



EAST WEST UNIVERSITY

Internship (Industrial Training) Report

On

Core Networking System and NOC of ICX

**As a partial fulfilment of the degree of Bachelor in Electronics
and Telecommunication Engineering at East West University**



By

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Company Profile (VOICETEL Ltd.)

It is an Interconnection Exchange (ICX) operator providing following services:

- Routing/ Switching Inter operator Domestic Voice calls.
- Routing/ Switching International Calls between ANS and IGW Operators.
- SMS, VMS and VAS services.
- ENUM, IMEI and number portability Services.
- Special Code number, Emergency Number, Call center number Routing.



Disclaimer

This is to declare that this is the internship report based on core networking and NOC department in an ICX company in Bangladesh. This internship report has not been submitted elsewhere for any purpose.

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Acceptance

This internship report has been presented to the department of Electronics and Communications Engineering, East West University and submitted in partial fulfilment of the requirement for degree of B.Sc. in Electronics and Telecommunication Engineering, under complete supervision of the undersigned.

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Acknowledgement

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Chapter 1

Introduction

1.1 Introduction

Telecommunication occurs when the exchange of information between two or more entities (communication) includes the use of technology. New technologies are changing the way regulators need to manage interconnection. Thoughtful consideration of innovative ideas can greatly improve the efficiency in multi-operators/service atmosphere. The formation of advisory groups in international, regional and/or national levels and national regulatory authorities could expedite the process of accommodating or improve the ICX approach of interconnection in the respective markets and/or interconnection models. One of the emerging markets of South Asia- Bangladesh has adopted the unconventional approach in its interconnection regime. Telecom regulators introduced an ICX based interconnection regime in 2007 and with that started a new era of interconnection in Bangladesh. Comparison of benefits of before and after the changes has proved that ICX based arrangement can be beneficial to the overall interconnectivity scenario. Service provider all over the world are now emphasizing on cost optimization and simplified architecture which allows adoption of future technology/services. ICX based interconnection regime can be the solution and the potential of such model is gaining in popularity. International Telecommunications Union (ITU)'s recent publications recommends the concept of an "Interconnect Gateway Exchange" for the multi-service and multi-operator environment. The handbook suggests that countries setting up an 'Interconnect Gateway Exchange' in a multi-operator environment can address the challenges of multi-operator and multi-service interconnection environment more effectively and efficiently. Two aspects of the prior 2008 interconnection regime in Bangladesh raised particular concerns:

- a) The limited capacity of the incumbent (former-BTTB now BTCL) for interconnection with other operators and

- b) The monopoly of international gateway- BTTB retained a monopoly on IGW services in Bangladesh as a result of the contemporary regulatory approach. BTTB has underinvested in international gateway capacity in a way that could not meet market demand. Besides capacity expansion was not expected to enable it to meet the rapid growth in demand. The monopoly had also led to high levels of illegal bypass which has reduced the revenues attained by the Government.

1.2 ICX model in Bangladesh

In the context of having an interconnection regime which harmed overall efficiency and were likely to be holding back overall access to telecommunications services in Bangladesh the policy makers introduced a new era of interconnection with ILDTS2 policy 2007. This policy is governed under the Telecom Act-2001. To implement this policy BTRC has amended the Interconnection regulation-2004 in 10th February-2008. This policy stipulates building a three-tier telecommunication infrastructure for international calls. Initially the government granted three international private sector through auction. Introduction of ICX based interconnection model brought in change in following three frameworks-

- ❖ Regulatory
- ❖ Technical
- ❖ Financial

1.2.1 Regulatory framework

Along with the ILDTS Policy 2007, the following is the guiding framework of interconnectivity in Bangladesh:

1. Bangladesh Telecommunication Act-2001 (as amended)
2. Interconnection Regulations-2004 (as amended)
3. Relevant directives (interim directives on MTR etc.) issued by the regulator (BTRC).

1.2.2 Technical framework

The three layers of network architecture keep the provision of International Gateway, interconnection Exchange and Internet Exchange. Services provided under these 3 layers can be translated into following kind of interconnection:

- a) Interconnection for Domestic telephone service
- b) Interconnection for International telephone service and
- c) Interconnection for International Data service.

1.2.3 Financial framework

Previously revenue share for domestic off-net calls were done as per the pre-fixed termination rate and each operator used to bill the other for the total traffic volume (minutes) as per as respective CDR. For international calls no revenue sharing was in place. As per the ILDTS policy a certain revenue sharing arrangement is now in place among all stakeholders for international calls. Domestic termination rate and revenue sharing of it are also determined by NRA (BTRC). For domestic calls' a termination rate is still fixed by the BTRC. At present, they are conducting a cost study, the result of which is expected to be adopted by next year.

Chapter 2

ICX

2.1 What is ICX?

Switching system which provides interconnection among telecommunication networks of operators in order for offering easy access and allows monitoring, lawful interception (LI) facilities and roaming number portability. It is connected with ANS and IGW (Fig 1) for call flowing. There is a switch room in ICX (Fig 2) where every department is connected with each other logically or physically.

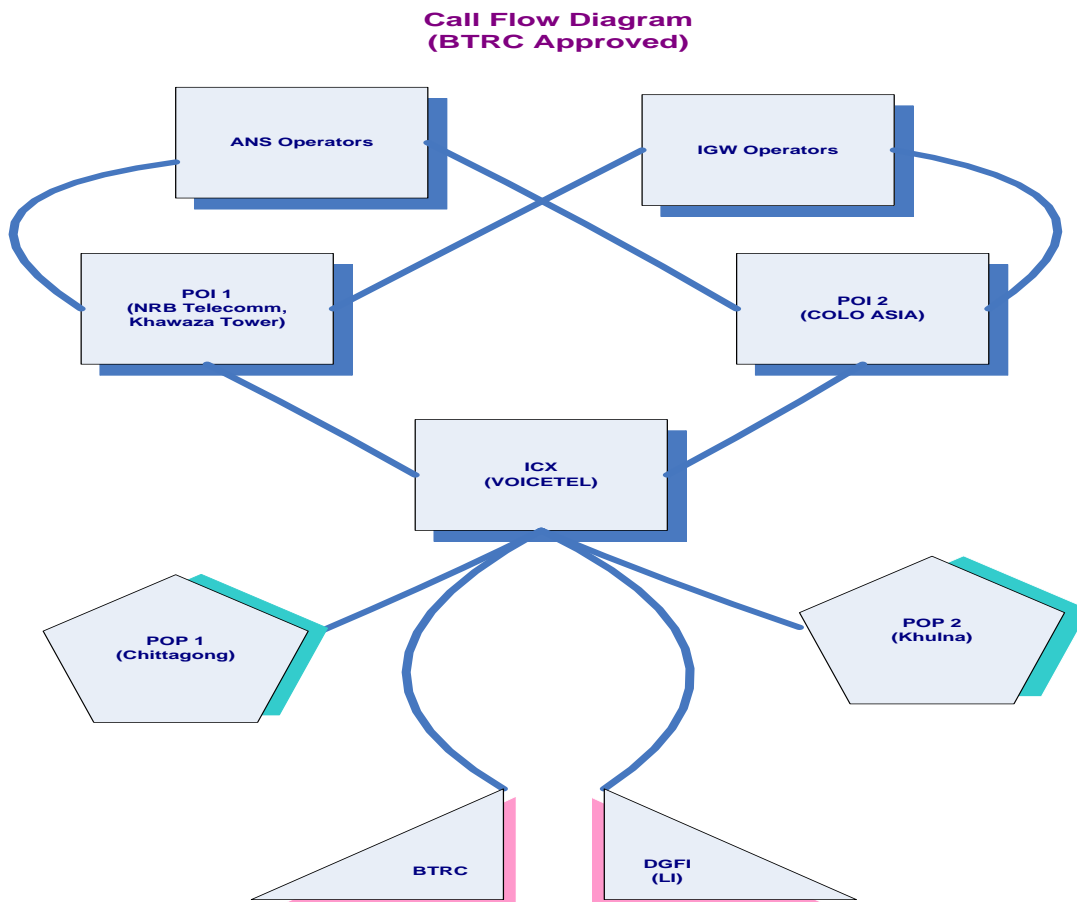


Fig 1: Call flow diagram

VOICETEL SWITCH ROOM

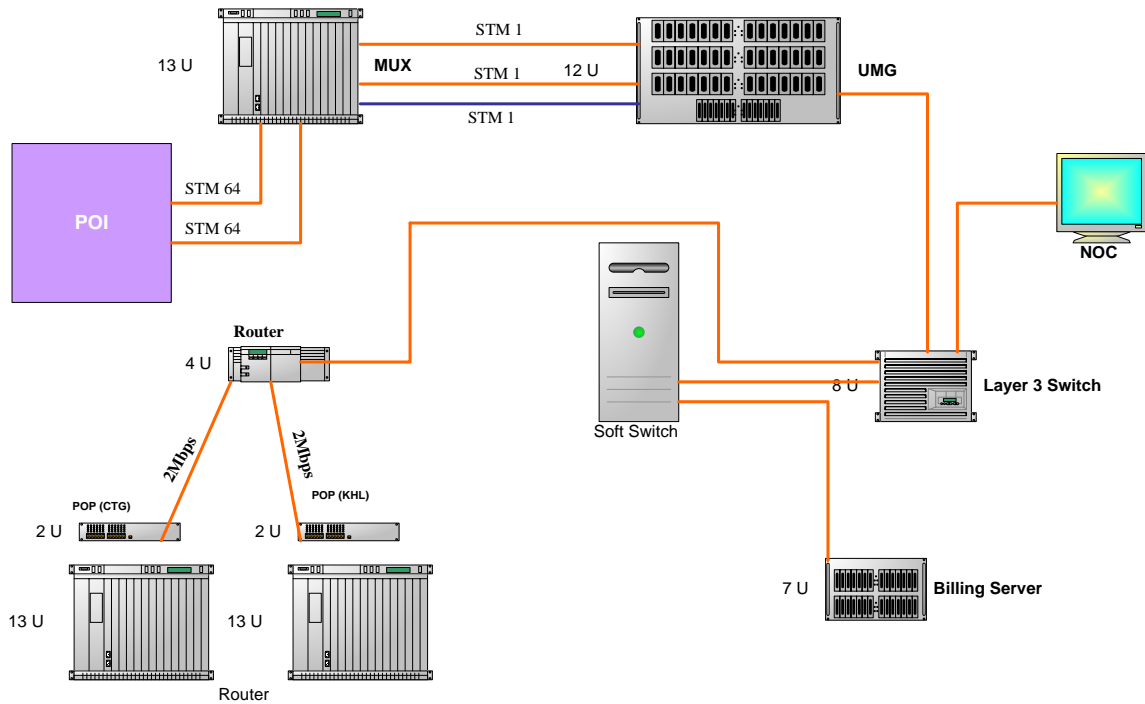


Fig 2: Voicetel switchroom

2.2 Network Topology of ICX:

Network Architecture is based on three layers.

- ❖ The first layer is International Gateway (IGW) which is connected with Submarine cable and VSAT.
- ❖ The second layer is Interconnection exchange (ICX) which is connected with IGW and Access Network Service (ANS) operators.
- ❖ The third layer is the Access Network Service (ANS) operators where the subscribers are connected.

There is point of interconnection (**Fig 3**) and point of presence connection (**Fig 4**) of ANS and IGW with ICX.

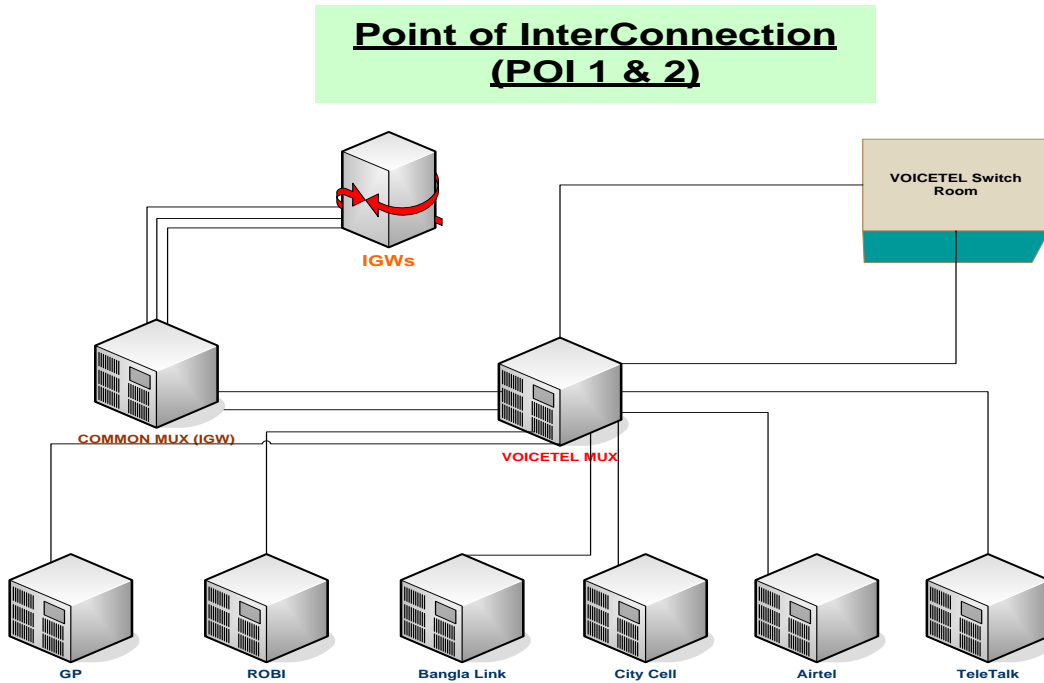


Fig 3: POI connection

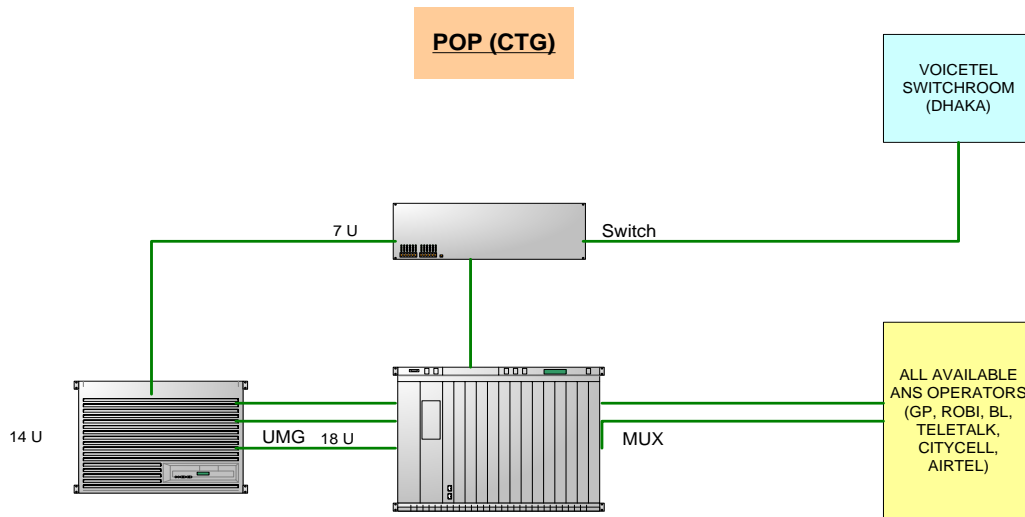


Fig 4: POP connection

Chapter 3

Core Networking

3.1 What is Core Network?

A core network is a telecommunication network's core part, which offers numerous services to the customers who are interconnected by the access network. Its key function is to direct telephone calls over the public-switched telephone network.

In general, this term signifies the highly functional communication facilities that interconnect primary nodes. The core network delivers routes to exchange information among various sub-networks (**Fig 5**). When it comes to enterprise networks that serve a single organization, the term backbone is often used instead of core network, whereas when used with service providers the term core network is prominent.

This term is also known as network core or backbone network. Core network usually has a mesh topology that provides any-to-any connections among devices on the network which are typically connected to the public networks.

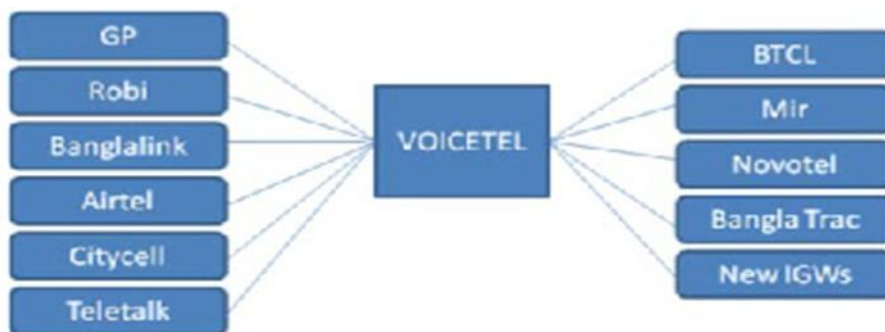


Fig 5: Sub-network connection

3.2 Department of Core Network of ICX

Core network has two parts. These are-

- i. UMG (Universal Media Gateway)
- ii. SS (Soft switch)

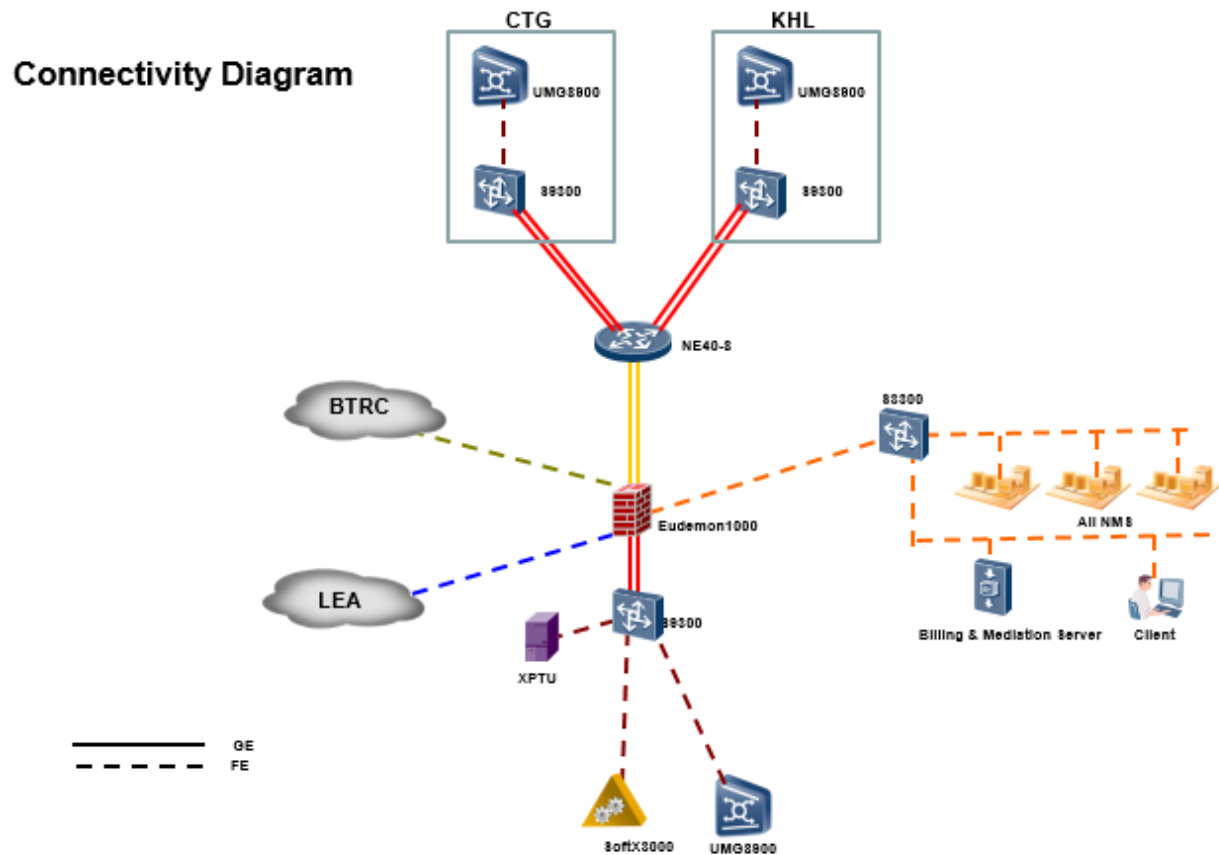


Fig 6: Connectivity diagram

3.2.1 UMG

A Universal Media Gateway or UMG, is one of the key factors in the Access subsystem of the NGN. This is the country's main access system being used today because of its multiple function ability and because it is the most economical solution when the telecom network is part PSTN and part NGN.

UMG8900 (**Fig 7**) has been used in Voicetel. This Universal Media Gateway (UMG) helps to migrate GSM-R services from TDM to all-IP communications, reduce TCO and protect ROI.

The UMG, together with Huawei's Mobile Switching Center (MSC) server, collaborates with other devices to support various basic, supplementary, and value-added mobile services on a traditional GSM-R network. Its simplified network structure also contains built-in video networking and signaling link gateways. The UMG architecture enables fast and flexible introduction of new services.



Fig 7: UMG8900

3.2.2 SS

Soft Switch is a core component for fixed core network solutions. It implements call control and signaling & protocol processing to provide basic services and supplementary services. It also interworks with application server (AS) to provide diversified value-added services to subscribers. It can also function as AGCF, enabling smooth network evolution and protecting operators' existing investment.

Soft Switch is the media gateway controller. It is responsible for controlling all the media gateways within its zone. Soft Switch is also known as SoftX. The SoftX3000 (**Fig 8**) has been used in Voicetel. It uses carrier-class Open Standards Telecom Architecture (OSTA) Platform as its hardware platform and uses Distributed Object-oriented Programmable Realtime Architecture (DOPRA) as its software platform. The key boards support 1+1/N+1 hot backup. It adopts modular design, consisting

of interface module, system support module, signaling processing module, service processing module and Back Administration Management (BAM) module.



Fig 8: SoftX3000

❖ **Additional services of Soft Switch:**

There works two additional services on the corresponding to soft switch. These are:

- IGW B
- XPTU

□ **IGWB:**

IGWB abbreviation stands for International Gateway of Billing. It is saved by

- .bill format
- .dat format

There are two types of IGWB. These are:

- IGWB0
- IGWB1

□ **XPTU:**

XPTU is a monitoring server which is used for lawful interception.

Chapter 4

Management issues for call routing

To flow the calls, there are two types of management issues. These are:

1. Software management.
2. Hardware management.

4.1 Software management

There are mainly three types of protocols to manage software which work for call flowing.

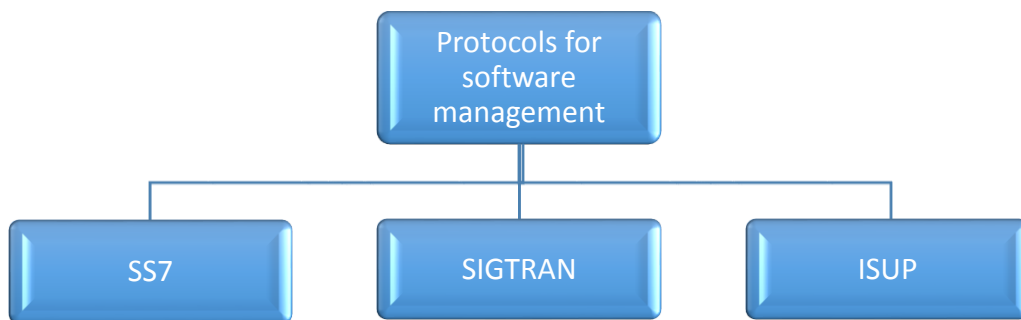


Fig 9: Software management

4.1.1 Protocol Information

□ SS7:

Signaling System No. 7 (SS7) is a set of telephony signaling protocols (**Fig 10**) developed in 1975, which is used to set up and tear down most of the world's public switched telephone network (PSTN) telephone calls. It also performs number translation, local number portability, prepaid billing, Short Message Service (SMS), and other mass market services.

❖ **Principle:**

- Out of band Signaling.
- Higher Signaling data rates (56Kbps & 64 Kbps).
- Signaling traffic is burst and of short duration, hence operates in connectionless mode using packet switching.
- Variable length signal units with maximum size limitation.
- Optimum use of bandwidth.
- Reliability and flexibility.

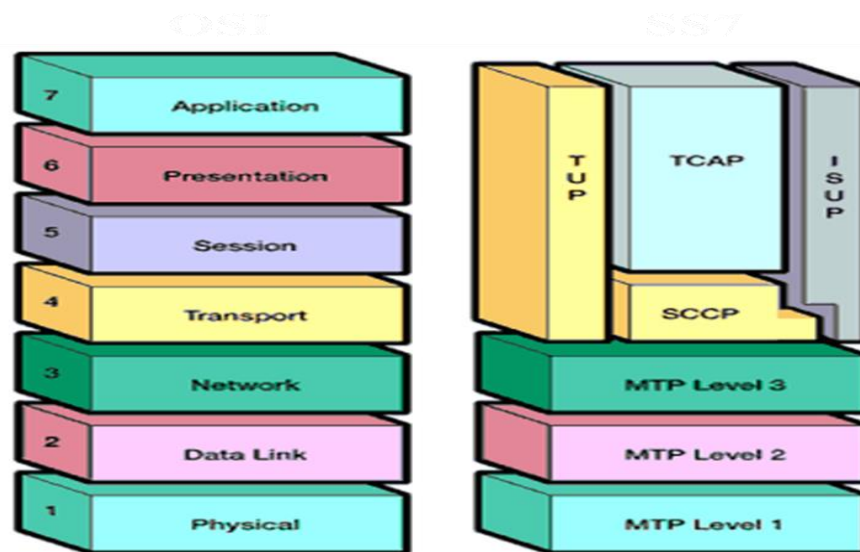


Fig 10: OSI and SS7 layer

□ **SIGTRAN:**

SIGTRAN is the name, derived from signaling transport, of the former Internet Engineering Task Force (IETF) working group that produced specifications for a family of protocols that provide reliable datagram service. The SIGTRAN (**Fig 11**) family of protocols includes:

- Stream Control Transmission Protocol (SCTP).
- ISDN User Adaptation (IUA).
- Message Transfer Part 2 (MTP) User Peer-to-Peer Adaptation Layer (M2PA).
- Message Transfer Part 2 User Adaptation Layer (M2UA).
- Message Transfer Part 3 User Adaptation Layer (M3UA).

- Signaling Connection Control Part (SCCP) User Adaptation (SUA).
- V5 User Adaptation (V5UA).
- DPNSS/DASS2 User Adaption (DUA).

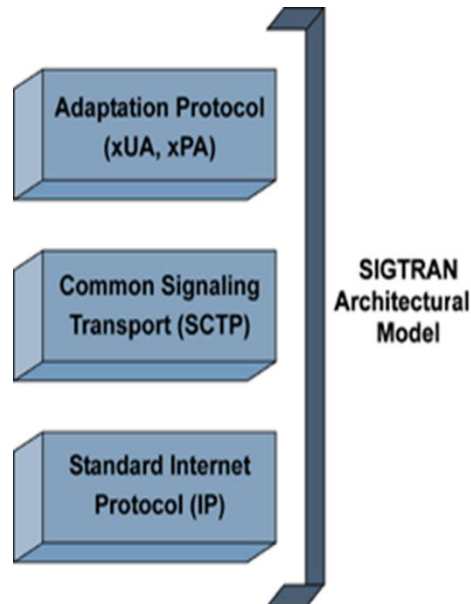


Fig 11: SIGTRAN Architecture Model

□ ISUP:

The ISDN (Integrated Services Digital Network) User Part or ISUP is part of the Signaling System No. 7 (SS7) which is used to set up telephone calls in the public switched telephone network (PSTN).

An ISUP message contains a fixed header containing the circuit identification code and the ISUP message type, followed by a mandatory fixed-length parameter part, a mandatory variable-length parameter part, and an optional parameter part that are dependent on the type of message being sent. ISUP messages can be sent using the services of the Message Transfer Part, or, less often, the Signaling Connection Control Part. These messages are transmitted in various stages of call setup and release (**Fig 12**). The most common messages are:

- Initial address message (IAM) — First message sent to inform the partner switch that a call has to be established on the CIC contained in the message. Contains the called number, type of service (speech or data) and optional parameters.

- Subsequent address message (SAM)— For networks that support *overlap* dialing procedures, and then in the case that the IAM did not contain the full called number, one or more SAMs follow containing additional digits.
- Address complete message (ACM) — Message returned from the terminating switch when the subscriber is reached and the phone starts ringing, or when the call traverses an interworking point and the intermediate trunk is seized.
- Call progress (CPG) — Contains additional information about the progress of a call. Normally sent after the ACM when the status of the call changes from that reported in the ACM.
- Answer message (ANM) — Sent when the subscriber picks up the phone, a resource is connected or answer supervision is returned by an interworking point. Normally charging starts at this moment. It is required that the call be cut through in both directions by this point.
- Connect (CON) — Sent when the call is answered by an automatic terminal. This message replaces the ACM, CPG and ANM for calls that are answered by automatic terminals.
- Release (REL) — Sent to clear the call when a subscriber goes on hook. This is also sent (in direct response to an IAM) if the terminating switch determines that the call cannot be completed. In either case, the terminating switch provides a cause value in the message to explain the reason for the release, *e.g.*, "User busy".
- Release complete (RLC) — Acknowledgment of the release – the circuit is idle afterward and can be used again.

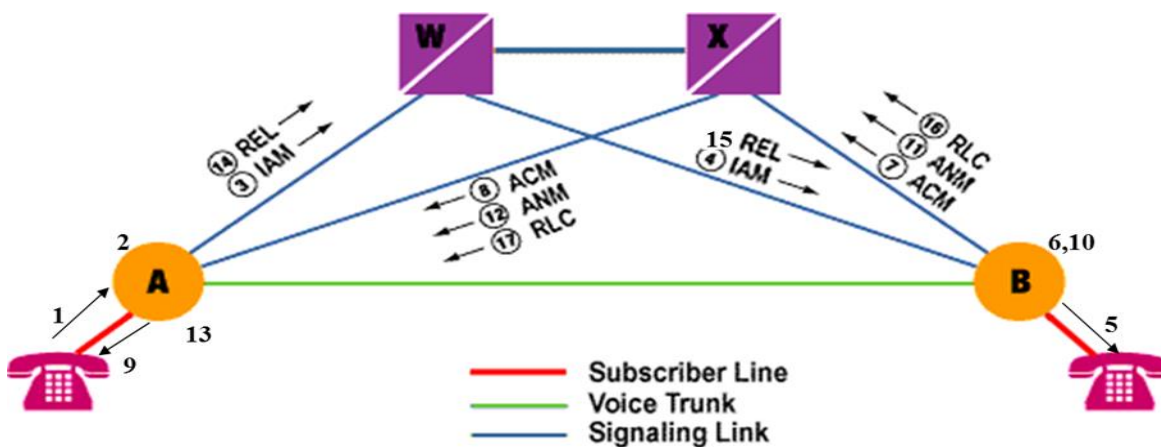


Fig 12: Transmission of messages for call setup

4.1.2 Call establishment

There are three sections to establish a call between two different operators. These are:

1. Establishing link
2. Routing
3. Selection

❖ Establishing link:

Some information are needed to establish a link.

Optical port no.:

E1T1 no.:

SPF band no.:

Link set no.:

Int-type Interface ID:

E1 type:

Start time slot:

End time slot:

SPF sub board no.:

Link type:

❖ Routing:

For routing (**Fig 13**) some parameters work. These are:

- CNAULD→ Used for prefix of call terminated party
- RT→ Route No.
- RSC→ Route Selection Code
- RSSC→ Route Selection Source code
- RTANA→ Route Analysis

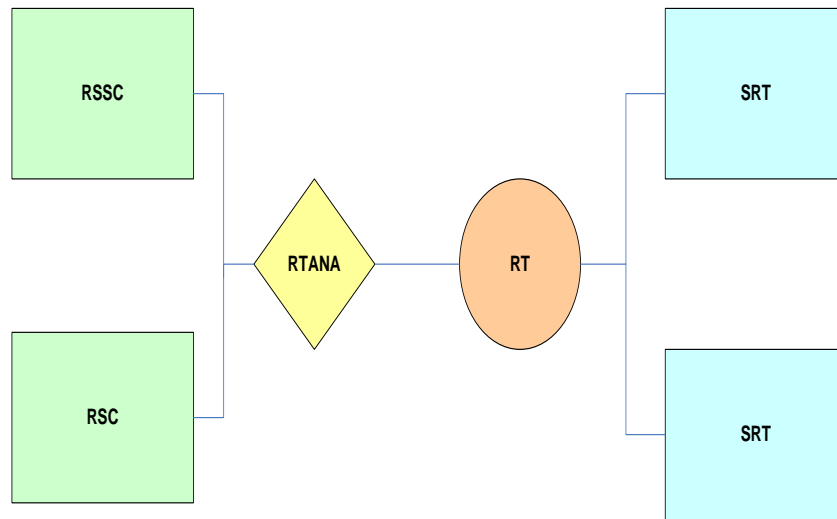


Fig 13: Routing process

❖ **Selection:**

- I. Point code selection
- II. Circuit selection mode
- III. Capacity

● **Point code selection:**

Connection between two operators through MSC to MSC.

● **Circuit selection mode:**

In every operation there is a predefined circuit on CIC (Circuit Identification Code) and SIC (Signaling link Code)

● **Capacity:**

More than two STMs cannot be connected in a route. In a STM, there are 63 synchronization links, 2 signaling links and 1951 voice links.

4.2 Hardware Management

Hardware management includes data configuration and device maintenance. To run a system, subscribers should firstly add shelf, frame, board, module and other special configurations with the data configuration commands according to actual hardware installation. When the system is running, the device management provides maintenance commands for subscribers to display the running status of the device, solve problems, restore the normal running status and enhance the performance of the system.

1. Device Panel
2. Board Information of UMG
3. Board Information of SS

4.2.1 Device Panel

1. Shelf Management:

A shelf contains four frames and one PDB. The system provides the shelf management function, including adding shelves to the whole NE, checking shelf list, adding/modifying/deleting a shelf, refreshing a shelf, and switching the front and back of shelves. These functions are described below.

Operation:

a) Adding a shelf

- 1- Open the Device Panel, and right click the parent node of **Device Panel Management**. A shortcut menu appears.
- 2- Select Add Shelf on the pop-up menu. A window for adding a shelf is displayed. Enter mandatory parameters, which are described in the table below.
- 3- Click **OK**.
- 4- You can also execute the **MML** command **ADD SHF** to implement the same function.

b) Modifying a shelf

- 1- Right click a shelf sub-node on the navigation tree. A shortcut menu is displayed.
- 2- Select **Modify Shelf**. A window for modifying the shelf appears. Modify corresponding shelf parameters, which are described in the table below.

3- Click **OK**.

4- You can also execute the **MML** command **MOD SHF** to implement the same function.

c) Removing a shelf

1- Right click a shelf sub-node on the navigation tree. A shortcut menu is displayed.

2- Select **Remove Shelf**. A window for confirmation appears. Click **Yes**.

3- You can also execute the **MML** command **RMV SHF** to implement the same function.

❖ **Note:** Before deleting a shelf, you must delete all frames on the shelf.

2. Frame Management:

Double click a sub-node in the navigation tree in the device panel, all frames are displayed in the right part of the Device Panel Management window. This part is a simple shelf, or simple device panel window. The black number at the left side in each frame is the number of the frame. The system provides subscribers with functions of frame management, including adding frame, removing frame, modifying frame, listing frame, enabling emulated frame, displaying the status of a board in the frame, and show or hide failure bar. Functions of frame management are detailed in the following.

Operation:

a) Adding a frame

1- In the simple panel in the right section of the **Device Panel Management** window, right click a blank frame.

2- Select **Add Frame** in the menu and enter a frame number.

3- Click **OK** to add a new frame.

4- You can also execute the **MML** command **ADD FRM** to implement the same function.

b) Removing a frame

1- In the simple panel in the right section of the **Device Panel Management** window, right click the border of an existing frame.

2- Select **Remove Frame** in the menu to pop up a window for confirming the operation.

3- Click **OK** to remove the frame successfully.

4- You can also execute the **MML** command **RMV FRM** to implement the same function.

- **Note:** Before removing a frame, all boards in this frame must be removed.

c) Modifying a frame

1- In the simple panel in the right section of the **Device Panel Management** window, right click the border of an existing frame.

2- Select **Modify Frame** in the menu to pop up a window.

3- Enter parameters to set attributes to modify the frame. (The parameters are listed below).

4- Click **OK** to modify the frame.

5- You can also execute the **MML** command **MOD FRM** to implement the same function.

3. Board Management:

In the navigation panel in the left section, click TAB of the Device Panel to display all shelves of the NE. Double click a node to open the shelf and the running status of all frames and their boards is displayed.

Operation:

a) Adding a frame

1- Right click the empty slot in a frame to pop up a menu- Select **Add Board**.

2- In the window displayed, select mandatory parameters (such as Board type). Click **OK** to add a board in the specified position.

3 - You can also execute the MML command **ADD BRD** to implement the same function.

b) Removing a board

1- Right click the board in a slot of the frame.

2- Select **Remove Board** in the menu to pop up a window for confirmation Click **YES** to remove the board.

3 - You can also execute the MML command **RMV BRD** to implement the same function.

- **Note:** To remove boards, you should remove the main control board after other boards.

c) Modifying Soft Switch

- 1- Right click the board in a slot of the frame.
- 2- Choose **Modify Software Switch of Board Loading** on the shortcut menu. Then modify the software switch of board loading in the prompted window.
- 3- You can also execute the MML command **MOD LSS** to implement the same function.

4. Port Management

Port management can display the status of the port on a specific board. In the system, there are four kinds of ports: E1 port, ATM port, FE port and ATM2M port. To manage ports by operating on the device management window, you must enable the emulation frame. Refer to the Frame Management for detailed operations.

Operation

Displaying port status

- 1- Enable the emulation frame, and right click a port on a board.
- 2- Select Display Port on the shortcut menu. (Pay attention to the availability of the shortcut menu)
- 3- A window displaying the status of the port appears, including the port type, port status, and port loop type.
- 4- You can execute the **MML** command **DSP PORT** to implement the same function.

5. Board Loading Process

Board Loading Process in the device panel navigation, it monitors the procedure of starting or switching the boards, in order to trace the board loading process and the loaded files.

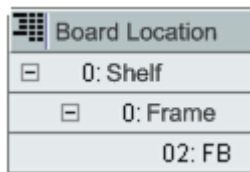
It displays the following information in a tree-like list:

- Board Location
- Load Process
- Board Type
- Load File
- Start Time

It also displays the following information in a history record list:

- Load Date
- Board Location
- Board Type
- Load File
- Start Time
- End Time

For instance, the following figure (**Fig 14**) shows the board loading process of the front board in slot 2 of frame 0 in shelf 0.






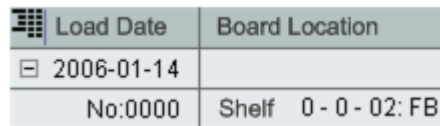
 Board Location
 0: Shelf
 0: Frame
02: FB

Fig 14: Board loading process

The following figure (**Fig 15**) shows the history record of the front board in slot 2 of frame 0 in shelf 0.





 Load Date	Board Location
 2006-01-14	
No:0000	Shelf 0 - 0 - 02: FB

Fig 15: History record of front board

4.2.2 Board information of UMG

This section introduces some basic knowledge of the boards in the UMG8900. This is divided into two panels. These are:

- Front Panel**
- Back Panel**

Front Panel:

SL	Board Name	Function	Board Capacity	Power Consumption
1	OMU	Operation and maintenance unit responsible for the management of the whole UMG8900	----	61 W
2	MPU	Providing switching functions at the FE control plane to exchange control information between all boards with FE control interfaces in the presence of a single frame, and exchange control information between frames and manage interfaces in the case of multi-frame cascading case. Monitoring and managing the board status in the frame.	----	60 W
3	CMF	Front connect management unit. Interworking with packet service boards, TDM service boards and service resource boards to implement service bearer conversion and service stream formats conversion.	Up to 64(H.248) links on each board and 128 links in the system	14.8 W
4	SPF	The sub-boards that attached on the MSPF, receives signaling from TDM switching boards and then deals with it at TDM level, and then the MSPF adapts TDM signaling to IP type. The MSPF implements M3UA/M2UA/V5UA/IUA adaptation on signaling based on SIGTRAN protocol, and	Up to 23 64kbit/sMTP2 links. Or, Up to one 2Mbit/s MTP2 link	33.5 W

		forward IP signaling to the MGC.		
5	FLU	The MFLU corresponds to the MBLU in the back slot. Providing one 8 k TDM data cascading channel for the MBLU.	----	3.4 W

Back Panel:

SL	Board name	Function	Board Capacity	Power Consumption
1	CMB	Back connect management unit. Interworking with packet service boards, TDM service boards and service resource boards to implement service bearer conversion and service stream formats conversion.	Up to 64(H.248) links on each board and 128 links in the system	15.7 W
2	NET	Providing packet service switching channels in a frame to exchange service data between all packet service boards in the frame.	----	38.4 W
3	CLK	Receiving one 2048 Kbit/s or 2048 kHz signal input from the external synchronization interface, two line clock inputs from the TDM interface board, and one satellite positioning signal input from the GPS/GLONASS system.	----	13 W
4	HRU	High-speed routing unit, Processing IP routes, converging and distributing IP services.	----	36.2 W

5	G10	Being equipped with the pluggable interface module and providing one GE interface or electrical interface in conformity with the IEEE8002.3z standard.	----	Optical module-7.6W Electrical module-1W
6	TNB	Establishing and releasing TDM time slots in cooperation with TDM service interface boards, and providing 8K or 2K or 1K switching capacity for each interface board.	----	49 W
7	E32	32E1 port TDM interface board	----	19.2 W
8	S4L	<ul style="list-style-type: none"> • Extracting clock signals and forming frames at the two 155 M optical interfaces. • Processing overheads of regenerator section and multiplex section of optical signals and checking communication over optical channels. • Implementing SDH mapping, de-mapping and processing overheads of high-order path and low-order path. <p>Forming 4*63 E1/2 * 84T1 frames and performing DS0 switch.</p>	----	25 W
9	BLU	Back cascading board, providing four 8 K TDM narrowband data channels to connect frames directly through multi-mode optical fibers that are no more than 50 m spaced.	----	19.4 W

4.2.3 Board information of SS

This section introduces some basic knowledge of the boards in the SOFTX3000, including their functions, technical indices and indicators.

SL	Board Name	Board Function	Board Capacity	Consumer Power
1	ALUI (Alarm Unit)	Controlled by SMUI, indicates the system status and reports the alarm information obtained by other means.	-----	2W
2	BFII (Back insert FE Interface Unit)	The Back insert FE Interface Unit (BFII) is the back interface board of the IFMI. It is used to implement FE driver processing and enable the external physical interface of the IFMI. The BFII is configured in pair with the IFMI.	-----	2 W
3	BSGI (Broadband Signaling Gateway)	The Broadband Signaling Gateway (BSGI) is used to process the IP packets after the IFMI level-1 dispatch. It processes the packets based on UDP, SCTP, MTP Layer-2 User Adaptation (M2UA), M3UA, V5UA, IUA, MGCP, H.248.	-----	16 W
4.	MSGI (Multimedia Signaling Gateway)	The Multimedia Signaling Gateway Unit (MSGI) processes UDP,TCP,H.323 (including H.323 RAS and H.323 Call Signaling) and SIP protocols	-----	16 W
5	SMUI (System Manage-	The System Management Unit (SMUI) is the main control board of a frame. The SMUI is used to:		14 W

	ment Unit)	<ul style="list-style-type: none"> • Configure shared resource buses and manage their status. • Manage all boards in the frame, report their status to the BAM and control the status of the indicators on the front panel of the ALUI through serial port bus and shared resource bus. • Load and manage system program and data. 	-----	
6	SIUI (System Interface Unit)	Provide the SMUI with Ethernet interface. Identify frame ID through the setting of the DIP switches.	-----	4 W
7	HSCI (Hot Swap Control Unit)	Ensure the switching of Ethernet buses in the frame. Conduct board hot swap control. Provide six external FE interfaces.	-----	16 W
8	UPWR (Universal Power)	It provides power supply for all the other boards in the frame.	-----	20 W
9	IFMI (IP Forward Module)	<p>The IFMI is used to:</p> <ul style="list-style-type: none"> • Receive and transmit IP packets. • Process Media Access Control (MAC) layer messages. • Distribute IP messages. • Provide IP interfaces together with the BFII. 	500,000 equivalent subscribers (MAX 4 pairs)	16 W
10	FCCU (Fixed Call Control Unit)	The Fixed Calling Control Unit (FCCU) controls calls and processes the following protocols: MTP3, ISUP, INAP, MGCP, H.248, H.323, SIP, R2, Digital signaling system No.1	<ul style="list-style-type: none"> • 50,000 equivalent subscribers (MAX 40 pairs) • 400K BHCA 	16 W

		(DSS1).Generates and stores bills in its bill pool.		
11	CDBI (Central Database Board)	As the database of the equipment, the CDBI stores all data of call location, gateway resources management, outgoing trunk circuit selection.	<ul style="list-style-type: none"> • Maximum 2 pairs in one system • One pair of CDBI:serve for 1,000,000 equivalent subscribers 	16 W
12	MRCA (Media resource Control Unit)	Each MRCA can function as an independent media resource server. The MRCA is used to : <ul style="list-style-type: none"> • Process the audio signals in real time. • Collect and generate DTMF signals. • Play and record audio clips. • Provide multi-party conference function. 	240 channels per card	40 W
13	MRIA (Media Resource Interface Unit)	It is used to provide 10/100 Mbit/s interface for the external media streams.	-----	2 W

#Protocol stacks of some boards:

1. Protocol stack of the BSGI:

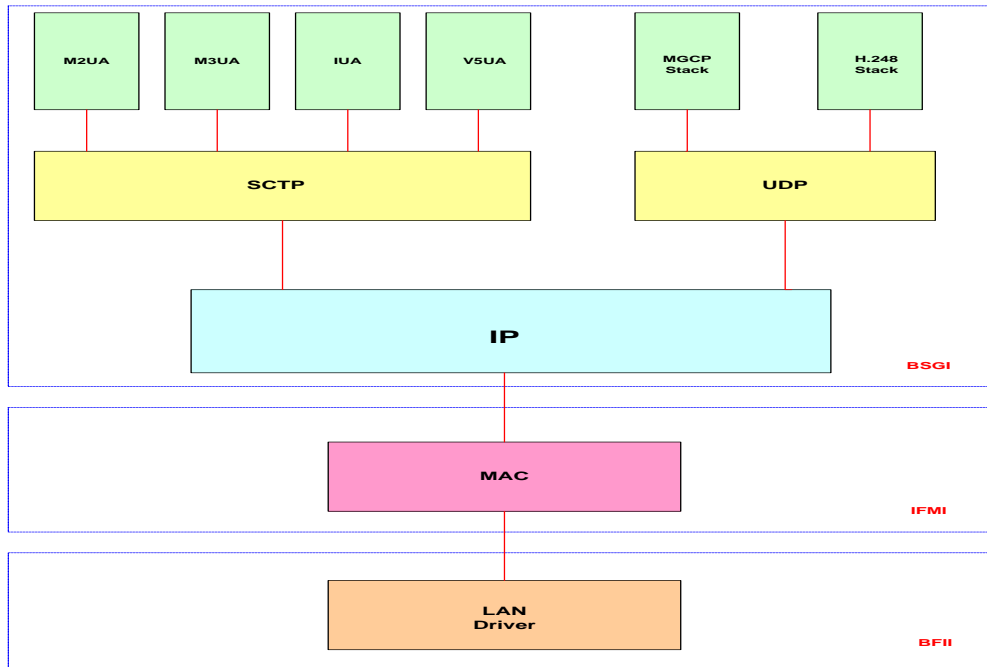


Fig 16: Protocol stack of the BSGI.

2. Protocol stack of MSGI:

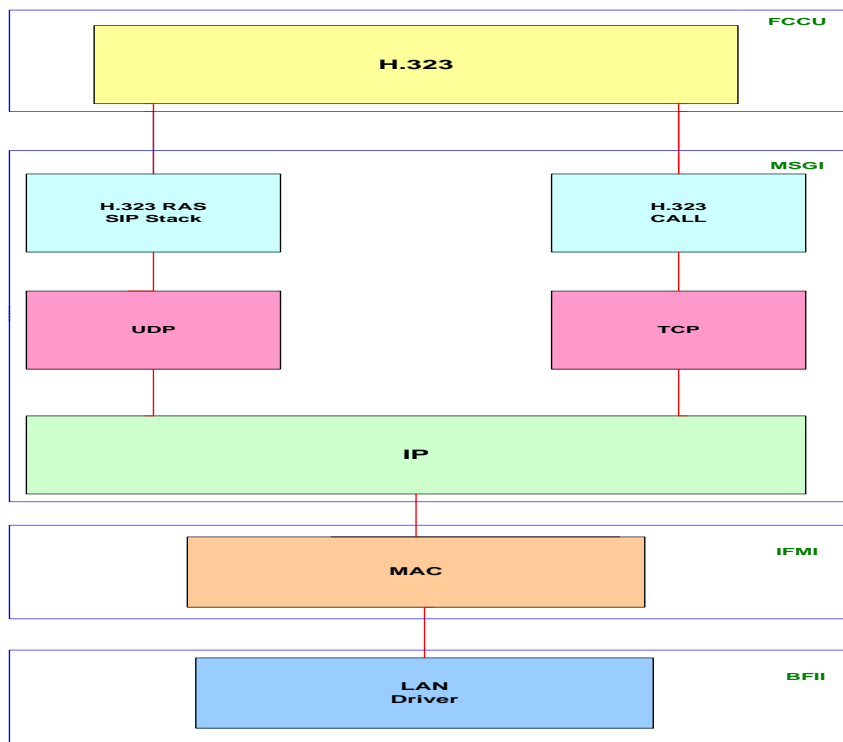


Fig 17: Protocol stack of the MSGI

3. Protocol stack of FCCU:

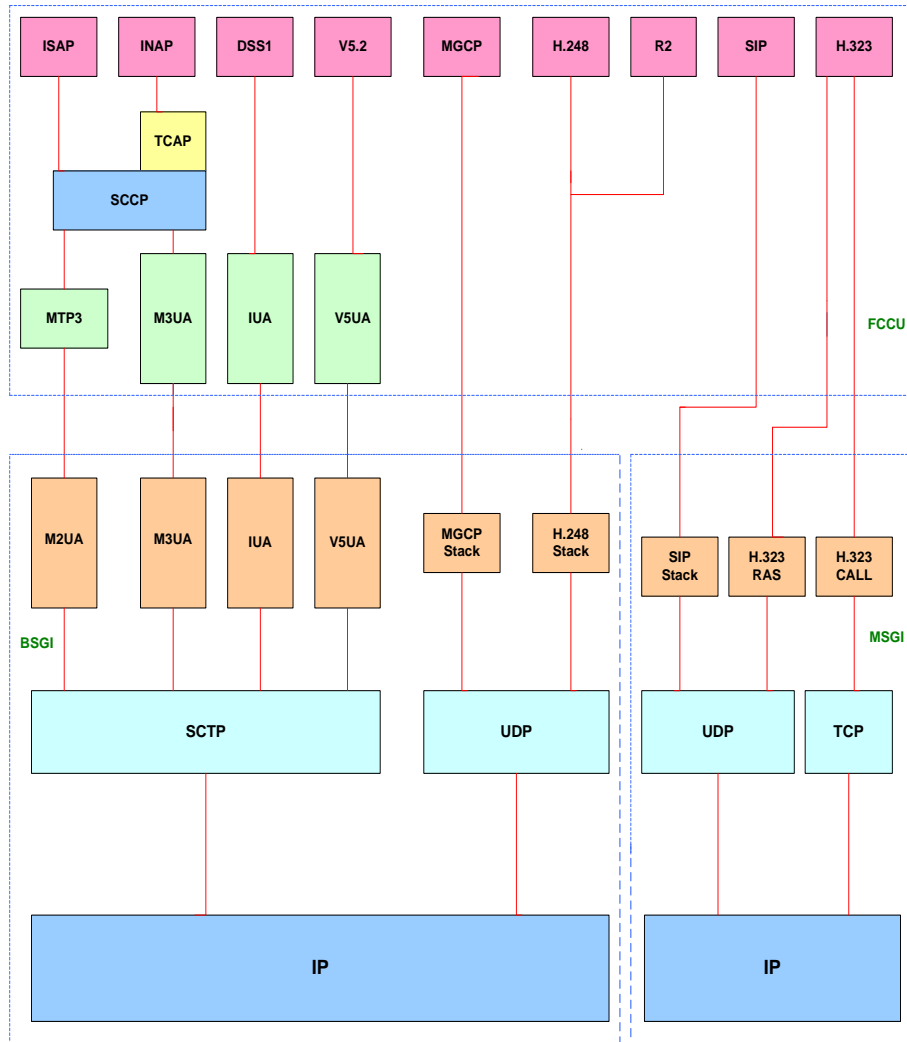


Fig 18: Protocol stack of the FCCU

Chapter 5

Call Flowing in hardware level

Processing Path for ISUP/INAP over MTP3/M2UA section describes the uplink path and downlink path for ISUP/INAP over MTP3/M2UA.

5.1 Uplink Path for ISUP/INAP over MTP3/M2UA

The uplink path in the SoftX3000 for ISUP/INAP over MTP3/M2UA is as shown in Fig 19

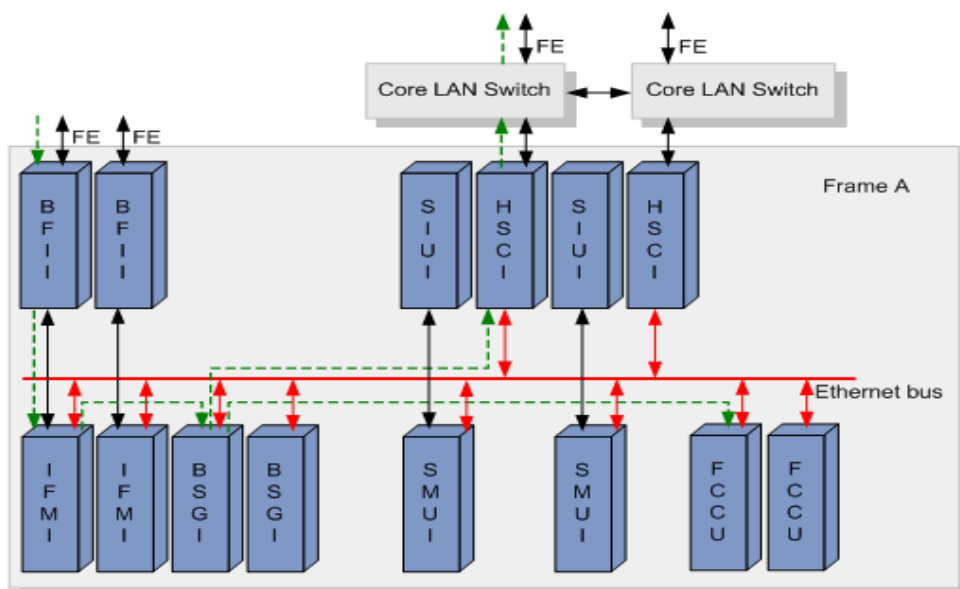


Fig 19: Uplink path for ISUP/INAP over MTP3/M2UA

NOTE:

If the destination BSGI and FCCU are resident in a different frame, the uplink path passes:

1. HSCI in the local frame
2. Core LAN Switch in the local frame
3. HSCI in the destination frame with the destination FCCU
4. Destination BSGI
5. Destination FCCU

1. The BFII performs the following steps:
 - Provides an external IP interface to receive IP packets.
 - Processes messages of the physical layer.
 - Transfers the packets to an IFMI through a fixed connection.
2. The IFMI processes the MAC messages, and then dispatches the messages to a designated BSGI through the Ethernet switching plane for further processing. The dispatch is based on the following:
 - IP protocol type
 - Local IP address
 - Local SCTP port number
 - Peer IP address
 - Peer SCTP port number

The mapping between the BSGI board number and the combination of the following items must be configured manually:

- IP protocol type
- Local IP address
- Local SCTP port number
- Peer IP address
- Peer SCTP port number

 **CAUTION:**

Media Gateway Control Protocol (MGCP), H.248, and SCTP can only be processed by a BSGI rather than an MSGI or IFMI.

3. The BSGI processes IP, SCTP, M2UA, and MTP3 messages, and then transfers the messages to the ISUP and SCCP dispatch modules of the board itself. The ISUP dispatch module dispatches the received messages to the FCCU that is responsible for their CIC through the Ethernet switching plane based on the NI, OPC, DPC and CIC in the messages. The SCCP dispatch module dispatches

the received messages to the FCCU that is responsible for their transactions based on the TCAP/INAP transaction ID.

4. The FCCU processes the ISUP/INAP messages.

5.2 Downlink Path for ISUP/INAP over MTP3/M2UA

The downlink path in the SoftX3000 for ISUP/INAP over MTP3/M2UA is as shown in Fig 20

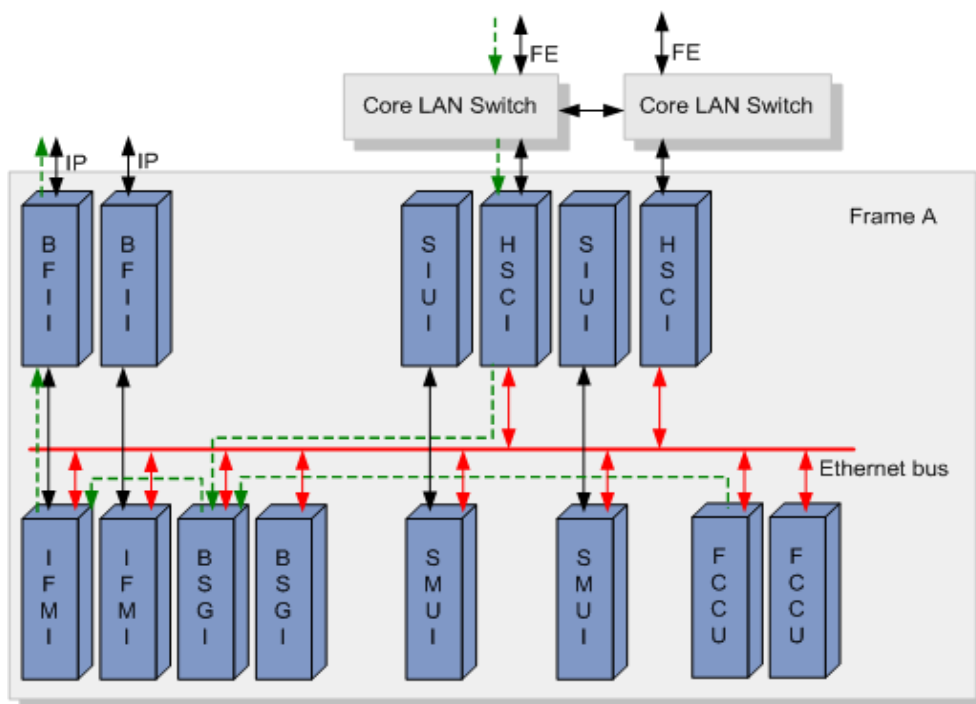


Fig 20: Downlink path for ISUP/INAP over MTP3/M2UA

1. The FCCU transmits received messages to a BSGI through the Ethernet switching plane based on the BSGI module number of the associated M2UA/MTP3 link.
2. The BSGI performs the following steps:
 - Processes the M2UA and MTP3 messages.
 - Determines an IFMI based on the source IP address of the IP packets.

- Dispatches associated messages to the designated IFMI through the Ethernet switching plane.
3. The IFMI processes the MAC-layer messages, and then transfers the IP messages to a BFII through a fixed connection.
 4. The IP signaling message packets are driven by the BFII then distributed out of the SoftX3000 through the network cable connected to the BFII.

Chapter 6

Basic configurations and commands in core system

6.1 Configuration for the connection of GP INTERNATIONAL (29/09/2012)

- **UMG CONFIGURATION:**

UMG LOC: 1/3/0 Board No. 0 & UMG LOC: 1/3/2 Board No. 0

ADD MTP2LNK: LNKNO=711, LNKNAME="GP-1152-INT1", IFBT=S4L, IFBN=0, OPN=0, E1T1N=0, STRTTS=16, ENDTS=16, SPFBN=0, SUBBN=0, BITREVERSE=OFF, LNKTYPE=M2UA64K, LKS=136, BINIFID=711;

ADD MTP2LNK: LNKNO=712, LNKNAME="GP-1152-INT2", IFBT=S4L, IFBN=0, OPN=0, E1T1N=1, STRTTS=16, ENDTS=16, SPFBN=1, SUBBN=0, BITREVERSE=OFF, LNKTYPE=M2UA64K, LKS=137, BINIFID=712;

ADD MTP2LNK: LNKNO=713, LNKNAME="GP-1152-INT3", IFBT=S4L, IFBN=0, OPN=2, E1T1N=0, STRTTS=16, ENDTS=16, SPFBN=0, SUBBN=0, BITREVERSE=OFF, LNKTYPE=M2UA64K, LKS=136, BINIFID=713;

ADD MTP2LNK: LNKNO=714, LNKNAME="GP-1152-INT4", IFBT=S4L, IFBN=0, OPN=2, E1T1N=1, STRTTS=16, ENDTS=16, SPFBN=1, SUBBN=0, BITREVERSE=OFF, LNKTYPE=M2UA64K, LKS=137, BINIFID=714;

- **SOFTX CONFIGURATION:**

ADD N7DSP: DPX=71, DPC="1152", OPC="11FD", DPNAME="GP-1152-INT";

ADD N7LKS: LSX=71, ASPX=71, LSNAME="GP-1152-INT";

ADD N7RT: LSX=71, DPX=71, RTNAME="GP-1152-INT";

ADD N7LNK: MN=136, LNKN=2, LNKNAME="GP-1152-INT1", LNKTYPE=M64K, M2LSX=136, BINIFID=711, LSX=71, SLC=0, TID=2064;

ADD N7LNK: MN=137, LNKN=2, LNKNAME="GP-1152-INT2", LNKTYPE=M64K, M2LSX=137, BINIFID=712, LSX=71, SLC=1, TID=2096;

ADD N7LNK: MN=136, LNKN=13, LNKNAME="GP-1152-INT3", LNKTYPE=M64K, M2LSX=136, BINIFID=713, LSX=71, SLC=2, TID=6160;

ADD N7LNK: MN=137, LNKN=12, LNKNAME="GP-1152-INT4", LNKTYPE=M64K, M2LSX=137, BINIFID=714, LSX=71, SLC=3, TID=6192;

ADD OFC: O=170, ON="GP-INT", DOT=INTT, DOL=LOW, DPC1="1152";

ADD SRT: SRC=1711, O=170, SRN="GP-INT-1711", RENT=URT;

ADD RT: R=171, RN="GP-INT", IDTP=UNKNOWN, NAMECFG=NO, SNCM=SRT, SRST=SEQ, SR1=1711, STTP=INVALID, REM=NO;

ADD CALLSRC: CSC=171, CSCNAME="GP-INT", LP=0, RSSC=171;

ADD N7TG: TG=1711, TGN="GP-INT-1711", EID="10.0.10.3:2944", G=INOUT, SRC=1711, SOPC="11FD", SDPC="1152", CSC=171, CSM=MINCIC, RCHS=0, PRTFLG=ITUT_Q767, NOAA=FALSE, ISM=FALSE, EA=FALSE;

// ADD RTANA: RSC=2517, RSSC=23, TM=TMM, R=170;

// ADD RTANA: RSC=25, RSSC=170, TM=TMM, R=25;

// ADD CNACLD: LP=0, PFX=K'23017, CSTP=BASE, CSA=NTT, RSC=171, MINL=13, MAXL=13, CHSC=0, EA=NO;

// ADD CNACLD: LP=0, PFX=K'25017, CSTP=BASE, CSA=NTT, RSC=2517, MINL=13, MAXL=15, CHSC=0, EA=YES, DEST=2517, ASF=NO, QCDN=NO, OBDMFFLAG=NO, VPNF=NOVC;

ADD 1 STM-1 UMG LOC: 1/3/0 Board No. 0

ADD N7TKC: MN=24, TG=1711, SC=0000, EC=0319, SCIC=0000, TID="2048";

ADD N7TKC: MN=24, TG=1711, SC=0320, EC=0639, SCIC=0320, TID="2368";

ADD N7TKC: MN=24, TG=1711, SC=0640, EC=0959, SCIC=0640, TID="2688";

ADD N7TKC: MN=24, TG=1711, SC=0960, EC=1279, SCIC=0960, TID="3008";

ADD N7TKC: MN=24, TG=1711, SC=1280, EC=1599, SCIC=1280, TID="3328";
 ADD N7TKC: MN=24, TG=1711, SC=1600, EC=1919, SCIC=1600, TID="3648";
 ADD N7TKC: MN=24, TG=1711, SC=1920, EC=2015, SCIC=1920, TID="3968";

ADD 1 STM-1 UMG LOC: 1/3/2 Board No. 0

ADD N7TKC: MN=23, TG=231, SC=6048, EC=6367, SCIC=2016, TID="6144";
 ADD N7TKC: MN=23, TG=231, SC=6368, EC=6687, SCIC=2336, TID="6464";
 ADD N7TKC: MN=23, TG=231, SC=6688, EC=7007, SCIC=2656, TID="6784";
 ADD N7TKC: MN=23, TG=231, SC=7008, EC=7327, SCIC=2976, TID="7104";
 ADD N7TKC: MN=23, TG=231, SC=7328, EC=7647, SCIC=3296, TID="7424";
 ADD N7TKC: MN=23, TG=231, SC=7648, EC=7967, SCIC=3616, TID="7744";
 ADD N7TKC: MN=23, TG=231, SC=7968, EC=8063, SCIC=3936, TID="8064";

6.2 Basic commands

1. To see running calls: DSP OFTK

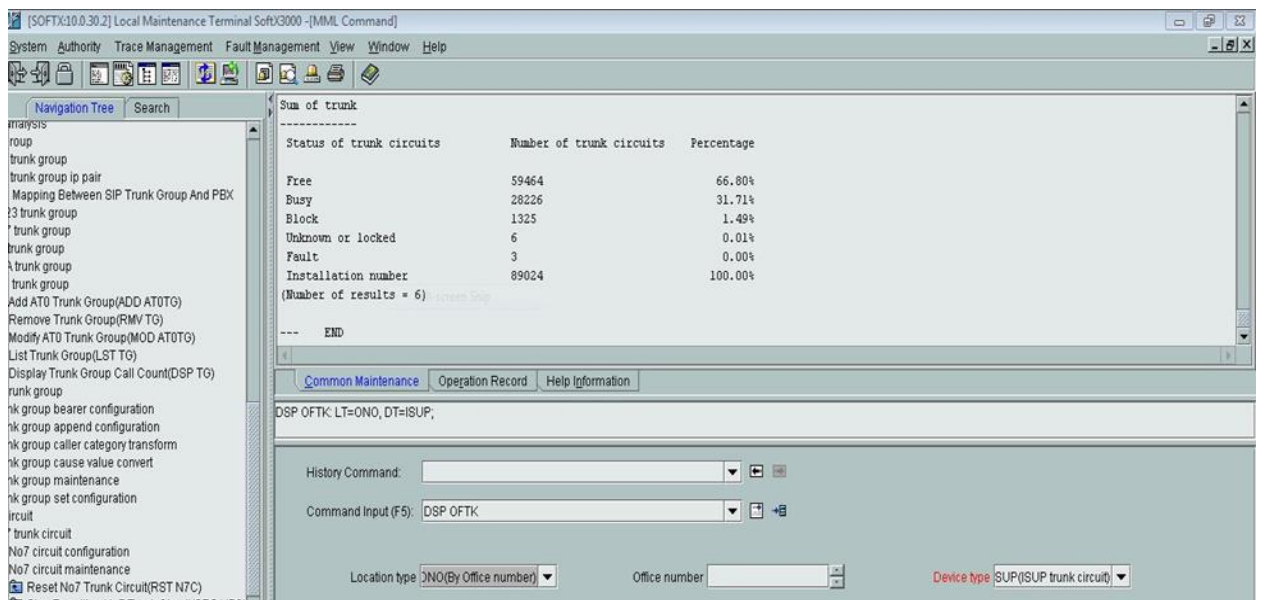


Fig 21: MML command for running call observation

2. To see incoming and outgoing calls: DSP OFTK

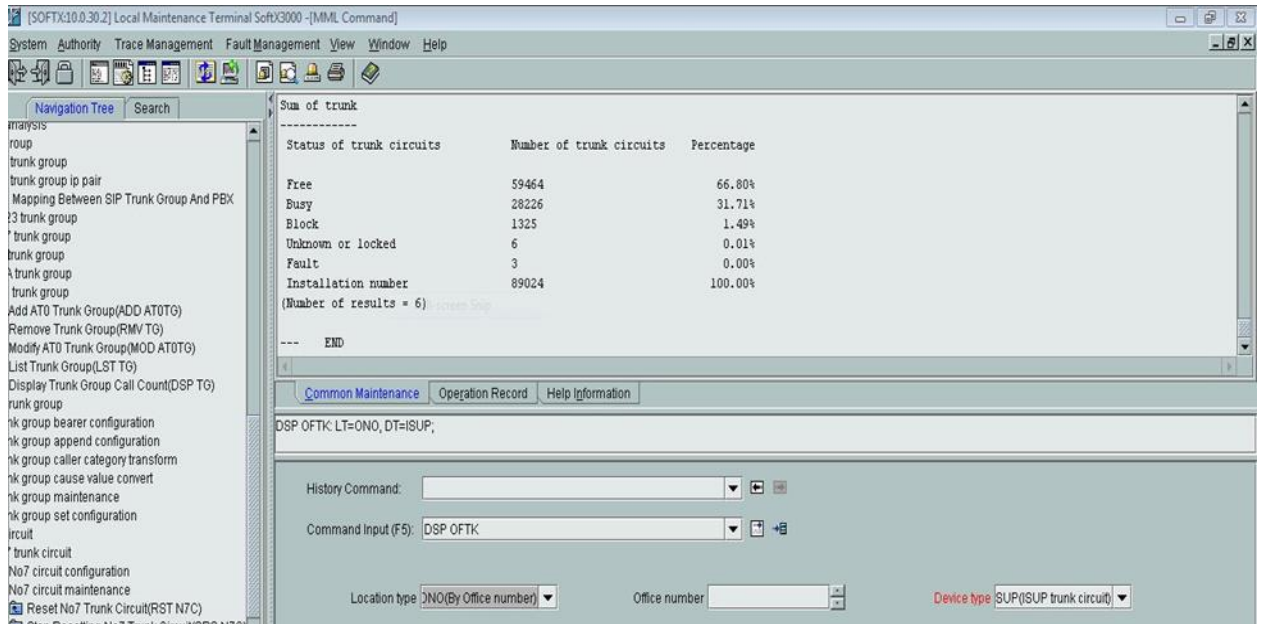


Fig 22: MML command for incoming and outgoing call observation

3. To see the trunk group number: LST TG

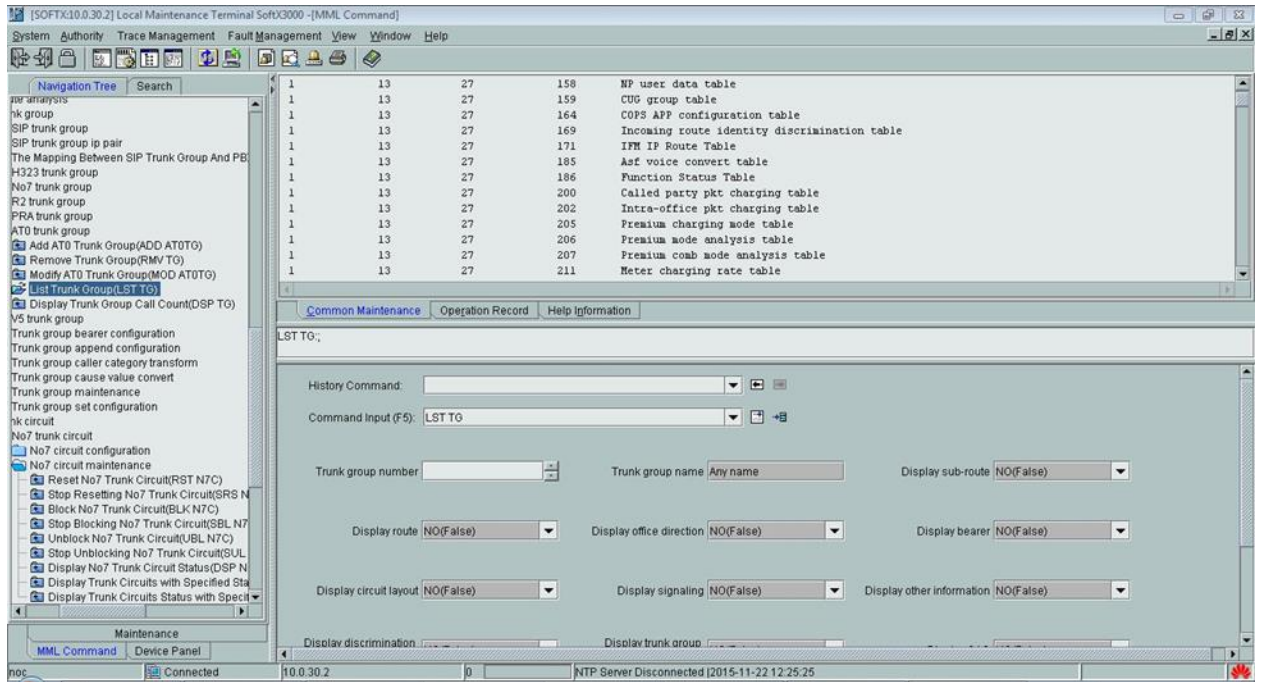


Fig 23: MML command for trunk group number observation

4. To know any information of any IGW's specific link

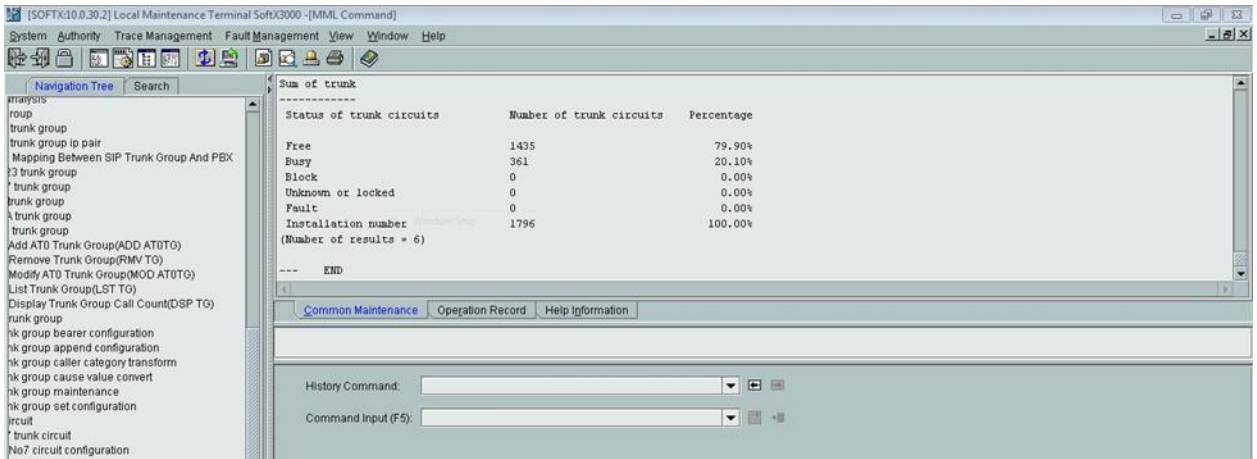


Fig 24: MML command for IGW's specific link observation

5. To see the start circuit and end circuit and the trunk group number: LST CIC

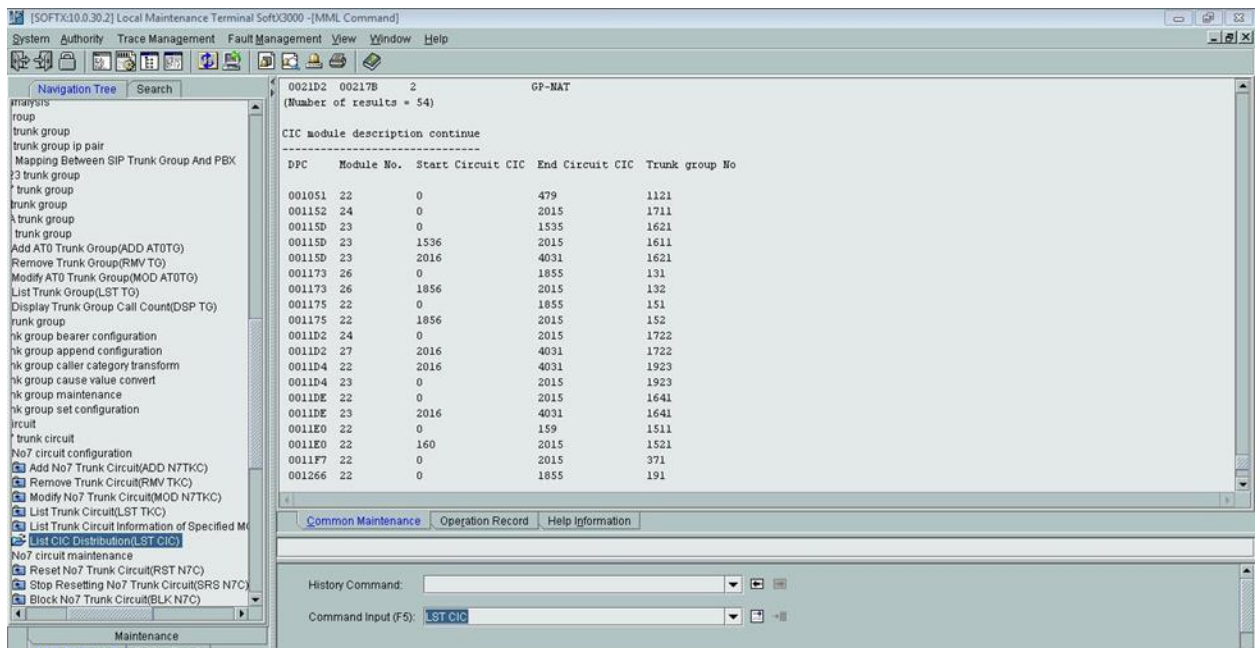


Fig 25: MML command for circuit and trunk group number observation

6. To see the summary of total link: LST N7LNK

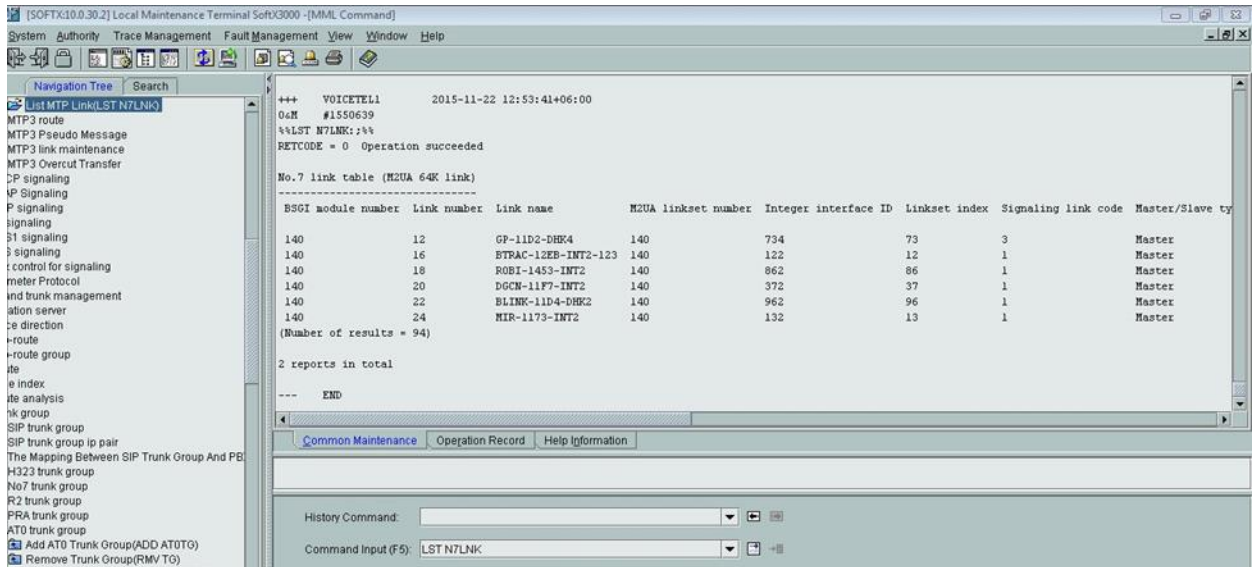


Fig 26: MML command for summary of total link observation

7. List route: LST RT

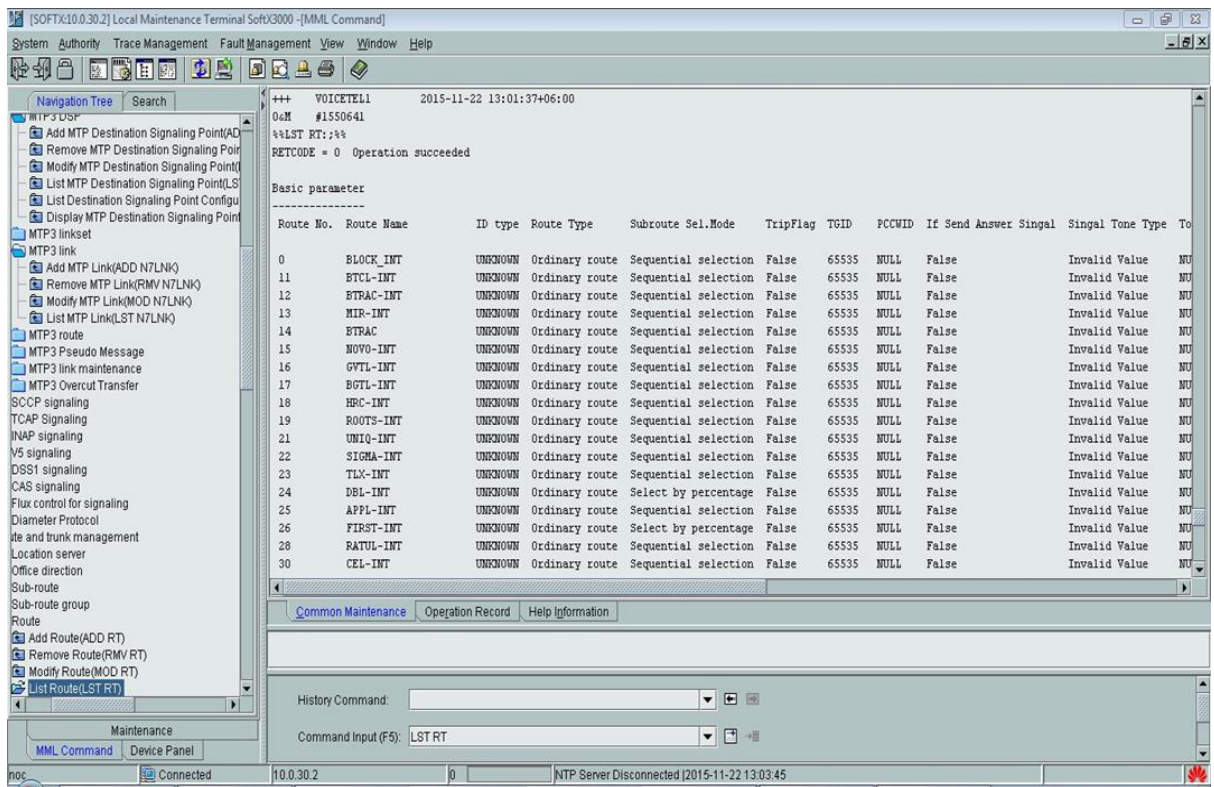


Fig 27: MML command for List of route observation

8. List route analysis: LST RTANA

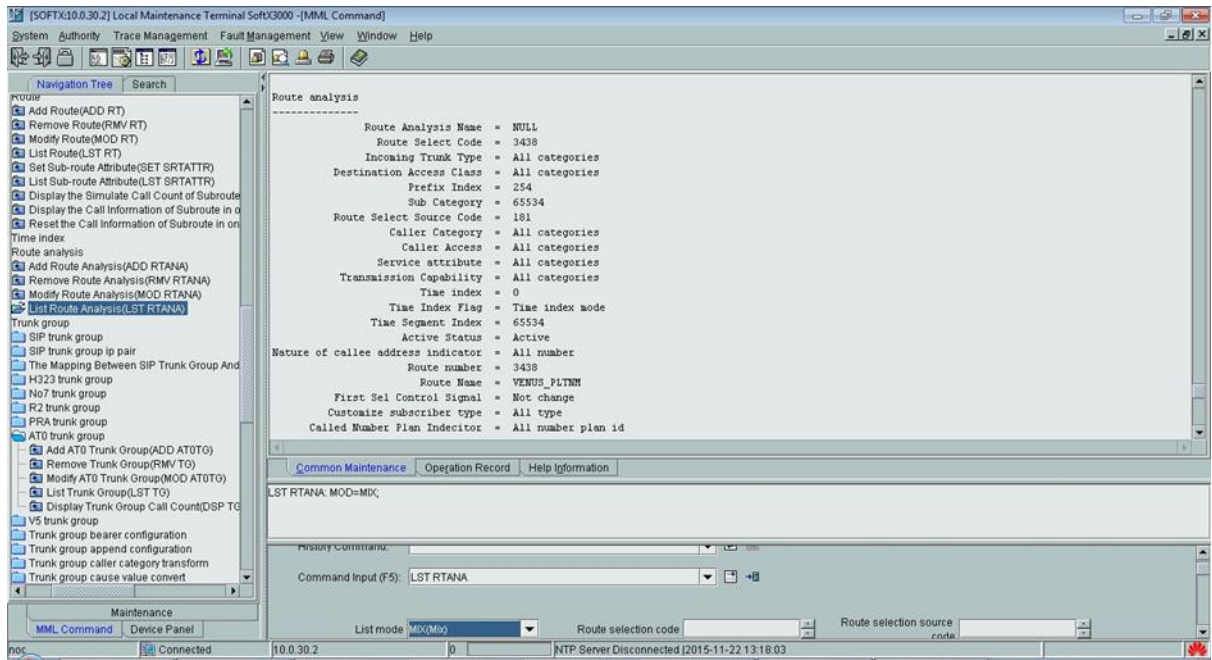


Fig 28: MML command for List of route analysis observation

This is all about my gained knowledge from core department.

Chapter 7

NOC

In the practical part of my internship I worked in NOC. NOC abbreviation stands for Network Operations Center. In NOC mainly network alarms are checked. After getting alarm, maintenance are done from the NOC by the server, if it is not possible sometimes then experts take the responsibility for maintenance.

There are four types of alarm found in the NOC. These are:

1. Major alarm
2. Critical alarm
3. Minor alarm
4. Warning alarm

The figures (Fig 29, 30, 31, and 32) below show the alarms of SOFTX, UMG-DHK, UMG-CTG and UMG-KHL of core system respectively:

The screenshot shows the 'Browse Alarm' window for SOFTX. The status bar indicates 0 Critical, 2 Major, 0 Minor, 0 Warning, and 0 Cleared alarms. The main table displays two major alarms:

Serial No.	Alarm Name	Alarm Severity	Raised/Clear Time	Location Info	Alarm ID	Module ID	Event Type	Alarm Type	NE Name
38456	The number of subscribers reache...	Major	2015-09-22 10:51:24	Configuration Item=64 kbit/s link, Lice...	2311	0(BAM)	Running	Fault	VOICETEL1
38457	The number of subscribers reache...	Major	2015-09-22 10:51:24	Configuration Item=The number of acti...	2311	0(BAM)	Running	Fault	VOICETEL1

Fig 29: Alarms of SOFTX

The screenshot shows the 'Browse Alarm' window for UMG-DHK. The status bar indicates 0 Critical, 3 Major, 997 Minor, 0 Warning, and 32 Cleared alarms. The main table displays a list of minor path fault alarms:

Serial No.	Alarm Name	Alarm Severity	Raised/Clear Time	Location Info	Alarm ID	Module ID	Event Type	Alarm Type	NE Name
62917	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62918	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62919	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62920	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62921	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62922	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62923	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62924	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62925	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62926	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62927	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62928	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...
62929	SDH/STM-1 path fault	Minor	2015-07-01 14:36:07	Frame No=1, Slot No=13, Board Posi...	2658	75	Trunk	Fault	HUAWEI UMG8...

Fig 30: Alarms of UMG-DHK

Serial No.	Alarm Name	Alarm Severity	Raised/Clear Time	Location Info	Alarm ID	Module ID	Event Type	Alarm Type	NE Name
21648	SDH/STM-1 path fault	Minor	2015-06-15 14:08:13	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
21649	SDH/STM-1 path fault	Minor	2015-06-15 14:08:13	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
21650	SDH/STM-1 path fault	Minor	2015-06-15 14:08:13	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
21651	SDH/STM-1 path fault	Minor	2015-06-15 14:08:13	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
21652	SDH/STM-1 path fault	Minor	2015-06-15 14:08:13	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
21653	SDH/STM-1 path fault	Minor	2015-06-15 14:08:13	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
21654	SDH/STM-1 path fault	Minor	2015-06-15 14:08:13	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
21655	SDH/STM-1 path fault	Minor	2015-06-15 14:08:13	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...

Fig 31: Alarms of UMG-CTG

Serial No.	Alarm Name	Alarm Severity	Raised/Clear Time	Location Info	Alarm ID	Module ID	Event Type	Alarm Type	NE Name
7721	SDH/STM-1 fault	Major	2014-06-05 10:45:55	Frame No=1, Slot No=4, Board Positi...	2656	75	Trunk	Fault	HUAWEI UMG8...
7722	SDH/STM-1 fault	Major	2014-06-05 10:45:54	Frame No=1, Slot No=4, Board Positi...	2656	75	Trunk	Fault	HUAWEI UMG8...
7723	SDH/STM-1 fault	Major	2014-06-05 10:45:55	Frame No=1, Slot No=4, Board Positi...	2656	75	Trunk	Fault	HUAWEI UMG8...
14694	SDH/STM-1 path fault	Minor	2015-10-13 01:35:09	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
14695	SDH/STM-1 path fault	Minor	2015-10-13 01:35:09	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
14696	SDH/STM-1 path fault	Minor	2015-10-13 01:35:09	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
14697	SDH/STM-1 path fault	Minor	2015-10-13 01:35:09	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
14698	SDH/STM-1 path fault	Minor	2015-10-13 01:35:09	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
14699	SDH/STM-1 path fault	Minor	2015-10-13 01:35:09	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...
14700	SDH/STM-1 path fault	Minor	2015-10-13 01:35:09	Frame No=1, Slot No=3, Board Positi...	2658	75	Trunk	Fault	HUAWEI UMG8...

Fig 32: Alarms of UMG-KHL

Apart these there are monitoring issues also.

1. Top-30 route analysis:

Mainly there are 30 countries where outgoing calls are passed through IGW via ICX. The destinations (IGWs) are selected by the ICX according to IGWs performance. Performance is measured by some parameters which are shown in **Fig 33**. These are:

- Attempt→ number of calls per 15 minutes
- CER→ Call Established Ratio
- ASR→ Average Success Ratio (connected + received)
- ACD→ Average Call Duration (averagely calling time in second)

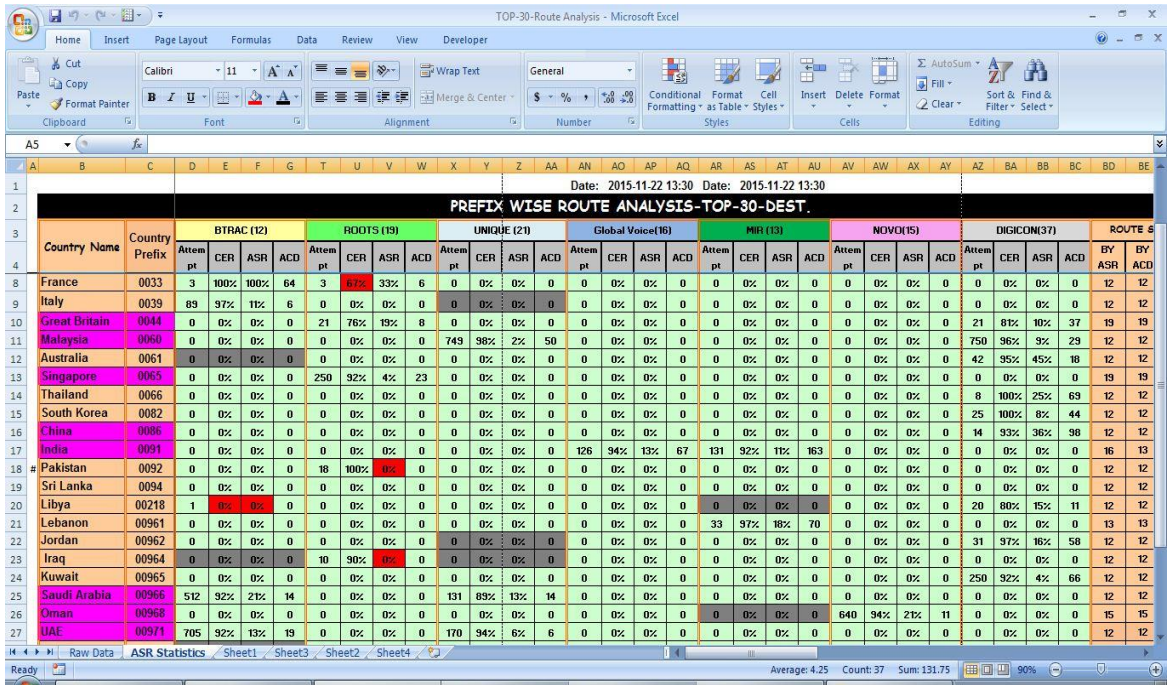


Fig 33: Top-30 route analysis

If the performance of an IGW is not good, we can change the route by selecting MOD CNACLD command according to Fig 34(a) and then we need to copy it.

2015-11-25 11:45													BG		BH		BI		BJ		BK	
30-DEST.																						
MR (13)			NOVO (15)			DIGICON (37)			ROUTE SELECTION													
CER	ASR	ACD	Attem pt	CER	ASR	ACD	Attem pt	CER	ASR	ACD	BY ASR	BY ACD	Final Selection	Preferred Destination								
0%	0%	0	1	100%	0%	0	0	0%	0%	0	19	19	19	19	MOD CNACLD: LP=0, PFX=k000 ,RSC=	19	.EA=NO,					
13%	28%	66	0	0%	0%	0	0	0%	0%	0	13	13	1319	1319	MOD CNACLD: LP=0, PFX=k001 ,RSC=	1319	.EA=NO,					
0%	0%	0	0	0%	0%	0	0	0%	0%	0	12	12	12	12	MOD CNACLD: LP=0, PFX=k0027 ,RSC=	12	.EA=NO,					
0%	0%	0	0	0%	0%	0	0	0%	0%	0	19	19	1219	1219	MOD CNACLD: LP=0, PFX=k0033 ,RSC=	1219	.EA=NO,					
0%	0%	0	0	0%	0%	0	0	0%	0%	0	12	12	12	12	MOD CNACLD: LP=0, PFX=k0039 ,RSC=	12	.EA=NO,					
0%	0%	0	0	0%	0%	0	0	0%	0%	0	19	12	1219	1219	MOD CNACLD: LP=0, PFX=k0044 ,RSC=	1219	.EA=NO,					
0%	0%	0	0	0%	0%	0	734	96%	4%	15	12	12	2137	2137	MOD CNACLD: LP=0, PFX=k0060 ,RSC=	2137	.EA=NO,					
0%	0%	0	0	0%	0%	0	48	88%	19%	25	12	12	37	37	MOD CNACLD: LP=0, PFX=k0061 ,RSC=	37	.EA=NO,					
0%	0%	0	0	0%	0%	0	0	0%	0%	0	19	19	19	19	MOD CNACLD: LP=0, PFX=k0065 ,RSC=	19	.EA=NO,					
0%	0%	0	0	0%	0%	0	0	0%	0%	0	19	19	19	19	MOD CNACLD: LP=0, PFX=k0066 ,RSC=	19	.EA=NO,					
0%	0%	0	0	0%	0%	0	0	0%	0%	0	12	12	21	21	MOD CNACLD: LP=0, PFX=k0082 ,RSC=	21	.EA=NO,					
0%	0%	0	0	0%	0%	0	18	100%	28%	31	12	12	37	37	MOD CNACLD: LP=0, PFX=k0086 ,RSC=	37	.EA=NO,					

Fig 34(a): Change of route

After that SELECT System → Batch command according to **Fig 34(b)**, then need to paste it.

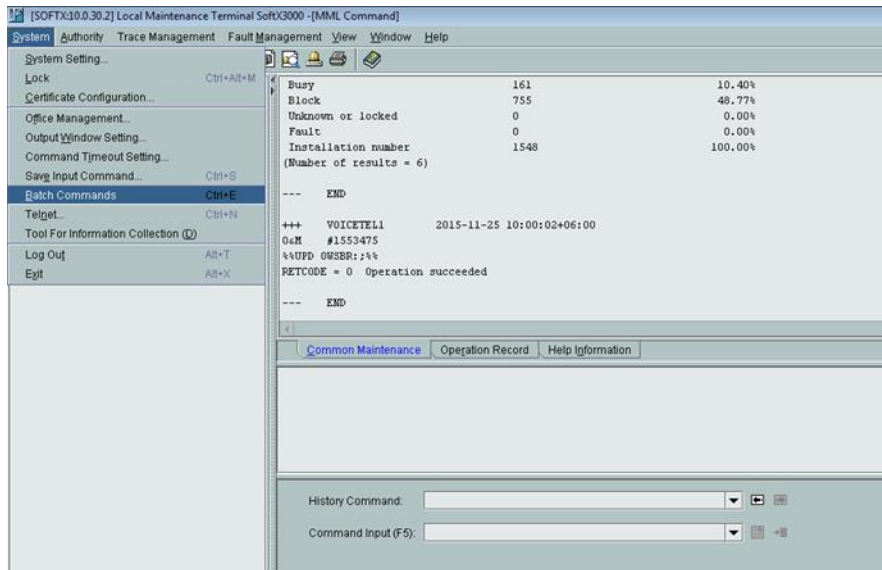


Fig 34(b): Change of route

After that CLICK Go. So route will be changed according to **Fig 34(c)**

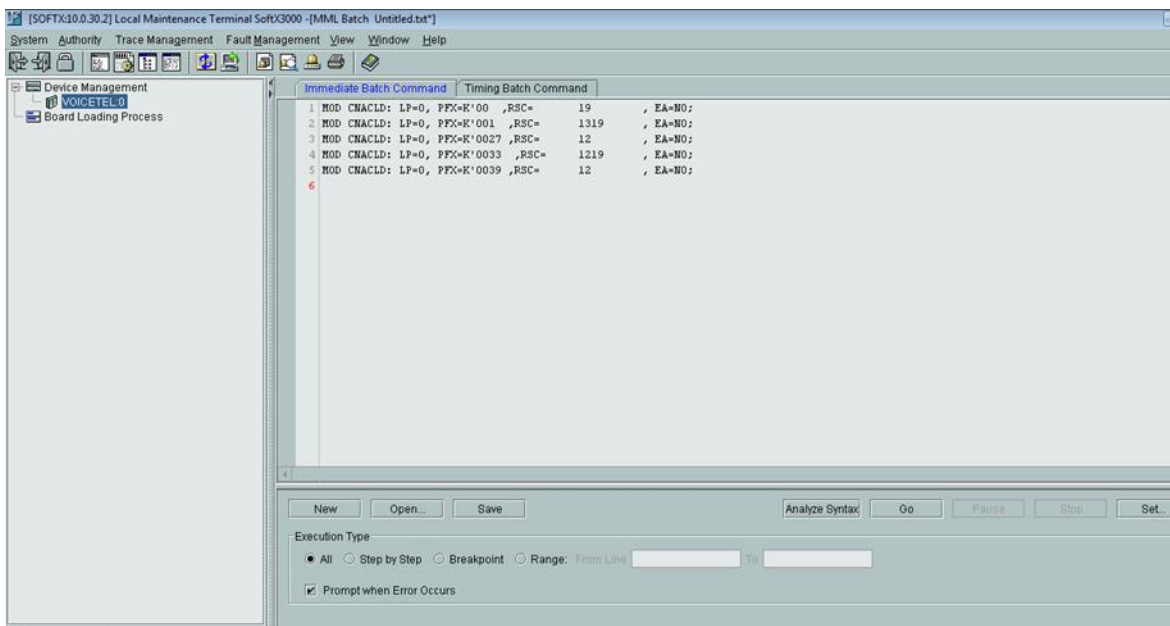


Fig 34(c): Change of route

2. IGW to ANS analysis:

Performance of incoming calls from IGW to ANS are monitored here (Fig 35). It is monitored per hour.

Time	BTRAC (12)			MIR (13)			NOVO (15)			GLOBAL VOICE (16)			ROOTS (19)			UNIQUE (21)								
	Attempt	CER	ASR	ACD	Attempt	CER	ASR	ACD	Attempt	CER	ASR	ACD	Attempt	CER	ASR	ACD	Attempt	CER	ASR	ACD				
00:00-01:00	0	0%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	8	75%	25%	4.4	3	100%	33%	0.5	0	0%	0%	0.0
01:00-02:00	0	0%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	4	100%	25%	2.0	1	100%	100%	22.8	0	0%	0%	0.0
02:00-03:00	1	100%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	1	100%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0
03:00-04:00	0	0%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0
04:00-05:00	1	0%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	2	100%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0
05:00-06:00	2	100%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	1	100%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0
06:00-07:00	1	100%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	2	100%	50%	0.7	2	100%	0%	0.0	0	0%	0%	0.0
07:00-08:00	2	100%	0%	0.0	0	0%	0%	0.0	0	0%	0%	0.0	5	80%	0%	0.0	2	100%	0%	0.0	5	80%	0%	0.0
08:00-09:00	5	100%	20%	12.4	0	0%	0%	0.0	0	0%	0%	0.0	14	93%	21%	4.0	5	80%	40%	2.7	26	88%	27%	5.8
09:00-10:00																								
10:00-11:00																								
11:00-12:00	3	100%	100%	0.5	0	0%	0%	0.0	0	0%	0%	0.0	18	100%	33%	12.9	6	100%	33%	0.4	0	0%	0%	0.0
12:00-13:00	5	100%	40%	0.4	0	0%	0%	0.0	0	0%	0%	0.0	22	100%	32%	5.7	13	100%	100%	1.9	0	0%	0%	0.0
13:00-14:00																								
14:00-15:00																								
15:00-16:00																								

Fig 35: IGW to ANS analysis

3. Traffic report:

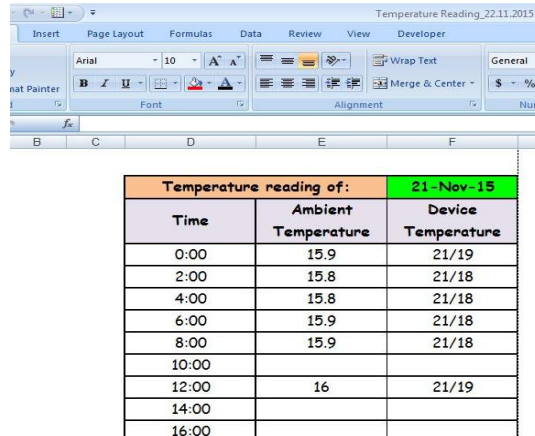
Traffic report within a network allows network managers and analysts to both make day-to-day decisions about operations and to plan for long-term developments. A network traffic analyst must take measurements for the busiest hour of each day. We take report per hour (Fig 36).

Date & Time							
22-Nov-2015 13:00							
Rtn	IGW	CER	ASR	ACD	Last Hour Minute	Total Minute	Target Minute
12	BTRAC	91%	14%	14	197	1,117	4000
13	MIR	81%	19%	82	265	1,673	4000
15	NOVO	87%	19%	11	118	756	2500
16	GLOBAL VOICE	80%	12%	35	248	984	2500
19	ROOTS	89%	7%	48	160	1,410	4000
21	UNIQUE	50%	5%	18	65	317	2500
37	DIGICON	93%	9%	45	325	1,535	4000
						7,792	23,500

Fig 36: Traffic report

4. Temperature reading:

It is needed to monitor ambient temperature and device temperature (Fig 37).



Temperature reading of: 21-Nov-15		
Time	Ambient Temperature	Device Temperature
0:00	15.9	21/19
2:00	15.8	21/18
4:00	15.8	21/18
6:00	15.9	21/18
8:00	15.9	21/18
10:00		
12:00	16	21/19
14:00		
16:00		

Fig 37: Temperature reading

5. For observing device temperature:

Device temperature is collected from the device panel management (Fig 38).

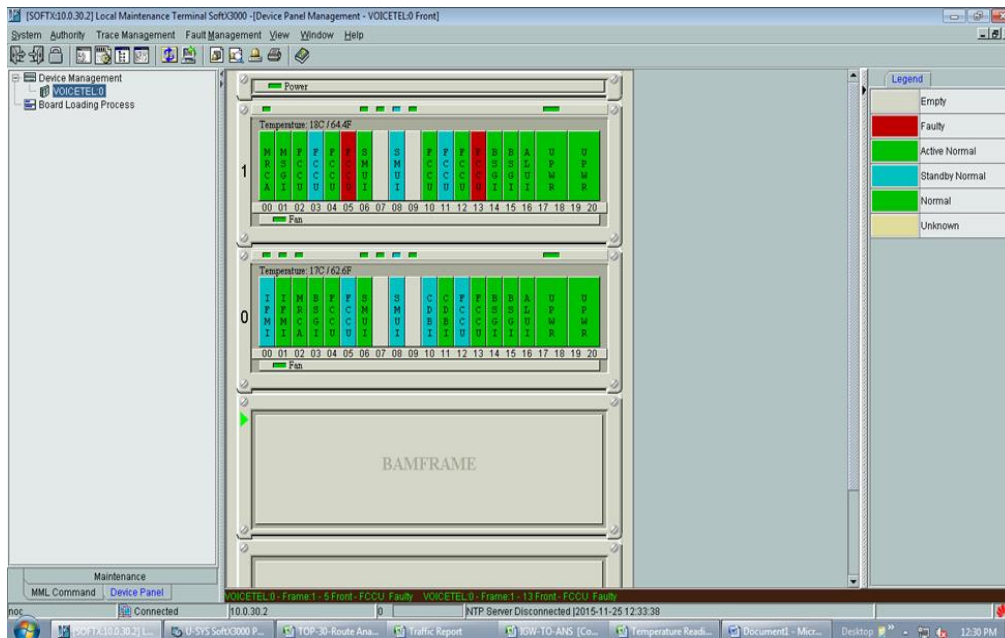


Fig 38: Observation of device temperature

Conclusion

At last I want to say that work with core network and besides in NOC is very compulsive. I have got the opportunity to gain practical experiences using my theoretical knowledge. I have learned so many informative things from there to apply in future in professional field.

References

1. <http://e.huawei.com/en/products/wireless/gsm-r/core-network/umg8900>
2. <http://www.voip-info.org/wiki/view/softswitch>
3. <http://carrier.huawei.com/en/products/core-network/singlecore/fixed-softswitch>
4. <http://www.btrc.gov.bd>
5. www.wikipedia.com
6. www.google.com
7. www.wikianswer.com
8. IT division documentation of Voicetel
9. <http://www.voicetelltd.com>
10. http://www.btrc.gov.bd/old/jdownloads/Current%20News/icx2009_draft_licensing_guideline.pdf