OVER VIEW OF NEW TECHNOLOGY SWITCHING SYSTEM

New Switching Systems-General

An Electronic exchange has following hardware units in general (Fig.1).

1. Subscriber Connection Units (SCU)
2. Trunks Connection Unit (TCU)
3. Switching Network (SN)
4. Special Circuit Units (SPCU), i.e., Tones, MF receivers/generators, etc.
5. Central Control nit (CCU) and its assigned units, i.e.,
   (a) Man machine Interface (MMI)
   (b) External Memory (EM)
   (c) Alarm Display Unit (ADU)
   (d) Clock Generator (CG)
6. CCS7 handling (CCSU).

Main function of these units are: -

1. Subscriber Connection Units (SCU)

Analog and digital subscribers (2B+D) are terminated on these units on analog/digital line cards. In some systems digital card can be mixed with analog cards in the same shelf (EWSD) or rack. Some NSS (EXE-10, Fetex-150) have facility to connect Pas (30B_D). In some systems local SCUs are directly connected to Switching networks (AXE-10, Fetex-150) and in others through TCU (EWSD). These links can be 2Mbps (AXE-10), 4Mbps (EWSD) or 8Mbps (FETEX-150).

Remote SCUs are invariably connected via 2Mbps links with main exchange on local interface, which may be type of TCU.

All NSS provide facility of local switching in case of isolation and some even provide local metering in such case (5ESS).

2. **Trunks Connection Unit (TCU).**
In all NSS, 2Mbps links from other exchanges or remote SCUs are terminated on TCUs which are connected to SN via 2Mbps (AXE-10) or 8Mbps links.

3. **Switching Network (SN)**

Most of NSS switch 2048 numbers of 2Mbps (AXE-10) or 512 numbers of 8Mbps links and utilize TST switching. EWSD in higher configuration utilizes TSSST switching. In OCB only Time switching is utilized.

4. **Special Circuit Unit (SPCU), i.e., Tones, MF receivers/generators, etc.**

In most of NSS Tones and MF receivers are provided centrally, hence, are available globally to all subscribers and trunks. In some systems MF receivers for subscribers are provided in SCUs itself (AXE-10) and in some systems these are provided in TCUs and thus are available locally only to the trunks and/ or subscribers connected to the TCU.

5. **Central Control Unit (CCU)**

All call processing software, analysis, routing and metering data is available in the CCU. The number of processors and size of memory is expandable according to exchange size.

Other units to assigned to CCU are:

(a) **Man Machine Interface (MMI)**
General PC ATs are used in NSS to give Commands and to display system response. The facility of menu driven

commands is also available in some systems (EWSD. EFTEX-150).

(b) **External Memory (EM)**

EM is used to store not so often-used software programs and also to store non-permanent data i.e. alarms, metering and detailed billing information. etc. Hard-disk drives and Magnetic tape drives are used as EM.

(c) **Alarm Display Unit (ADU)**

ADU gives audible and visual alarms in case of fault and abnormal traffic conditions in the exchange.

(d) **Clock Generator (CG)**

TB provides timing pulses of various frequencies to synchronize the functioning of various units in the exchange.

6. **CCS7 handling unit (CCSU)**

All NSS have the compatibility to handle CCS7 and ISDN services. For this purpose CCSU handle the signalling links (MTP: level 1,2 & 3 functions). The Signalling Links from TCUs are transported to CCSU via SN and processed. In Signalling Transfer Point mode, the signalling links are recreated by CCSU and transported to concerned TCU for onward transmission to distant exchange. In Signalling Point function, the signalling message is sent to concerned TCU, where the User part (UP: level 4) functions are provided via CCU and SN.

The architecture of three NSSs i.e., Seimen's EWSD, Fujitsu's Fetex-150 and Ericssion's AXE-10 Digital Switching Systems will be discussed on the pattern of the general architecture of an Electronic Exchange, as explained above.

Block Diagram of a Digital Electronic Exchange

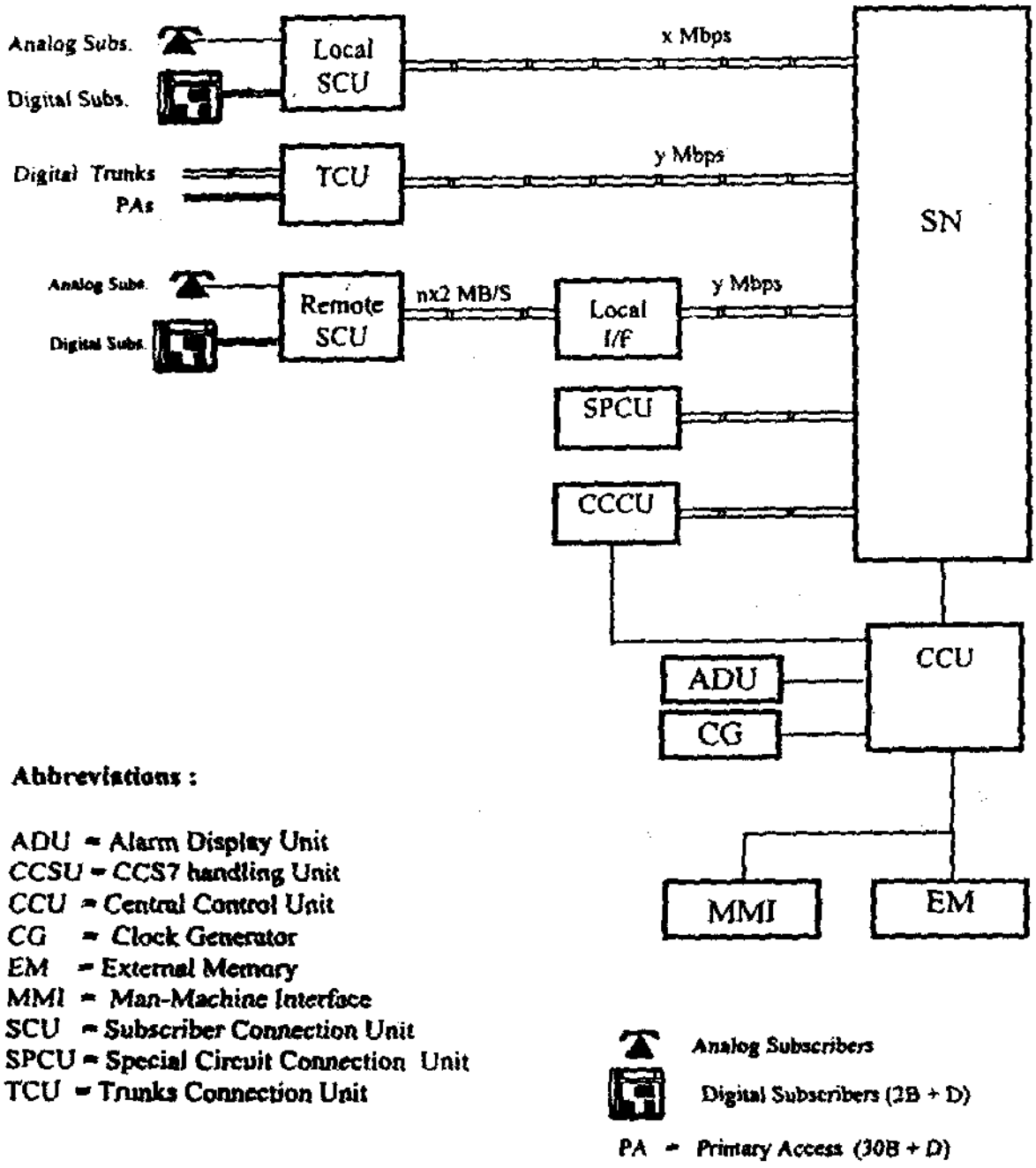
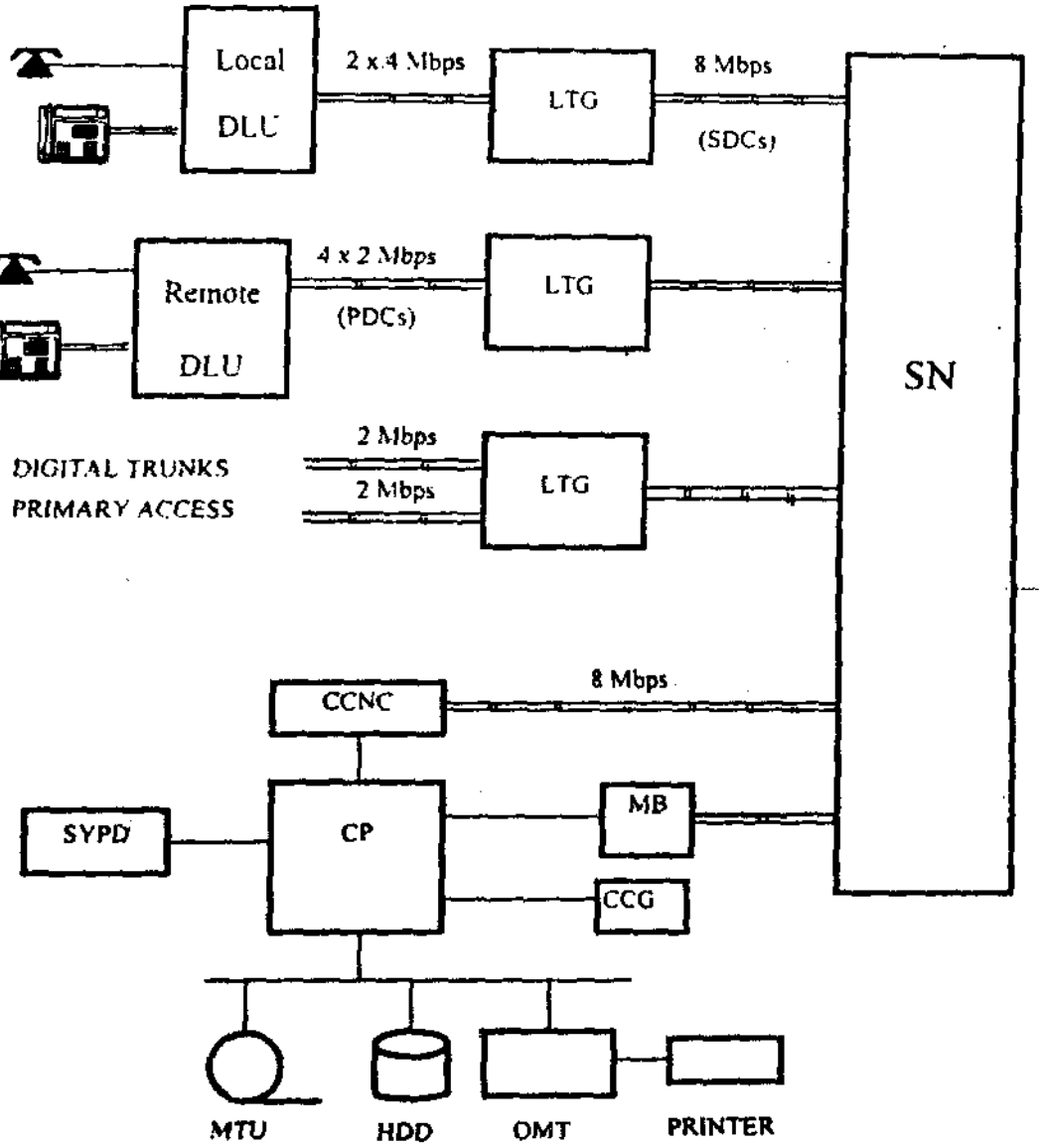


Fig 1.

BLOCK DIAGRAM OF EWSD



Abbreviations :

CCNC = Common Channel Signaling Network Controller
CP = Co-ordination Processor
DLU = Digital Line Unit
LTG = Line/Trunk Group
MB = Message Buffer
MDD = Magnetic Disk Drive
MTU = Mag. Tape Unit
OMT = Operation & Maintenance Terminal
SN = Switching Network.
SYPD = System Panel Display

Analog Subscribers

Digital Subscribers (2B + D)

PA = Primary Access (30B + D)

EWSD SWITCHING SYSTEM

The EWSD Digital switching system has been designed by M/s Siemens of Geremany. It mainly consists of following units:

1. Digital line unit (DLU)
2. Line Trunk Group(LTG)
3. Switching Network (SN)
4. Co-ordination Processor (CP)
5. Common Channel Signalling Network Control (CCNC)

1. **Digital line unit (DLU)-**

Analog and digital subscribers are terminated on DLU. Each DLU can carry 100 Erlang traffic. Local DLUs are connected to SN via two number of 4Mbps links. And Remote DLUs are connected to SN via four number of 2Mbps links. Analog subscribers are terminated on SLMA cards and Digital subscribers are terminated on SLMD cards. Both SLMA & SLMD can accommodate 8 subscribers each. One DLU Rack can accommodate either one DLU with 952 low traffic subscribers or two DLUs with total 880 high traffic subscribers.

Subscribers connected to a Remote DLU can talk to each other in case it is disconnected from main exchange. Besides six RDLUs can be interconnected in a cluster. Subscribers connected to those RDLUs in the cluster, which have been disconnected from main exchange, can also talk to each other.

2. **Line Trunk Group (LTG) :**

Digital trunks from other exchanges, Primary access from ISDN PABXs and DLUs (Local & Remote) are terminated on LTGs. One LTG takes four 2 Mbps streams and is connected to SN via 8Mbps links. Code Receivers and Tone Generators are also housed in LTGs.

3. **Switching Network (SN) :**

SN consists of Time Stage Groups (TSG) and Space Stage Groups (SSG): Connection paths through TSGs and SSGs are switched by Switch Group Controls (SGC) in these units in accordance with the switching information from CP. In maximum configuration 504 LTGs can be connected to SN giving traffic handling capacity of 25,200 Erlangs.

4. **Co-ordination Processor (CP) :**

The Co-ordination Processor handles following functions.

- Storage and administration of all programs, exchange and subscriber data.
- Processing of received information for routing, path selection and zoning.
- Communication with operation and maintenance centers.
- Handling of the man machine interface.
- Supervision of all sub-systems, receipt of error messages, alarm treatment, error detection and neutralization.

The main function units of Co-ordination Processor are:

(a) Base Processor (BAP) for operation and maintenance, and call processing.
(b) Call Processor (CAP) for call processing only (Used only in case of higher BHCA)
(c) Common Memory (CMY)
(d) Input/ Output Controller (IOC)
(e) Input/ Output Processor (IOP)

Other units assigned to CP are:

(i) Message Buffer (MB) for coordinating internal message traffic between the CP, the SN the LTG & the CCNC.

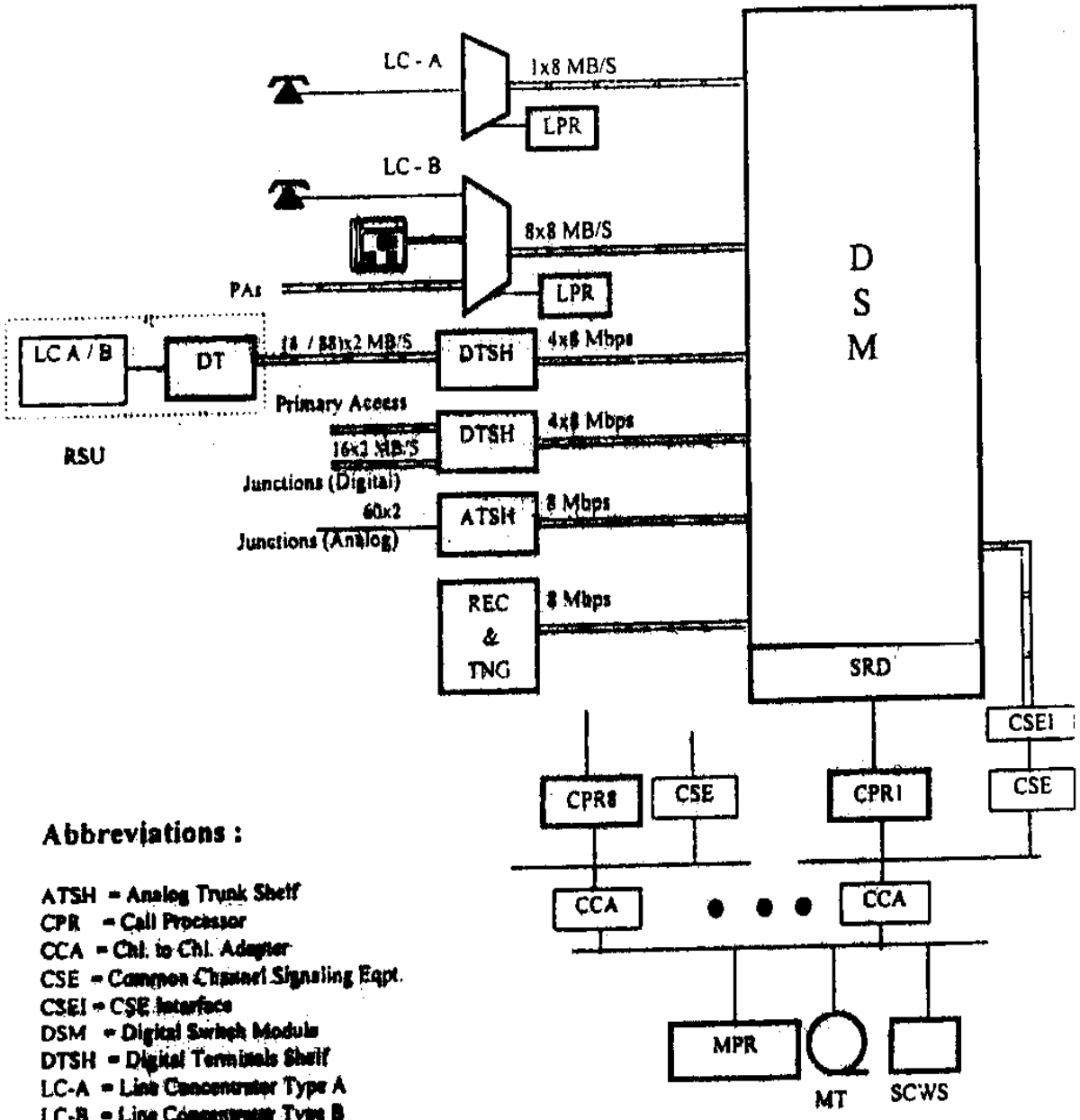
(ii) Central Clock Generator (CCG) for the synchronization of the exchange.
(iii) System Panel (SYP) to display system internal alarm and the CP load.
(iv) Input/ Output terminals (OMTs) for operation and maintenance.
(v) External Memory (EM) in the form of MDD for programs and data that do not always have to be resident in the CP, The EM is duplicated.

5. **CCNC (Common Channel Signalling Network Control) :**

The CCITT standardized signalling system No. 7 (CCS7) is one of the system that is used for inter-exchange signalling in EWSD. To promote flexibility in the use of this system a distinction is made between Message Transfer Part (MTP) and the User part (UP). The UP functions are handled by LTGs. The common MTP functions in an EWSD exchange are handled by the Common Channel Signalling Network Control (CCNC). A maximum of 254 common channel signalling channels can be connected to the CCNC via either digital or analog links. The CCNC consists of:

(i) Multiplexers to perform Signalling Data link (level 1) functions.
(ii) Signalling link terminals Digital (SILTD), one per signalling link, to perform Signalling link (level 2) functions.
(iii) One duplicated Common Channel Signalling Network Processor (CCNP) which perform Signalling network (level 3) functions.

BLOCK DIAGRAM OF FETEX –150



Abbreviations :

ATSH = Analog Trunk Shelf
CPR = Call Processor
CCA = Chl. to Chl. Adapter
CSE = Common Channel Signaling Eqpt.
CSEI = CSE Interface
DSM = Digital Switch Module
DTSH = Digital Terminals Shelf
LC-A = Line Concentrator Type A
LC-B = Line Concentrator Type B
LPR = Line Processor
MPR = Main Processor
MT = Mag Tape
REC = Receiver
RLC = Remote Line Concentrator
SRD = Signal Receiver/Distributor
SCWS = System Control Work Station
TNG = Tone Generator

FETEX –150 SWITCHING SYSTEM

The FETEX-150 Digital switching system has been designed by M/s Fujitsu of Japan. It mainly consists of following units:

1. Line Concentrator A (LC-A) & Line Concentrator B (LC-B)
2. Digital Terminals for PCM Junctions (DT)
3. Analog Trunk (AT)
4. Receiver unit for MFC Code Generator /Receiver (REC)
5. Digital Switch Module (DSM)
6. Call Processors (CPR), Main Processor (MPR), I/O Units.
7. Common Channel Signalling Equipment (CSE)

1. Line Concentrator A (LC-A) & Line Concentrator B (LC-B)

Analog subscribers only are terminated on LC-A but Analog/ digital subscribers (BA) and Primary Access (PA) are terminated on LC-B. Each LC-A and LC-B can carry 90 Erlang and 840 Erlang traffic respectively. Local LCs (A/B) are connected to DSM via one of eight numbers of 8Mbps optical link respectively and Remote LCs are connected to DSM via four or maximum 88 number of 2Mbps links respectively. These are terminated on Digital Terminals (DT) on both sides.

Analog subscribers are terminated on Subscriber Line Circuit (SLC) cards and Digital subscribers in LC-B are terminated on Digital Line Circuit (DLC) cards and Pas on DT cards. Each SLC & DLC card can accommodate maximum 1920 ordinary subscribers and One LC-B Rack can accommodate maximum 4320 ordinary subscribers or 2016 Digital subscribers.

Subscribers connected to a Remote LC-A only can talk to each other in case it is disconnected from main exchange. Besides five LC-As subject to the maximum 3000 subscribers, can be

interconnected in a cluster and subscribers connected to those LC-As in the cluster, which have been disconnected from main exchange, can also talk to each other.

2. **Digital Terminal (DT)**

DT is provided for PCM junctions, One DT shelf can accommodate 16 DT cards providing maximum of 16PCMs. This DT shelf is connected to the DSM via 4 numbers of 8Mbps Serial Optical Link.

Analog Trunk (AT): AT shelf accommodates some miscellaneous trunk and Talkie trunk for broadcasting of announcement. Two numbers. Of AT shelf are connected to DSM via one 8 Mbps Serial Optical Link.

3. **Digital Switch Module (DSM)**

This is the main switching unit with T-S-T structure. In Fetex-150 system one Digital Switch Module (DSM) can accommodate 8 numbers of 8Mbps serial optical links. Optical links provide immunity from electromagnetic interference and causes reduction in number of transmission cables. Maximum 64 DSMs can be provided. Thus maximum 512 number of 8Mbps serial optical links or 2048 numbers of 2Mbps PCM links.

Signal Receiver and Distributor (SRD): SRD is a interface between DSM and CPR. Four numbers of Duplicated DSM may be controlled by one Duplicated SRD.

4. **Receiver Unit for MFC Code Generator/Receiver (REC)**

This unit consists of DTMF/ MFC receivers and MF senders and 26 types of call processing Tone Generator circuits. One REC

shelf can accommodate maximum of 120 such circuits and this is connected to the DSM via one 8Mbps serial optical link.

5. **Main Processor (MPR)**

This is the main processor for overall control of the system. One MPR is provided for one system. It has got Main Memory (MM) and File Memory (FM).

Call Processor (CPR): This is the main unit for Call Processing. It also has MM and FM for the execution of Call Processing Program. Maximum 8CPR can be connected in this system.

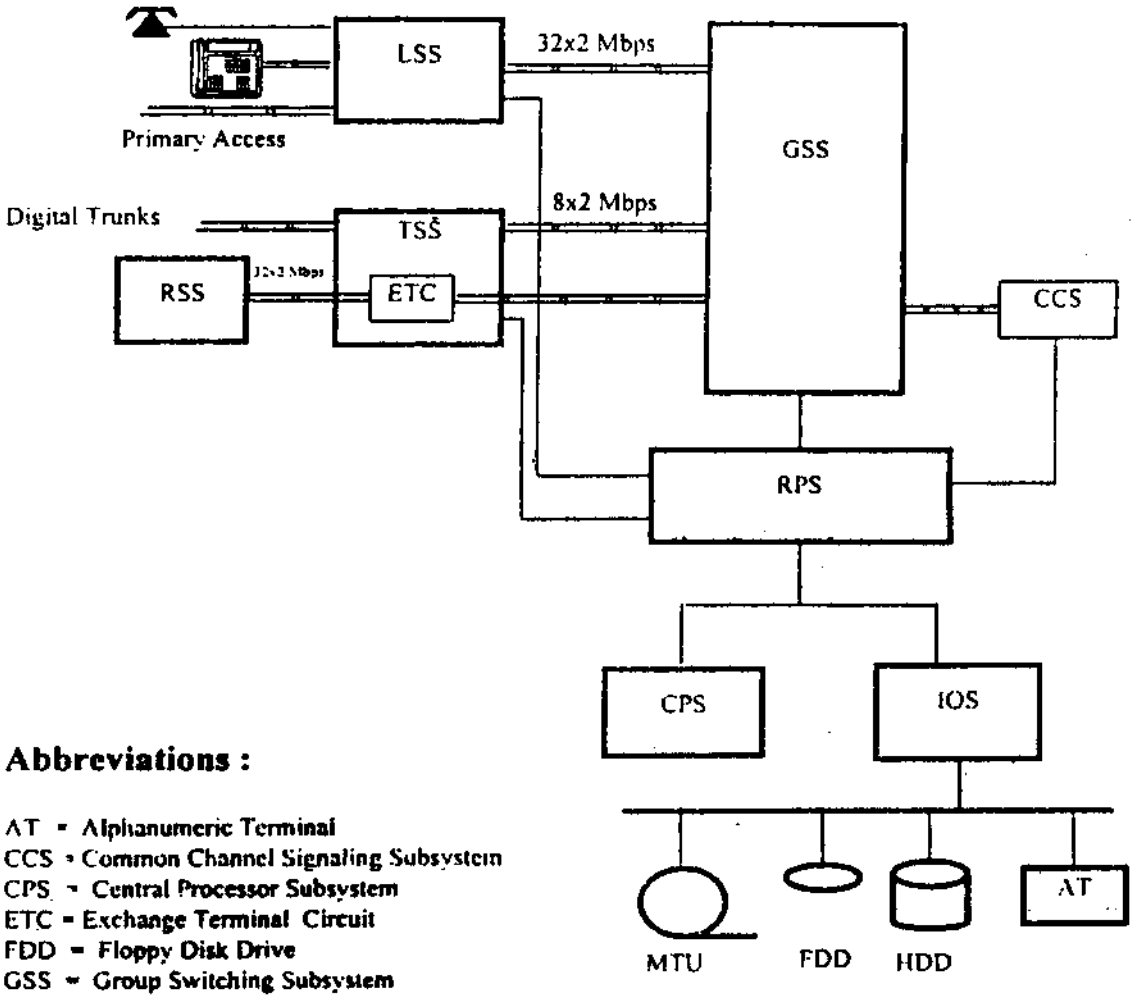
I/O Unit (I/O): The MTU, Main Machine Communication terminals are connected to the MPR. This unit is globally available for the system.

6. **Common Channel Signalling (CSE)**

The level 1 functions are handled in DSM and DT. Level 2 functions are handled in by CSE, which is connected to CPR. One CPR can connect upto 32 CSEs (256 CSEs per system) and one CSE can accommodate upto eight signalling data links. The level-3 functions are handled by CPR software. The UP function is again handled by CPR software.

Common channel Signalling Equipment Interface (CSEI) is located between CSE and DSM to convert the data transmission speed between the data on a time slot of optical 8Mbps highway to DSM and the 64Kbps to and from the CSE. It is located in the ATSH.

BLOCK DIGRAM OF AXE -10



Abbreviations :

AT = Alphanumeric Terminal
CCS = Common Channel Signaling Subsystem
CPS = Central Processor Subsystem
ETC = Exchange Terminal Circuit
FDD = Floppy Disk Drive
GSS = Group Switching Subsystem
HDD = Hard Disk Drive
IOS = Input Output System
LSS = Local Subscriber Stage
MTU = Magnetic Tape Unit
RPS = Regional Processor Subsystem
RSS = Remote Subscriber Stage
SSS = Subscriber Switching Subsystem
TSS = Trunk & Signaling Subsystem.

Analog Subscribers

Digital Subscribers (2B + D)

PA = Primary Access (30B + D)

AXE-10 SWITCHING SYSTEM

The AXE-10 Digital switching system has been designed by M/s Ericsson of Sweden. It mainly consists of following subsystems.

1. Subscriber Switching Subsystem (SSS)
2. Trunk & Signalling Subsystem (TSS)
3. Group Switching Subsystem (GSS)
4. Regional Processor Subsystem (RPS) & Central Processor Subsystem (CPS)
5. Input/ Output System (IOS)
6. Common Channel Signalling Subsystem (CCS)

1. Subscriber Switching Subsystem (SSS)

SSS consists of subscriber switching stages: Local (LSS) and Remote (RSS). Each LSS/RSS can be equipped with 16Line Switch Modules (LSM). Analog/digital subscribers and Primary Access are terminated on LSMs. Each LSS/RSS can be equipped with a maximum of 16LSMs and can connect 2048 analog subscribers. Each LSS is connected to GSS via 2 to 32 number of 2 Mbps links and RSS is connected to GSS via 2Mbps links which are terminated on Exchange Terminal Circuit (ETC) cards located in TSS.

Analog subscribers are terminated on Line Interface Circuit (LIC) cards, Digital subscribers on LIBA cards and Primary Access on LIPA cards. Both LIC & LIBA can accommodate 4 subscribers each. One LSM can accommodate either 128 Analog subscribers or 64 BAs or 4PAs. Subscriber Tone Generator and Keyset code Reception Circuits (KRC) for DTMF subscribers are also provided in LSMs to receive the Multi frequencies.

Subscribers connected to a RSS can communicate with other subscribers of the same RSS in case it is disconnected from AXE-main exchange.

2. Trunk & Signalling Subsystem (TSS)

Digital trunks from other exchanges and Remote SSS are terminated on ETCs in TSSs. One ETC magazines can take eight 2Mbps streams and is connected to GSS via 8 numbers of 2Mbps links. One TSS cabinet can house up to 12ETC Magazines. Announcement module, Code Receivers and Code Senders are also housed in TSSs.

3. Group Switching Subsystem (GSS)

Group switch has T-S-T structure. The capacity of each time switch called Time Switch Module (TSM) is 16 numbers of 2 Mbps Links Maximum of 32 TSMs can be connected to one Space Switch Module (SPM) & maximum 128 TSM can be connected to one fully equipped GSS resulting in 2048 PCMs or 65,636 ports.

4. Regional & Central Processor Subsystem (RPS & CPS)

Control part of AXE designated as APZ-212 has traffic handling capacity of 800,000 BHCA. It consists of duplicated Central Processor (CP) which is assisted by number of Regional Processor (RP) pairs.

CPS consists of basically two processor working in Executive and hot Standby mode. Both CPs have Regional Processor Handlers (RPH) to connect maximum 512 RP pairs working in load sharing mode. Central Processor does less frequent but more complex jobs i.e. analysis, routing, fault-diagnosis etc., where as Regional Processors do more frequent and less complex jobs, i.e. line scanning. Without CP exchange cannot function.

5. Input/ Output System (IOS)

All I/O devices of the system are connected to IO group (IOG), which has a minimum of 2 support processor nodes. Node-A and Node-B operating in passive standby mode. Each node can house 4 Hard-disk drives. 2 floppy disk drives and 16 Alphanumeric Terminals (AT), like PCs. TTYs. etc., used for Man-Machine communication. An AXE exchange with 2 IO nodes can have a maximum of 32 ATs. In addition 2 Mag Tape units (MTU) can be connected.

6. Common Channel Signalling Subsystem (CCS)

CCS is used to handle Common Channel Signalling Links from / to other exchanges. The hardware consists of Signalling Terminals (ST-7, one per Signalling Link) and Pulse Code Device-Digital (PCD-D, one for four ST-7)

Annexure –I

E-10B & NEW SWITCHING SYSTEMS

1. CAPACITY COMPARISONS

CHARACTERISTIC	E-10B	EWSD	AXE-10	FETEX-150
PCMs	384	2048	2048	2048
Trunks	10,000	60,000	60,000	60,000
Subscribers	49,000	2,50,000	65,000	2,40,000
BHCA	1,90,000	15,00,000	8,00,000	10,00,000
Traffic (Erl.)	4,000	25,200	26,000	24,000
CCS # 7	No.	Yes	Yes	Yes
ISDN	No.	Yes	Yes	Yes
Cost (Rs./Line)	13,000	4,673	4,673	4,673

2. HARDWARE

CHARACTERISTIC	E-10B	EWSD	AXE-10	FETEX-150
Subscriber Connection Unit	CSE	DLU	SSS	LCA LCB
Trunk Connection Unit	URM	LTG	TSS	DT
Switching Network	CX	SN	GSS	DSM
Codes Receivers & Tones In	ETA	LTGs	SSS TSS	REC-SH
Availability	Global	Local	Local	Global
Call Processing	MR+TR+TX+MQ	CP+LTG	CE+RP+ EMRP	LPR + CPR

2.1 SUBSCRIBER CONNECTION UNITS

CHARACTERISTIC	E-10B	EWSD	AXE-10	FETEX-150
Name	CSE	DLG	ENG	LCA LCB
Capacity (Erl.)	90	100 200	480	90 900
Maximum Subscribers	1024	944 864	2048	1920 4320
Connected to Via	CS 4X2Mbps	LTG 2X4Mbps	GSS 32X2Mbps	DSM 1X8Mbps 8X8Mbps
Subscriber Line Cards (Analogue)	XEJ-8/16	SLMA	LIBA	SLC
Capacity	8/16	8	4/8	4/8
Subscriber Line Cards (Digital)	-	SLMD	LIBA	DLC
Capacity (2b+D)	-	8	8	1
Digital Cards Shelfs	-	Same	Separate	Separate
Primary Access	-	-	LIPA	-
Tones + CR	-	-	Yes	-

2.2 REMOTE SUBSCRIBER CONNECTION UNITS

CHARACTERISTIC	E-10B	EWSD	AXE-10	FETEX-150
Name	CSED	R-DLU	RSS	RLC(A/B)
Connected to Via	URM 4X2Mbps	LTG 4X2Mbps	TSS 32X2Mbps	DT 4X16X2Mbps
Stand Alone Swg.	Limited	Yes	Yes	Yes
Metering	NA.	No	No	No
Cluster	No	Yes	No	No

2.3 TRUNK CONNECTIONS UNITS

CHARACTERISTIC	E-10B	EWSD	AXE-10	FETEX-150
Name	URM	LTG	TSS	DT
Input From	DIG.TKS CSED	DIG.TKS DLU(L/R)	A&d TKS RSSPA	A&DTKSRLCPA
Input	4X2Mbps	4X2Mbps	10X2Mbps	4X2Mbps
Output Links	4X2MbPS	1X8Mbps	10X2Mbps	1X8Mbps
Output To	CX	SN	GSS	DSM

2.4 SWITCHING NETWORK

CHARACTERISTIC	E-10B	EWSD	AXE-10	FETEX-150
Name	CX	SN	GSS	DSM
Links	2Mbps	8Mbps	2Mbps	8Mbps
Link's Name	LR	SDC	SNT	DL
Link Capacity	384	512	2048	512
PCMs	384	2048	2048	2048
Minimum Size (PCMs)	64	256	512	128
Switching	TST	TST TSSST	TST	TST
Max. Connectivity	-	504LTGs	-	64DSM

2.5 CENTRAL UNITS

CHARACTERISTIC	E-10B	EWSD	AXE-10	FETEX-150
Call Processing Units	MR, TR,TX,MQ	CP, LTG	CP,RP EMRP	CPR, LPR
O&M Units	OMC, OC,DSF	CP, DEVD	CP,IOG, EMRP	MPR
Expansion Units (Global Availability)	MR(2-6) TR(mem) ETA(2-16)	CP(0- 6CAP) MB(1-2)	Mem	CPR
Expansion Units (Local Availability)	CSE,URM CX	DLU/LTG TSG/SSG	EMG/TSS GSS/RP	LC/DT/DSM REC-SH
O&M Terminals	64	2	64	2

OVERVIEW OF OCB 283 DIGITAL ELECTRONIC

All new technology-switching systems are based on stored program control concept. The call processing programs are distributed over different control organs of the system and are stored in ROM/RAM of the units Data required to handle the calls are also managed in the RAMs of different control units. Processor in the control units by using the program and data stored in unit ROM/RAM process and handle calls. Handling or processing a call means to ultimately establish a connection in a switch between I/C and O/G ends. Depending on the system the name and architecture of control units and switch may change but basic criterian for switching remains more or less the same.

1.0 OVERVIEW OF OCB 283 DIGITAL ELECTRONIC SYSTEM

1.1 Introduction.

OBC 283 is digital switching system which supports a variety of communication needs like basic telephony, ISDN, interface to mobile communication, data communication etc., This system has been developed by CIT ALCATEL of France and therefore has many similarities to its predecessor E-10B (also known as OCB 181 in France).

The first OCB 283 exchanges of R11 version were commissioned in Brest (France) and Beijing (China) in 1991. The first oCB-283 exchange came to India in 1993. Subsequently, the system has been upgraded and current version R-20 was fully validated in January 1994. The exchanges, which are being supplied to India, belong to R20 version. At present R21 and R22 versions are also being supplied. The basic architecture remaining same

more facilities both to subscribers and administration are supported by later versions.

1.2 Salient Features of the system.

i. It is a digital switching system with single “T” stage Switch. A maximum of 2048 PCMs can be connected.

ii. It supports both analogue and digital subscribers.

iii. The System supports all the existing signalling systems, like decadic, MF (R2), CAS and also CCITT # 7 signalling system

iv. It provides telephony, ISDN, Data communication; cellular radio and other value added services.

v. The system has “automatic recovery” feature. When a serious fault occurs in a control unit, it gives a message to SMM (O&M Unit). The SMM puts this unit out of service, loads the software of this unit in a back up unit and brings it into service. Diagnostic programs are run on the faulty unit and the diagnostics is printed on a terminal.

vi. OCB 283 has a double remoting facility. Subscribers access unit CSND can be placed at a remote place and connected to the main exchange through PCM links. Further, line concentrators can also be placed at a remote location and connected to the CSNL or CSND through PCMs. This special feature can meet entire range of necessities viz. Urban, semi-urban and rural.

vii. Various units of OCB 283 system are connected over token rings (IEE 802.5 standard). This enables fast exchange of information and avoids complicated links and wiring between various units.

viii. The charge accounts of subscribers are automatically saved in the disc, once in a day. This avoids loss of revenue in case of total power supply / battery failure.

ix. The traffic handling capacity of the system is huge. It can handle 8,00,000 BHCA and 25,000 Erlangs of traffic. Depending on the traffic, a maximum of 2,00,000 subscribers or 60,000 circuits (or trade off between these two) can be connected.

x. The exchange can be managed either locally or from an NMC through 64 KB/S link.

xi. All the control units are implemented on the same type of hardware. This is called a station. Depending on the requirement of processing capacity, software of either one or several control units can be located on the same station. For all these control units, only one backup station is provided, enabling ‘automatic recovery’ in case of fault.

xii. The OCB 283 system is made up of only 35 types of cards. This excludes the cards required for CSN. Because of this the number of spare cards, to be kept for maintenance are drastically reduced.

xiii. The system has modular structure. He expansion can be very easily carried out by adding necessary hardware and software.

xiv. The SMMs (O&M Units) are duplicated. With one active and other hot standby. In case of faults, switch over takes place automatically. Moreover, as discs are connected to both SMMs, there is no necessity of changing cables from one system to another.

xv. The hard disc is very small in size, compact and maintenance free. It has a very hug memory capacity of 1.2 Giga bytes. The detail billing data are regularly saved in the disc itself, from where they can be transferred to magtape for prcessing.

xvi. The space requirement is very small. No separate room is required for OMC.

xvii. There is no fixed or rigid rack and suite configuration in the system. It provides great flexibility and adjustment in the available space.

xviii. The environment requirements of the system are very flexible. False floor and ceiling are not essential. Air conditioning requirements are also not stringent. The system can work at temperatures 5 to 45^{o}C. though the optimum temperature is 22^{o}C.

1.3 SUBSCRIBER FACILITIES PROVIDED BY OCB 283

OCB 283 provides a large number of subscriber facilities. Some facilities are available to only digital subscribers and as such they can not be availed by analogue subscribers. To avail these facilities subscriber number are given special categories by man machine commands.

Facilities to analogue subscribers

i. A line can be made only out going or incoming.

ii. Immediate hot line facility – The subscriber is connected to another predetermined subscriber on lifting the handset, without dialing any number.

iii. Delayed hot line facility – When subscriber lifts the handset, Dial Tone is provided he can dial any number. If he does not dial number, within a predetermined time, he is connected to predetermined number.

iv. Abbreviated dialing – The subscriber can record a short code and its corresponding full number in the memory. Later to dial this number, he has to only dial short code.

v. Call forwarding – When activated, incoming calls to the subscriber gets transferred to the number mentioned by the sub while activating the facility. The facility is especially very useful for the people who are on the move.

vi. Conference between 4 subscribers – The subscribers A and B while in conversation, can include two more subscribers by pressing “flash button” and dialing their numbers.

vii. Call waiting indication – When a subscriber is engaged in conversion and if gets an incoming call; an indication is given in the form of a tone. Hearing this, the subscriber has option, either to hold the subscriber in conversation and attend the waiting call or to disconnect this subscriber and attend to the

waiting call. In the former case, he can revert back to the earlier subscriber.

viii. Automatic call back on busy – If this facility is activated and if the called subscriber is found busy, the calling subscriber simply replaces the receiver. The system keeps watch on then sub and when it becomes free, a ring is given to both the subscribers. On lifting they can talk to each other.

ix. Priority line – Calls from this line are processed and put through even when the number of free channels are within a threshold or when the system is operating in a catastrophic mode.

x. Malaicious call identification – When this category is given to a subscriber, the number of calling subscriber (to this number) is printed on the terminal. 3.1.11 12 or 16KHz-meter pulses- The system can send 12 or 16KHz meter pulses on the subscriber line for the operation of the home meter.

xi. Battery reversal – The system extends battery reversal when called subscriber answers. This is useful in case of CCBs.

xii. Detailed billing – The system provides detailed bills giving details of date, time, metered units etc.

xiii. Absent subscriber service- When activated, the incoming calls are diverted to absent subscriber service for suitable instructions or information.

Facilities to digital subscribers

Digital subscribers are provided all the facilities available to analogue subscribers. In addition, they are provided following

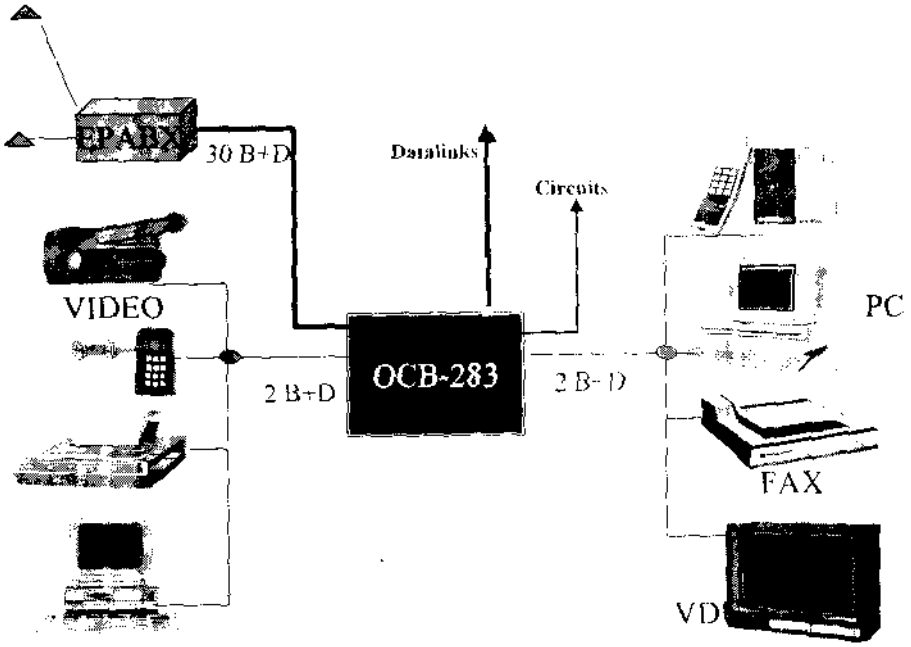
facilities which are called ISDN services An ISDN subscriber can use many electronic devices on its telephone line and can utilise them for 2 or more simultaneous calls of either.

- VOICE
- DATA
- VIDEO

The ISDN or Digital Subscribers of OCB-283 can be provided the following types of connections.

- 2B +D Line: - 2 Voice Channels of 64Kbps & 1 Data channel for 16Kbps.
- 30B + D Line :- 30 Voice channels of 64Kbps & 1 Data channel of 64 Kbps

ISDN SUBSCRIBERS



The following is the list of some of the services to Digital subscribers

a) It provides 64Kb/s digital connectivity between two subscribers for data communication.

b) The system can provide group 2,3 or 4 Facsimile (FAX) services.

c) It provides videotext services.

d) The system provides display of calling subscriber number on called subscriber's telephone.

e) The system also provides the facility for restriction of the display of calling subscriber number on called subscriber's terminal. To avail this facility, the subscriber has to be given a category.

f) The system provides the facility of displaying connected number on the calling subscriber's terminal. This especially useful when called subscriber has activated call transfer facility. The calling subscriber can choose to speak on forwarded number or disconnect the call.

g) The above facility can be restricted by giving special category to the subscriber. 3.2.8 Charging advice – The system is capable of providing charging advice either in real time or at the end of the call.

h) User to user signalling – The System permits transfer to mini messages between calling and called subscribers during call set up and ringing phase.

i) Terminal portability during the call – A subscriber (calling subscriber as well as called subscriber) can unplug terminal, carry it to some other place or room and resume the call within 3 minutes.

j) Listing unanswered calls – The number of calling subscribers, who calls during the absence of called subscriber, are recorded in called subscriber's terminal. The called subscriber can then check up these numbers and call them back if, he so wishes.

2.0 EXCHANGE FUNCTIONAL ARCHITECTURE

OCB – 283 exchange is also called alcatel 1000 E-10. It consists of three basic subsystems: -

1. Subscriber access subsystem
2. Connection & control subsystem
3. Operation & maintenance subsystem

2.1 Subscriber access subsystem: -

This is treated as an independent entity. Every Subscriber Connecting Equipment Rack is given a Signalling Point Number to operate in Common Channel Signalling mode with rest of the exchange Subsystems.

2.2 Control & connection subsystem

It is the block consisting of control functions and connection & switching equipments. **Control function** comprises of common control equipment's which process monitor & control the call setup & release.

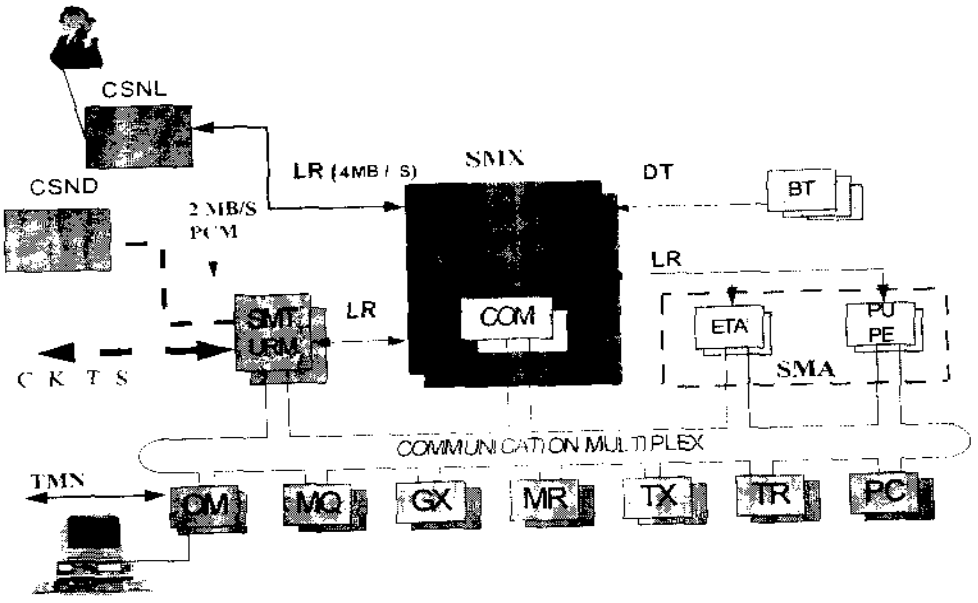
Connection & switching equipment block comprises of

- Switching matrix equipment for performing digital time switching of speech path.
- Connection equipment's for connecting PCM (digital) Junctions from other exchanges & RSU's.
- Auxiliary Equipment's for Tones, Frequencies & other auxiliaries for signalling protocol handling.

2.3 Operation & maintenance sysbsystem:-

For Operation & Maintenance of exchange by operators / remote NMC.

OCB – 283 FUNCTIONAL DIGRAM



3.0 OCB-283 SWITCHING SYSTEM

The functional architecture of the OCB-283 System comprises in general of following distinct components: -

Connection Units
Switching Network
Control Units

3.1 Connection Units.

These provide facility to connect a subscribers loop or circuits from an external PCM and transfer these Speech samples on to selected Time Slots called voice channels on a LR link (internal PCM) towards switching matrix & Viceversa: These units are

NAME	FUNCTIONAL NAMEE
Subscriber Connection units	CSNL, CSND, CSED
Circuit Connection Units	SMT (URM)
FREQUENCY GENERATOR, Sender & RECEIVER &Common	SMA (ETA)
Channel Signalling Protocol Handler	SMA (PUPE)

3.2 Switching Network

The provides facility for connecting the LRs (Internal PCM's) coming from connection units and performs Switching Operation for Calling Subs TS onto Called Subscriber TS & vice versa for a two way connection per call of telephone.

3.3 Control Units.

These units provide control of calls on the basis of Stored programs. They process the calls on reception of dialed digits from calling subscriber/ circuit & take part in

handling of call setup & release by processing, monitoring, measuring charging of calls & all the common control functions needed for working of an Automatic Common Control Exchange.

These Control units can comprise of following Functions.

NAME OF FUNCTION			NATURE OF JOB
MR	:	Multi-register	Translation of SET UP & RELEASE OF CALL
TR	:	Translator	Translation of digit, Databank of Subs & Connection units
MQ	:	Marker	Message distribution between Common Control & Connection units
TX	:	Charger	Computing the charge of call, keeping meters
GX	:	Matrix System Handler	Processes & makes connections in Switching matrix on the orders from MR or MQ
PC	:	Common Channel Signalling Network Controller	Manage the CCS7 network for signalling

3.4 **O&M Unit & Maintenance Peripherals :-**

In OCB-283 system all operation & maintenance activities are performed by a unit called O&M unit or OMC (Operation & Maintenance Center) This provides access for Man Machine dialogues for the human operators to interact and command the working of Exchange Equipment's.

4.0 OCB-283 HARDWARE ARCHITECTURE

OCB 283 exchange comprises the following hardware units.

1. Subscriber access Units(CSNL, CSND, CSED)
2. Trunks and Junction connection Units (SMT)
3. Switching Matrix (SMX)
4. Auxiliary Equipment's (SMA)
5. Control Units (SMC)
6. Communication multiplexes (MIS & MAS Token rings)
7. Time base generators(STS)
8. Operation and Maintenance Unit (SMM)

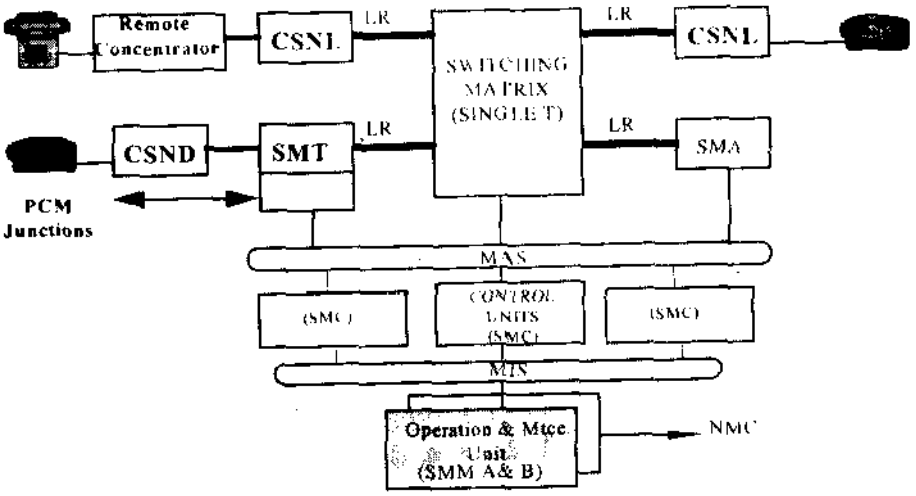


Fig. 1 General Architecture of OCB –383

The subscriber connection units CSN, SMTs, and SMAs, are connected to switching network through PCM links.

The interchange of messages between SMT, SMX, SMA and control units SMCs takes palace on 'MAS' token rings. The control units interchange messages with one another and with SMM on 'MIS' token rings.

The SMM is the O&M function unit & is duplicated as SMMA & SMMB. These work in Pilot/Standby mode.

The SMCs are the units which hold control functions MR, TR, TX, MQ, PC, GX these functional units are in software form and are duplicated except MR which can be more than two.

The duplicated functions work in Load sharing mode (except PC which works in Pilot /Standby mode.) hence SMCs can be minimum 2 & maximum 32 as per design.

The SMA stations hold the ETA & PUPE functions & these are also minimum 2 to max.32.

SMT station which is the interface for the external PCMs is made of duplicated hardware and can handle either 32 PCMs if SMTIG or 128 PCMs if 2G. The SMT's hardware is fully duplicated and functions P/R mode.