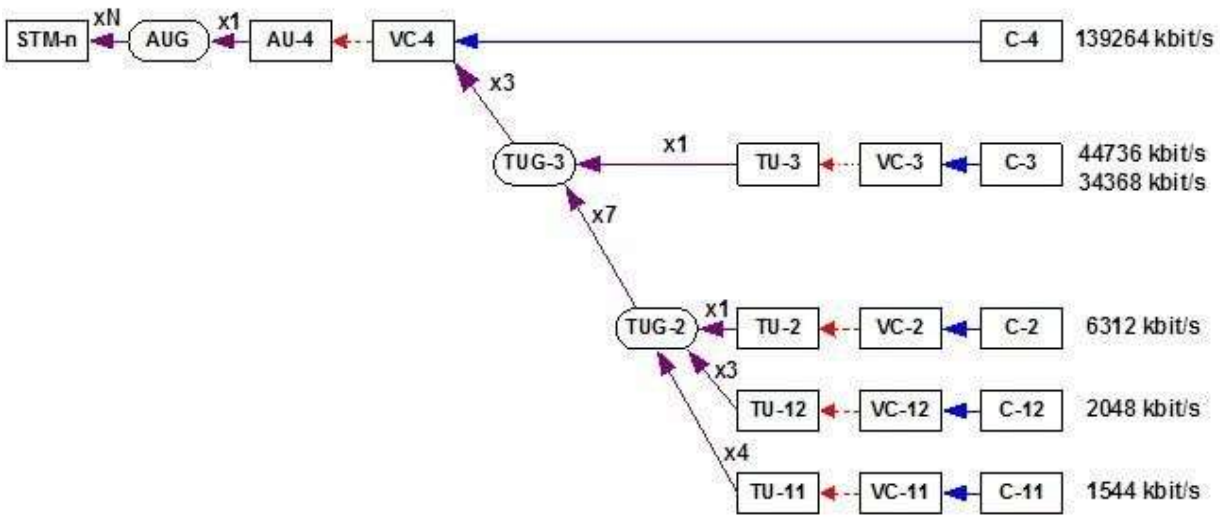

Fig 3.7: Full SDH Multiplexer Structure

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3.8 Basic SDH Network Topology

SDH networks square measure sometimes positioned in vulnerable jewels. This has the profit of giving defense to the facts, by if an alternate manner for it to transportable over within the occasion of drugs or network flop. All facet of the loop (known as A and B, or rarely, East and West), covers of a separate take and receive gravel. These threads can take various physical tracks to the reserved finish gear to minimalize the chance of eachhabits deteriorating at the similar time. The SDH gears have the flexibility to notice the difficult and can habitually switch to the substitute route.

3.9 Features and Advantages of SDH

In earlier post we've got seen the constraints of PDH. currently allow us to see the rewards of SDH. SDH licenses the blending of the present European and North yankee PDH bit rates. All SDH gear is predicated on the utilization of one chief reference clock basis & thus SDH synchronous. Friendly with the bulk of gift PDH bit rates SDH runs for extraction/insertion, of a lower directive bit rate from a fancy order combination torrent, while not the requirement to de-multiplex in phases. SDH permits for joined management employing a central network management. SDH delivers for a regular optical line therefore permitting the inter-working of various manufacturer's gear. Increase in network reliability because of reduction of essential equipment/jumping.

3.10 Mbps FRAME - FORMAT

Let us study about usual 2 Mbps frame format G.704 / G.732

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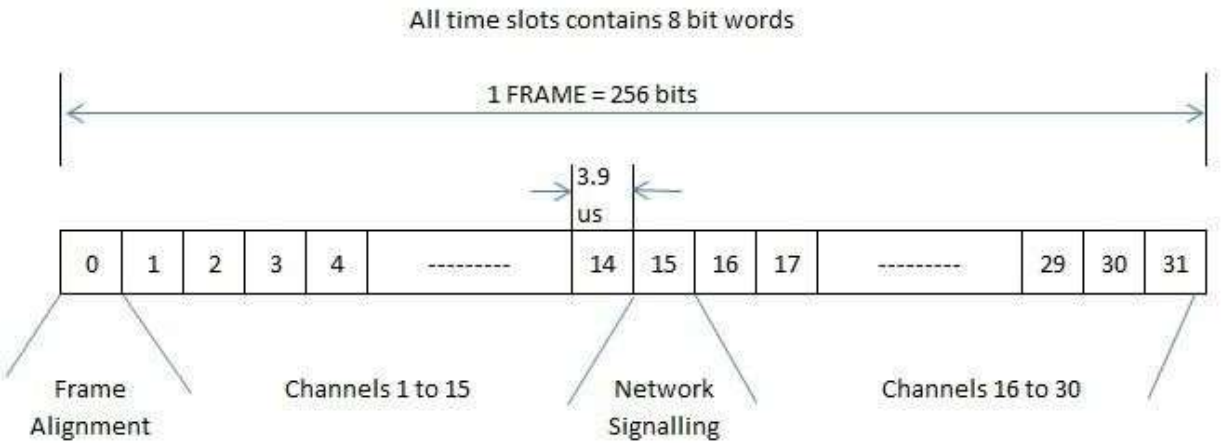

Fig 3.10: Mbps Frame - Format

Each two Mbps frame includes 256 bits (32 timeslots) at a repeat rate of eight kb/s. the primary timeslot i.e. TS zero is unbroken for framing, error-checking and alarm signs. Remaining thirty one canals will be used for knowledge circulation. Individual timeslots / channels will be used for sixty four kbps PCM. often TS16 is reserved for motioning. for instance - ISDN prime rate D channel sign (Q.931). the beginning of thirty two timeslot frame is supposed by the frame arrangement word 0011011 in TS0 of differentframes. within the different edge, bit two is about to 1 and bit three covers the assist for transfer alarm to the so much finish. If 3 edge alignment words in four ar standard in error, then the receiving fatal declares loss of frame arrangement and pledges a organic compound manner.

3.11 Positive Justification in PDH

Let us read the concept of optimistic justification

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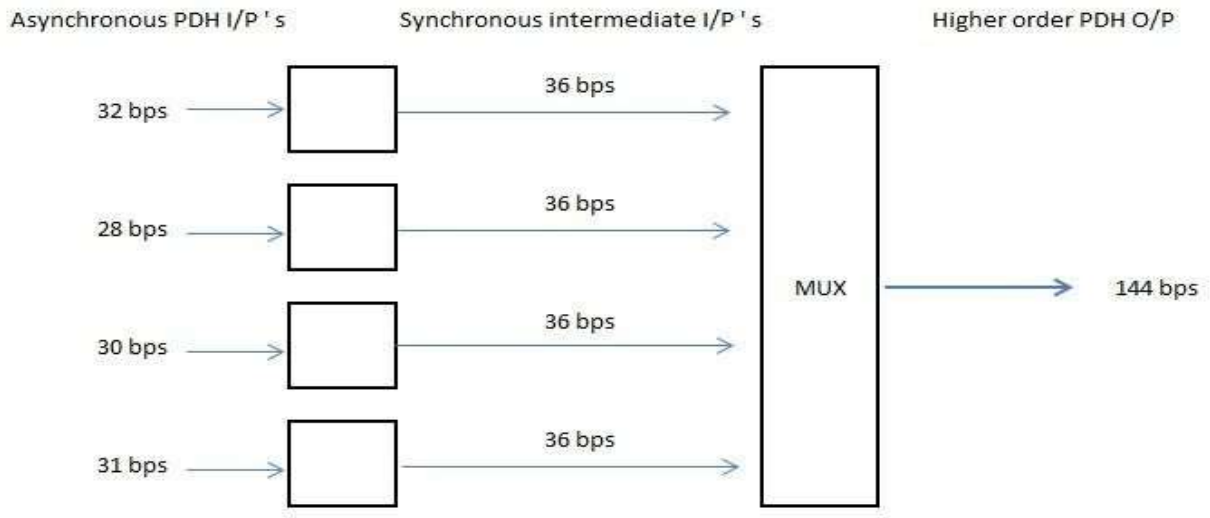

Fig 3.09: Positive Justification PDH

The diagram higher than proves the essential principle of useful justification. There ar four asynchronous inputs. All ar taken to same frequency (i.e. thirty six bps) by addition appropriate variety of idle bit to every branch. currently of these four synchronous thirty six rate inputs ar multiplexed to urge the assembly rate of a hundred and forty four rate. Admires of this method takes home at the Diamond State electronic device. From every branch signs, redundant bits ar detached to recover the distinctivesignal. These idle bits ar referred to as "padding" or "justification" bits. The advanced order stream are going to be taking frame assembly and framing bits in order thatinserted tributary bits is higher.

3.12 Line Rates and Hierarchy in SDH & SONET

The first hierarchy equal for SDH is about at one hundred fifty five,520 Kbit/s/s. this can be referred to as a Synchronous Carriage Module one (STM-1). Higher levels ar solely multiples of the primary equal

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Line Rates & Hierarchy

SDH	SONET	LINE RATE
STM-0	**STS-1/OC-1**	**51.84 Mb/s**
STM-1	**STS-3/OC-3**	**155.52 Mb/s**
STM-4	**OC-12**	**622.08 Mb/s**
STM-16	**OC-48**	**2.488 Gb/s**
STM-32	**OC-192**	**9.96 Gb/s**

Fig 3.10: Line Rates and Hierarchy in SDH & SONET

SDH permits for several PDH input rates to be charted into ampules as exposed below:

Ampule C11: 1544 Kbit/s (1.5 Mbit/s)

Ampule C12: 2048 Kbit/s (2 Mbit/s)

Ampule C2: 6312 Kbit/s (6 Mbit/s)

Ampule C3: 49,536 Kbit/s (45 & 34 Mbit/s)

Ampule C4: 139,264 Kbit/s (140 Mbit/s)

As may be seen when this chart, the sole PDH degree that's not strengthened by SDH is eight Mbit/s. SDH Concatenation, Interview minutes on Contiguous concatenation . There square measure 2 styles of concatenation in SDH.

They are conterminous concatenation and Simulated concatenation. during this article, allow us to study regardingcontiguous concatenation.

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3.13 Contiguous Concatenation

The SDH frame may be supposed of as transport lorry. the information to be elated is placed within the VC-4 'Container'. this can be then mounted to the sol 'Cab unit' that 'drives' the facts to its terminus. the utmost carrying volume of the vehicle is resolute by the dimensions of the 'container'. Then though the SDH sign is a hundred and fifty fiveMbit/s in size, the chief single circuit that may be unfold at anyone time by the client is proscribed to the dimensions of the VC-4 i.e. 140 Mbit/s.

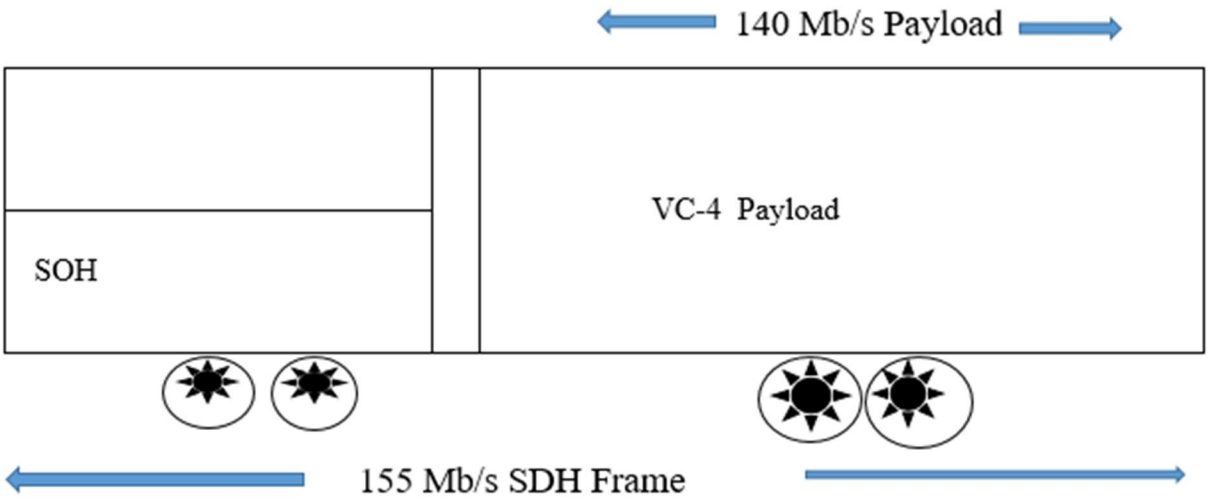

Fig 3.11: Contiguous Concatenation

When using advanced tolls of SDH (STM-4, STM-16 etc.), various 'containers' and 'cabs' are added one after added, to form a more van. The customer is still partial to a distinct trip size of 140 Mbit/s conversely, since each separable 'container' is restful the same size (140 Mbit/s). They can still transmit multiple 140 Mbit/s circuits simultaneously. Standard STM-4 manufacture is given below –

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The curb of one hundred forty Mbit/s per individual tour isn't a economical means of handling information measure. so as to powerless this limitation, a technique of uniting 'containers' composed has been industrial that is termed 'Concatenation .

3.14 STM-1 Frame Structure & Section Overhead

STM-1 Frame Building

STM-1 frame covers 2430 bytes of fabric. every computer memory unit contains eight knowledge jiffs (i.e. a 64kbit/s channel). amount of STM-1 transport edge is 125ms. the amount of edges per second is one second / 125ms = 8000 Edges per second. So, rate of STM-1 edge is calculated as follows: - eight bits x 2430 bytes x 8000 per further = a hundred and fifty five,520,000 bits/s or a hundred and fifty five Mbit/s.

STM-1 edge sliced up into nine segments, stacked on high of all alternative as shown within the drawing below. The bits begin at the best left with computer memory unitquantity one and area unit recite from left to correct and high to bottom. they're set as 270 columns across and nine rows unhappy.

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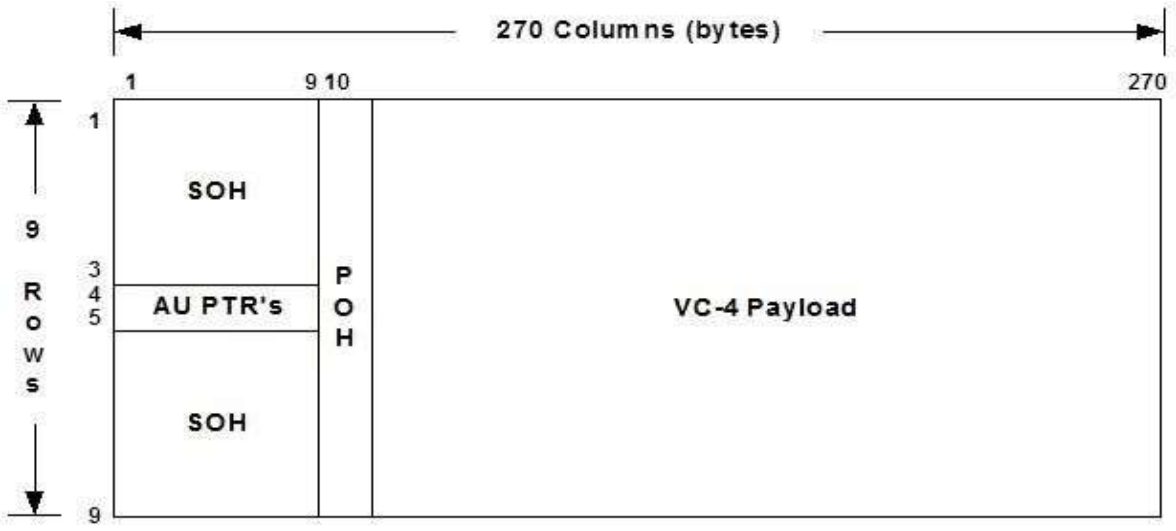

Fig 3.12 STM-1 Frame Structure & Section Overhead

3.15 STM-1 Section Overheads

The STM-1 Section on top of (SOH) consists of 9 pillars by 9 rows as shown underneath. It strategies the beginning of the STM-1 frame. The sol covers management and standing messages at the fibre level. initial 3 rows ar RSOH (Regenerator Unit Overhead), Fourth row is AU-4 pointer. Fifth to Ninth row ar MSOH (Multiplexer section above).

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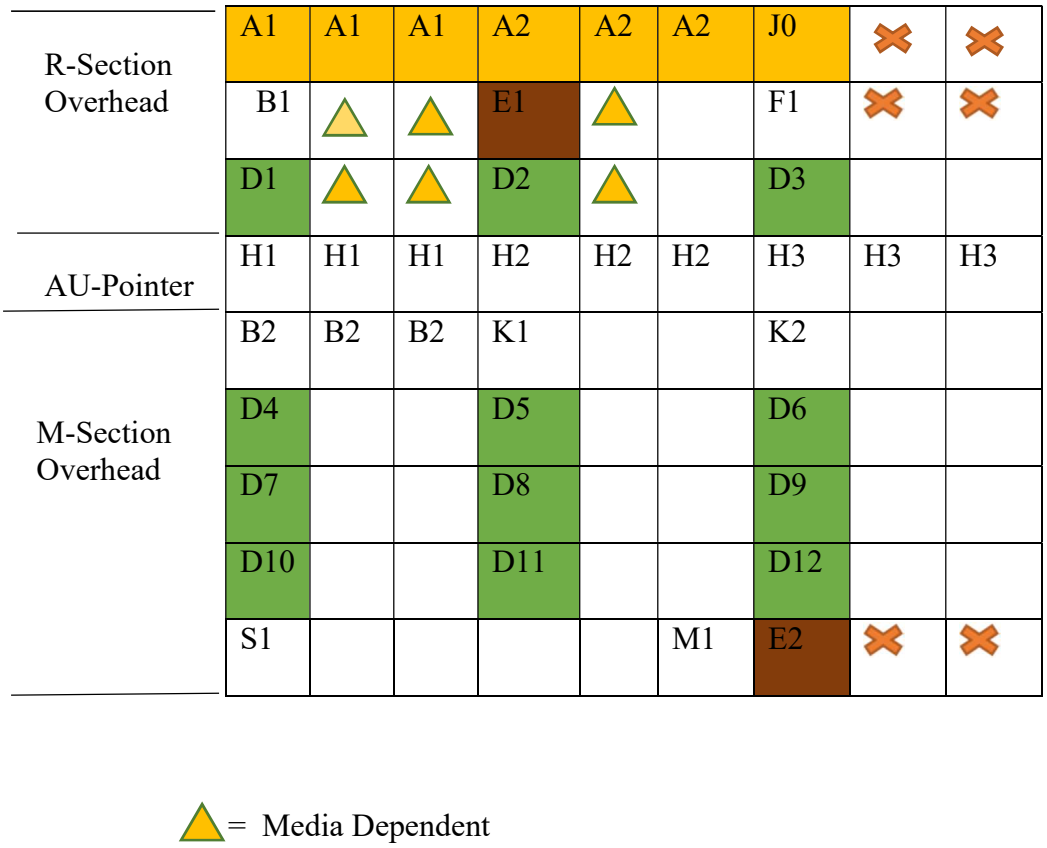

Fig **3**.13 STM-1 Section Overheads

3.16 Signaling Point Code (SPC):

The SPC code of a signal purpose during a exceedingly in a very C7 signal Network is associate unambiguous identification code for an exchange (Signaling Point) in an exceedingly network. The SPC codes are processed within the C7 signal network by the Message Transfer half (MTP) of every signal purpose (SP) or signal Transfer purpose (STP) to alter institution of speech path connections.In C7 signal traffic the SPC code allotted for the originating exchange is outlined as Originating purpose Code (OPC) and also the SPC code allotted for the self-addressed exchange is outlined because the Destination purpose Code (DPC).

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The SPC codes are divided into the international and also the national SPC codes.The international SPC codes are employed in the international traffic over international C7 signal links and that they are allotted and administered for every country/international exchange by the ITU-T Secretariat.

3.17 International Signaling Point Codes (ISPCs):

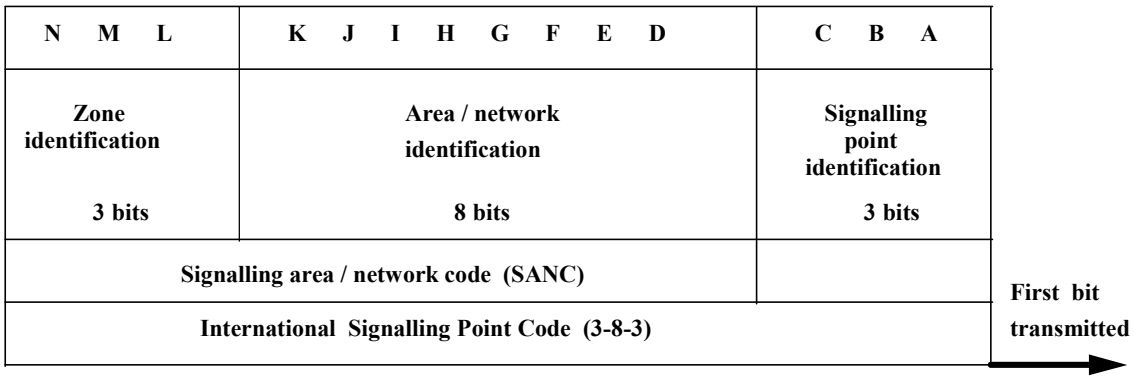

Fig. 3.14: ITU-T format for the International Signaling Point Codes (ISPCs)

The 3-bit sub-field 'NML' defines the planet geographical area wherever the network is found in. The 8-bit sub-field 'KJIHGFED' identifies the region or network inside a selected world zone. The 3-bit sub-field 'CBA' identifies the sign purpose (international exchange) inside a selected region or network.The combination of sub-fields 'NML-KJIHGFED' is outlined as a sign space Network Code (SANC).Each country shall be allotted a minimum of one SANC code. The allocation of the codes within the initial sub-field 'CBA' during this 3-8-3 bit structure is left for the national authorities with the responsibility to advise the ITU-T Secretariat on the codes used. The 3-bit structure of the 'CBA' sub-field permits eight International sign purpose Codes to be used for every SANC code.Should over eight International sign Points be needed, one or additional further SANC code(s) would then be allotted by ITU-T for the country.

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3.18 National Signaling Point Codes:

The following structure is usually recommended for the employment of the 14-bits within the signal purpose Code for the exchanges within the national networks:

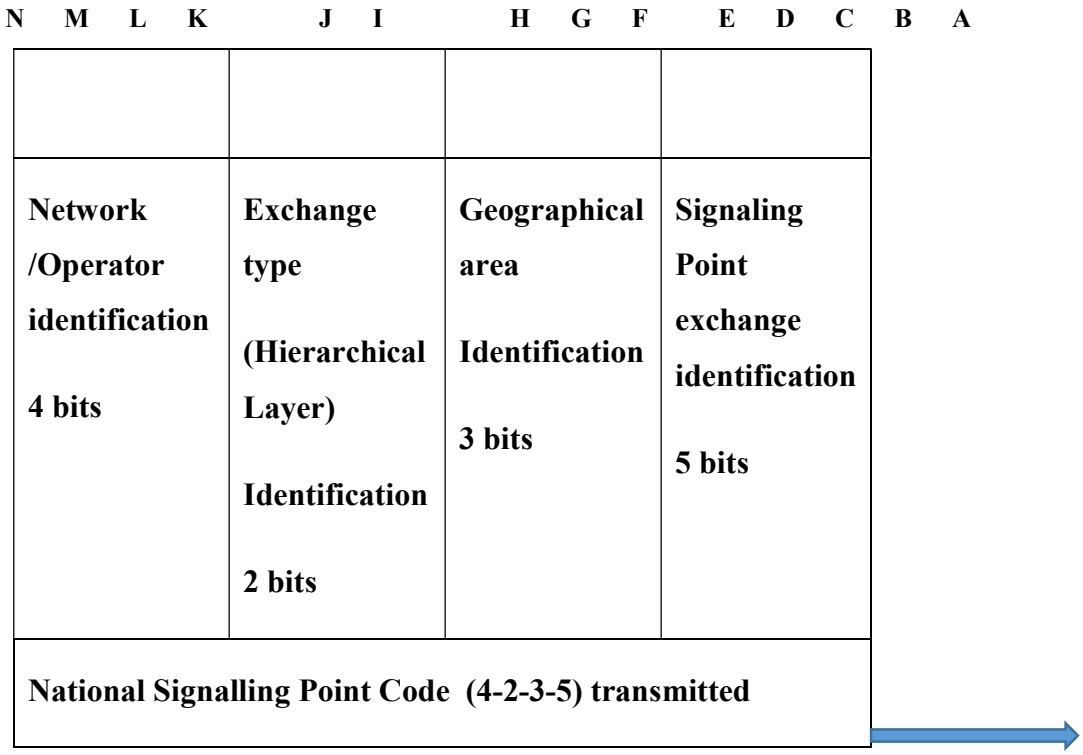

Fig. 3.15: Recommended general format for the national Signaling Point

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Chapter 4

Geographical Device Interfaces

4.1 Geographical Device Interfaces:

Gazi Network limited has four multiplexer of Tejash (TJ1270).

Figure 4.1: TJ1270

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TJ1270 is associate ultra-compact, high density MSPP, that packs many varieties and huge range of interfaces in a very compact 1U type issue. It will be used as a client Premise instrumentation or as a network part within the Access Network. It will more and more scale from STM1 to STM16 (both SDH & SONET versions). additionally it supports line rate iron and GigE interfaces with Carrier LAN capabilities. this can be appropriate for Mobile backhaul, at microwave hub locations and aggregation rings for baseball play and Enterprise services. It will be used for property of E1, E3/DS3 and LAN interfaces. With innovative Carrier LAN options, it's ideal for packet dominated networks.

4.2 Key Benefits:

4.2.1 Compact Flexible Solution:

In 1U type issue, TJ1270 provides STM16 ADM practicality with E1, E3/DS3, FE, GigE and STM1,STM4 drops. Layer one and Layer a pair of practicality is supported on LAN, so investment the efficiencies of applied mathematics multiplexing, right at the sting of the network. These facilitate the service supplier to cut back prices and save on land whereas still meeting all the necessities for the network.

4.2.2 Advanced Packet Capabilities:

The TJ1270 supports advanced options like sub 50ms protected packet rings, per service SLAs with CIR (Committed info Rate) & PIR (Peak info Rate) configurable in 64kbps roughness. Two rate, 3 Color Marking facilitates in higher congestion management and eight categories of service help to segregate and manage the info traffic a lot of with efficiency. ACLs and options like broadcast storm management improve the protection of the network.

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4.2.3 Extended Temperature Hardware:

TJ1270 comes in two variants, one is a normal use standard temperature range (0 to 50 degrees), while the extended temperature variant supports -20 degrees to 70 degrees.This can be used in extreme conditions like desert or high mountain terrain without the need for weather protection or air conditioning. This is also very useful in military applications.

4.2.4 Media Gateway:

A media gateway is a translation device or service that converts media streams between disparate telecommunications technologies such as POTS, SS7, Next Generation Networks (2G, 2.5G and 3G radio access networks) or private branch exchange (PBX) systems. Media gateways enable multimedia communications across packet networks using transport protocols such as Asynchronous Transfer Mode (ATM) and Internet Protocol (IP). Because the media gateway connects different types of networks, one of its main functions is to convert between different transmission and coding techniques. Media streaming functions such as echo cancellation, DTMF, and tone sender are also located in the media gateway.

4.2.5 Media Gateway Controller:

A media gateway controller (MGC), also known as a call agent, controls the media gateways. It monitors the gateways for events, such as an off-hook state when a user intends to initiate a telephone call, and issues requests to the gateway to initiate or complete sessions, to alert the called party, or to terminate a call. The protocols used for this interaction between the gateway and its controller have evolved through various types and versions. The Simple Gateway Control Protocol (SGCP) and the Internet Protocol Device Control (IPDC) have been replaced by the Media Gateway Control Protocol (MGCP) and Megaco, which is also known as H.248.Some MGCs interface with other signaling protocols, such as Signalling System No. 7 (SS7), for interconnection with the traditional telephone system, H.323, and the Session Initiation Protocol (SIP).

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Chapter 5

Alarms and Event Functions in NOC

5.1 Alarm Reporting

The C3 Controller supports four categories of alarms, including in order of severity, the following:

- Critical
- Major
- Minor
- Informational and Warning

The C3 Controller reports alarms that may be viewed from the GenView EMS or interface purchasers. The user receives notification of alarms as they occur throughout decision process activity. The EMS uses SNMP traps to send alarms to the Network Operations Center (NOC). The EMS provides descriptions of all EMS events and alarms and associates the alarms with corrective action for correcting the issues.The C3 Controller notifies GenView EMS purchasers of alarms, by severity and class, on the alarm bar or panel at the highest of the most screen. The system alarms are displayed within the GenView EMS by default, however the user will hide alarms by choosing a setting from the most menu. The C3 Controller notifies statement interface (CLI) purchasers of alarms and events by displaying them on the statement as they occur. The alarm report doesn't interrupt the user's command and might be turned off mistreatment keyboard commands.

5.2 Alarm Severity Levels

The following table describes the Alarm severity levels on the C3 Controller system:

Severity	Description
Critical	The system is experiencing a full or partial service outage.
Major	The system is experiencing loss of multiple pieces of equipment or loss of redundancy.
Minor	The system is experiencing loss of a single entity which has resulted in no loss of service or redundancy.
Warning	The system has experienced an issue that may require attention to avoid a potential problem.
Informational	The system has raised an event that has surpassed a specified threshold so it has reached the alarm level, but it requires no trouble-locating action by the administrator. The alarm contains information about a system operation.

5.3 Alarm and Event Categories

The following table describes the Alarm and Event classes. Some are common to the C3 Controller moreover on the MG, as noted.

Category	Description
PLAT	Category include events reporting operation system, UNIX, or communication Operations
CNFIG	Category includes events reporting on physical or software related configuration issues.

DATAB	Category includes events reporting on database operations status.
SIGNL	Category includes events reporting on trunk and line signaling errors.
BILL	Category includes events reporting on CDR and AMA operations issues.
SGW	Category includes events reporting on SS7 Signaling Gateway operations.
EXTRN	Category includes events reporting on operations with external equipment.
CKT	Category includes events reporting on errors and treatments on lines and trunks. (Common to C3 Controller and MG.)
NTWK	Category includes events reporting on switch fabric and service circuit faults and status. (Common to C3 Controller and MG.)
OVLD	Category includes events reporting on CPU occupancy and traffic levels.
SWLOG	Category includes events reporting on non-alarmed software anomalies, debug traps, and trace information.
CALEA	Category includes events reporting on CALEA feature operations.
COT	Category includes events reporting on Customer Originated Trace feature operations.
PERFM	Category includes events reporting on performance collections and distribution operations
SECUR	Category includes events reporting on password violations.
RESC	Category includes events reporting on shareable resources that are depleted or have reached a predefined level.
DEBUG	Category includes events reporting on internal events passing operations. (Common to C3 Controller and MG.)

5.4 Alarm and Event Screen Displays

C3 Controller alarms and events display on the GenView EMS when the user clicks the Fault radio button, as shown in Figure 5.1:

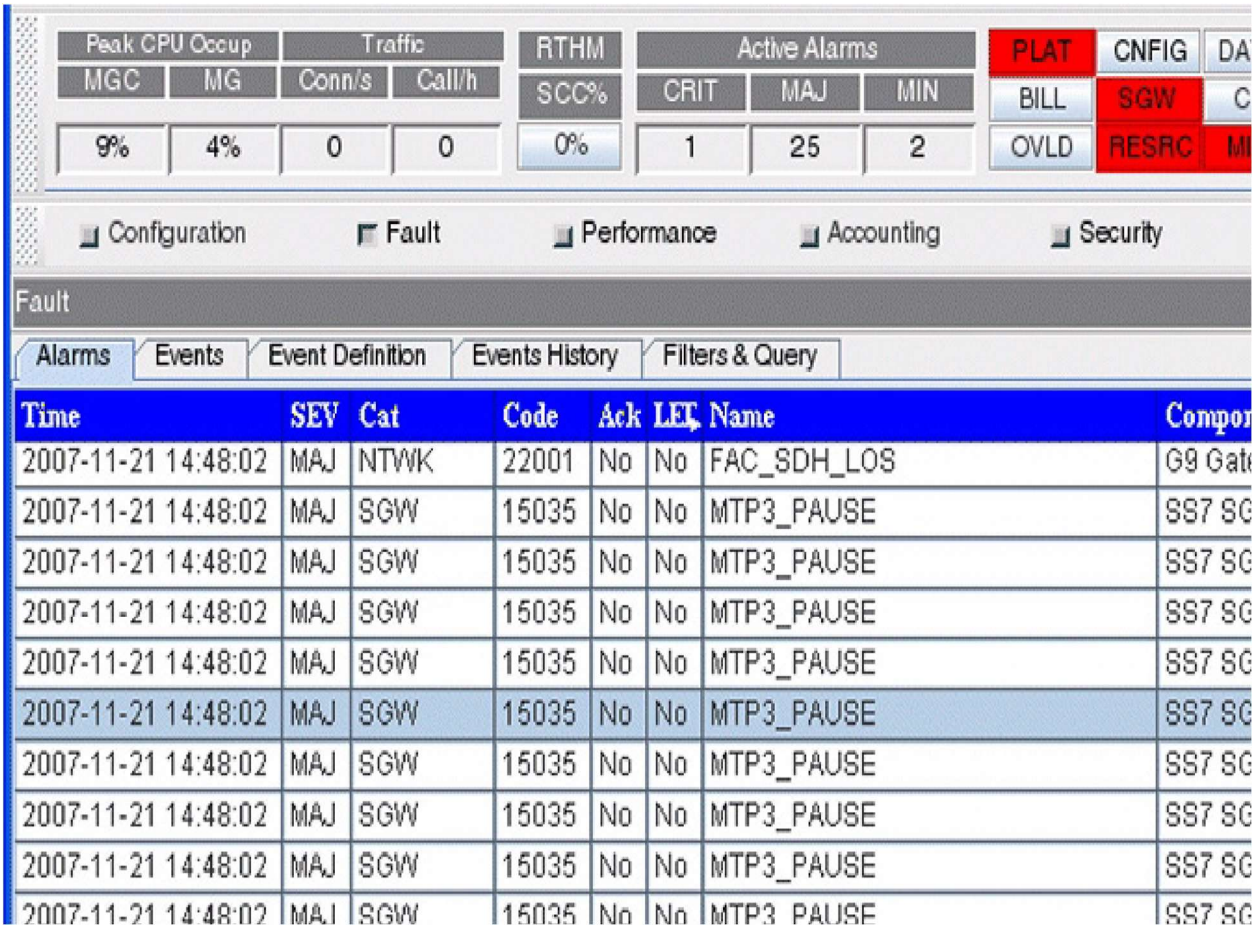


Figure 5.1: Fault Management Main Screen

Double-click on an alarm to display the alarm details, such as description, affected components, data words, alarm category, and severity in Figure 5.2.

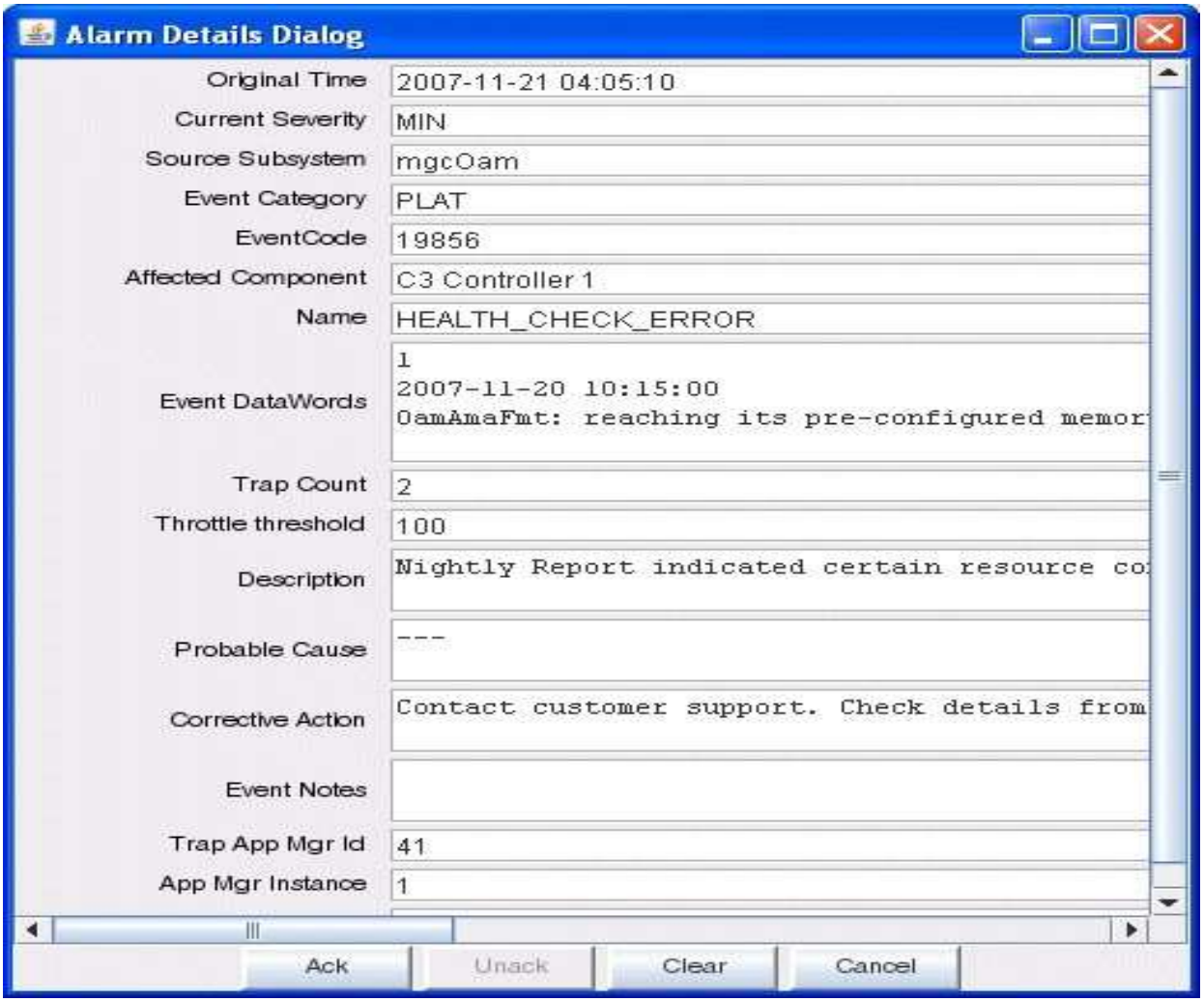
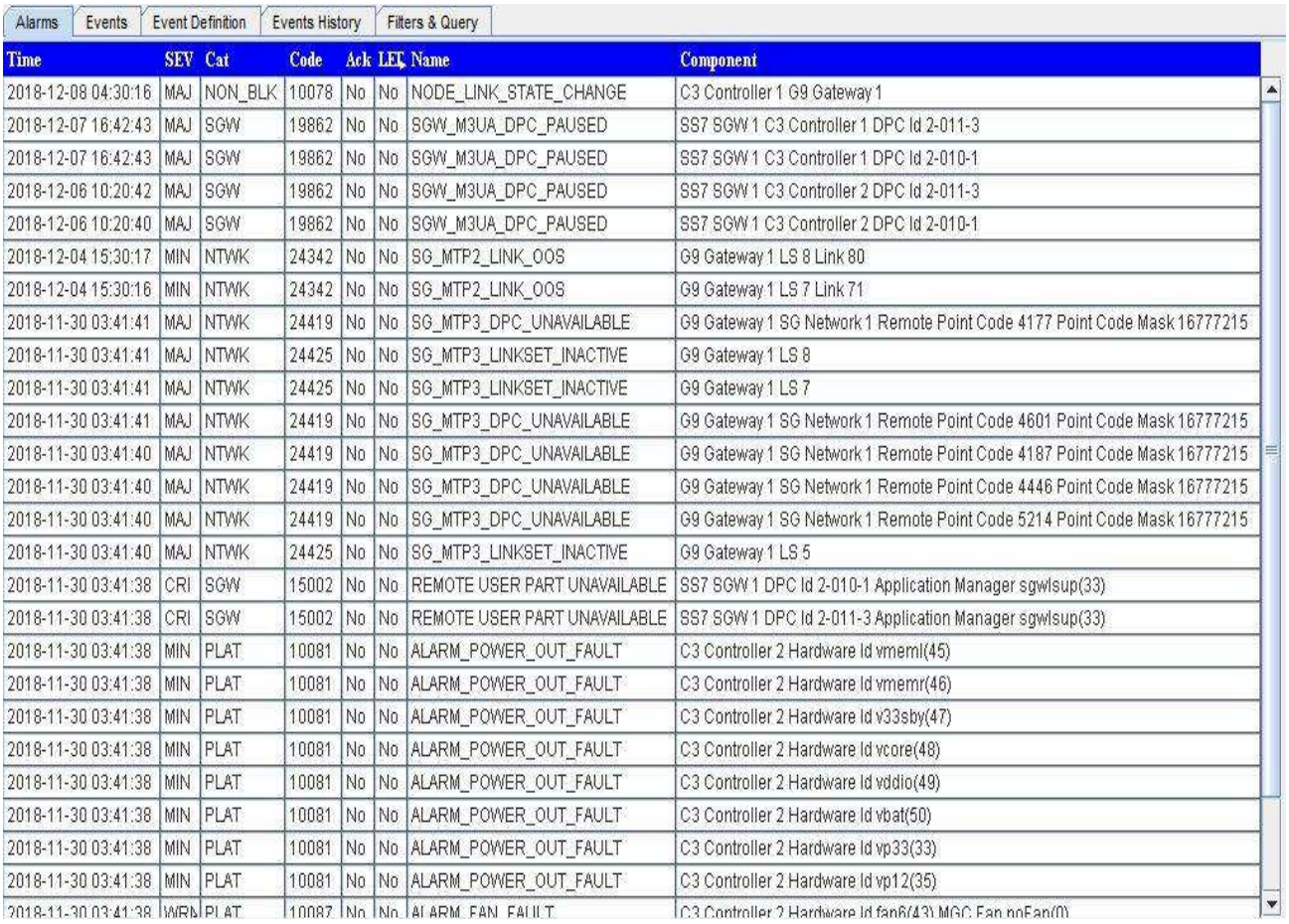


Figure5.2: Alarm Details

5.5 Real life alarms monitoring in NOC:

Whenever any problems occur in NOC then alarms indicate the severity of calling system .



Alarms | Events | Event Definition | Events History | Filters & Query

Time	SEV	Cat	Code	Ack	LET	Name	Component
2018-12-08 04:30:16	MAJ	NON_BLK	10078	No	No	NODE_LINK_STATE_CHANGE	C3 Controller 1 G9 Gateway 1
2018-12-07 16:42:43	MAJ	SGW	19862	No	No	SGW_M3UA_DPC_PAUSED	SS7 SGW 1 C3 Controller 1 DPC Id 2-011-3
2018-12-07 16:42:43	MAJ	SGW	19862	No	No	SGW_M3UA_DPC_PAUSED	SS7 SGW 1 C3 Controller 1 DPC Id 2-010-1
2018-12-06 10:20:42	MAJ	SGW	19862	No	No	SGW_M3UA_DPC_PAUSED	SS7 SGW 1 C3 Controller 2 DPC Id 2-011-3
2018-12-06 10:20:40	MAJ	SGW	19862	No	No	SGW_M3UA_DPC_PAUSED	SS7 SGW 1 C3 Controller 2 DPC Id 2-010-1
2018-12-04 15:30:17	MIN	NTWK	24342	No	No	SG_MTP2_LINK_OOS	G9 Gateway 1 LS 8 Link 80
2018-12-04 15:30:16	MIN	NTWK	24342	No	No	SG_MTP2_LINK_OOS	G9 Gateway 1 LS 7 Link 71
2018-11-30 03:41:41	MAJ	NTWK	24419	No	No	SG_MTP3_DPC_UNAVAILABLE	G9 Gateway 1 SG Network 1 Remote Point Code 4177 Point Code Mask 16777215
2018-11-30 03:41:41	MAJ	NTWK	24425	No	No	SG_MTP3_LINKSET_INACTIVE	G9 Gateway 1 LS 8
2018-11-30 03:41:41	MAJ	NTWK	24425	No	No	SG_MTP3_LINKSET_INACTIVE	G9 Gateway 1 LS 7
2018-11-30 03:41:41	MAJ	NTWK	24419	No	No	SG_MTP3_DPC_UNAVAILABLE	G9 Gateway 1 SG Network 1 Remote Point Code 4601 Point Code Mask 16777215
2018-11-30 03:41:40	MAJ	NTWK	24419	No	No	SG_MTP3_DPC_UNAVAILABLE	G9 Gateway 1 SG Network 1 Remote Point Code 4187 Point Code Mask 16777215
2018-11-30 03:41:40	MAJ	NTWK	24419	No	No	SG_MTP3_DPC_UNAVAILABLE	G9 Gateway 1 SG Network 1 Remote Point Code 4446 Point Code Mask 16777215
2018-11-30 03:41:40	MAJ	NTWK	24419	No	No	SG_MTP3_DPC_UNAVAILABLE	G9 Gateway 1 SG Network 1 Remote Point Code 5214 Point Code Mask 16777215
2018-11-30 03:41:40	MAJ	NTWK	24425	No	No	SG_MTP3_LINKSET_INACTIVE	G9 Gateway 1 LS 5
2018-11-30 03:41:38	CRI	SGW	15002	No	No	REMOTE USER PART UNAVAILABLE	SS7 SGW 1 DPC Id 2-010-1 Application Manager sgwlsup(33)
2018-11-30 03:41:38	CRI	SGW	15002	No	No	REMOTE USER PART UNAVAILABLE	SS7 SGW 1 DPC Id 2-011-3 Application Manager sgwlsup(33)
2018-11-30 03:41:38	MIN	PLAT	10081	No	No	ALARM_POWER_OUT_FAULT	C3 Controller 2 Hardware Id vmeml(45)
2018-11-30 03:41:38	MIN	PLAT	10081	No	No	ALARM_POWER_OUT_FAULT	C3 Controller 2 Hardware Id vmemr(46)
2018-11-30 03:41:38	MIN	PLAT	10081	No	No	ALARM_POWER_OUT_FAULT	C3 Controller 2 Hardware Id v33sby(47)
2018-11-30 03:41:38	MIN	PLAT	10081	No	No	ALARM_POWER_OUT_FAULT	C3 Controller 2 Hardware Id vcore(48)
2018-11-30 03:41:38	MIN	PLAT	10081	No	No	ALARM_POWER_OUT_FAULT	C3 Controller 2 Hardware Id vddio(49)
2018-11-30 03:41:38	MIN	PLAT	10081	No	No	ALARM_POWER_OUT_FAULT	C3 Controller 2 Hardware Id vbat(50)
2018-11-30 03:41:38	MIN	PLAT	10081	No	No	ALARM_POWER_OUT_FAULT	C3 Controller 2 Hardware Id vp33(33)
2018-11-30 03:41:38	MIN	PLAT	10081	No	No	ALARM_POWER_OUT_FAULT	C3 Controller 2 Hardware Id vp12(35)
2018-11-30 03:41:38	WRN	PLAT	10087	No	No	ALARM_FAN_FAULT	C3 Controller 2 Hardware Id fan6(43) MGC Fan noFan(0)

Fig 5.3 : Alarms in NOC

Chapter 6

Conclusion

Gazi Networks Ltd. is connected with all the twenty nine IGWs done the seven IOSs, six Mobile operators, a pair of IPTSP employees and BTRC. In Dhaka zone Gazi Networks Ltd. is skillful enough to grip all domestic calls yet as world incoming and outward calls. it's connected with the ANSs in Khulna and Bogra zone to handle regional native calls.Despite Asian nation taking associate immensely promising telecommunication market square – it perceived to be repeatedly waiting to happen until this point. The BTTB (Bangladesh Wire and phonephone Board), the groundbreaker within the telecommunication sector within the nation with land phone, PSTN (Public Swapped telecommunication Network) was the lone employee. The BTTB was formed in 1972. The transmissible & age recent equivalent system of central sustained for severalyears. Most region cities had access to a different system for pressing infrastructures, within the style of a ultrahigh frequency or VHF radio theme or radio relay network. With the summary of satellite networks within the post-independence decade, done facilities at flower and Aliabad earth-satellite places were mile-stones within the phase. With the summary of satellite networks within the post-independence decade, done facilities at flower and Aliabad earth-satellite places were mile-stones within the phase. As a outcome the quantity of calls was additive terribly quickly. the load was too high for the present three ICX operators to transmit numerous calls close to the Mobile employees that had been resultant technical difficulties terribly often. To resolve the problematic and make additional service and higher watching BTRC set to gift additional ICX employees. Then in 2012 BTRC gave license to twenty three additional ICX employees within the telecommunication section and Gazi Networks Ltd.became one in every of the foremost ICX operator among year.

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