E2-E3: CONSUMER FIXED ACCESS

CHAPTER-8

PSTN: NETWORK AND SERVICES

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PSTN: Network and Services

Telephony was invented in 1876 and automatic telephone exchanges were developed in 1895. At that time these exchanges were analogue. Now we have only digital exchanges in the network, which work on circuit switching principle.

1.0 Circuit Switching & Packet Switching

In normal telephone service, basically, a circuit or channel between the calling party and called party is set up (temporarily) and this circuit is kept reserved till the call is completed. Here two speech time slots are involved - one of the calling subscriber and other of the called subscriber. It is called circuit switching.

The data networks, on the other hand use the principle of Packet Switching. In Packet switching the information (speech, data etc) is divided into packets each packet containing piece of information also bears source and destination address. These packets are sent independently through the network with the destination address embedded in them. Each packet may follow different path depending upon the network. At the destination point all these received packets are reassembled.

2.0 PSTN

The telephone network used for fixed line services is also referred as PUBLIC SWITCHED TELEPHONE NETWORK (PSTN). There are different types of the telephone exchanges (switching systems) in PSTN. Earlier there were manual type, Electromechanical type like Strowger and Cross bar. E10B was the first digital electronic exchange to be inducted in the network. But it had certain limitations like:

- The ISDN and CCS7 signalling was not supported.
- The traffic handling capacity and BHCA capacity was low.
- In the RLU's in case of link failure with the main exchange local switching within RLU subscribers was not possible.

To avoid these problems new technology switching systems were inducted in our network. Mainly 4 NT switching systems were inducted in BSNL network:

- EWSD Supplied by M/s Siemens, Germany
- OCB-283 Supplied by M/s Alcatel, France
- 5ESS Supplied by M/s Lucent, USA
- AXE-10 Supplied by M/s Ericsson
Some new Salient features of New technology switches are:

- All NT exchanges support ISDN, C#7, V5.2, centrex facility.
- The traffic handling capacity and BHCA capacity are sufficient.
- Standalone RSU: All exchanges have this facility while in case of main link with the exchange is down subs of RSU can call among themselves. In 5ESS in standalone condition metering is done while in case of OCB-283 and EWSD metering is not possible. In case of OCB-283 double remoting is possible.

For rural area in our country where small capacity exchanges were required, CDOT equipment (CDOT 128P, 256P, SBM, MBM etc) was installed. CDOT technology is indigenously developed technology in our country. Initially standalone 128P, 256 P CDOT exchanges were installed but now these small independent exchanges have been converted into AN-RAX (Access Network Rural Automatic Exchange) and they are parented to nearby CDOT SBM/MBM or NT exchange. With this development now all remote ANRAXs can be maintained from the SBM/MBM. It improved O&M functions/issues of small exchanges.

In the BSNL network about 40% of the total switching capacity is on CDOT technology. The Total equipped capacity in BSNL as on Sept 2008 is about 54037724 (including WLL and DLC)
The WLL FWT (Fixed wireless terminals and the connection given over DLC are counted in Basic service(Fixed Network).

3.0 Network Organisation:
In BSNL (Earstwhile DOT), the whole network is divided into circles (24 circles), each circle is divided into SSA (Secondary Switching Area) as an administrative unit. SSA is also known as LDCA (Long Distance Charging Area) and then further one LDCA is divided into many SDCAs (Short Distance Charging Area). This division of LDCA and SDCA is for charging purposes. Normally an inter SDCA but within same LDCA call is charged on the SDCC distance basis and an inter circle call is charged on LDCC distance basis.

The telephone network is also referred as PUBLIC SWITCHED TELEPHONE NETWORK (PSTN). The offered voice service is referred as PLAIN OLD TELEPHONE SERVICE (POTS).
The PSTN network is organized in a hierarchical manner with Lev-1/Lev-2/Tandem/Local Exchanges. The calls from a local exchange is routed to lev-I TAX either directly or through Lev-II TAX. From Lev-I TAX it is routed to the destination exchange either directly or through another Lev-I/Lev-II TAX. For ISD calls ISD Gateway is used.

In PSTN Network we have:
- Lev-I TAX------In 21 places
- Lev-II TAX-------In 301 Places
- International gateways 6 places (Delhi, Chennai, Mumbai, Kolkata, Jalandhar and Ernakulam).
- Local Exchanges: About 36,000

**4.0 Interconnection With The Private Operator:**
Any operator can take license for providing Basic telephone service on circle basis. Licenses are issued by DOT. Once an operator gets a license in a particular circle, after installing the necessary equipment it is required to be interconnected with the BSNL network for making the calls into/from BSNL network. For this either the connectivity is taken at local exchange level for local calls and also at Lev-I/Lev-II TAX for long distance calls. It is called POI (Point of Interconnection). POI charges are prescribed by TRAI.

**5.0 Numbering Scheme In BSNL:**
DOT assigns the initial code for all the operators. BSNL having licenses in all the circle in the whole country except Delhi and Mumbai has been assigned digit ‘2’. The actual number which is dialed by the calling subscriber is prefixed with the SDCA code. At present the SDCA code + Local no are of 10 digits e.g in Jaipur SDCA the local number is identified as 141 (SDCA Code)+2601602(local Number).

Some special services like Directory Enquiry (197), Fault Booking (198), Railway Enquiry (139) etc are provided by these standard short codes using digit ‘1’.

**6.0 Services Offered On Landline:**

**6.1 ISDN (Integrated Service Digital Network)**
ISDN is a powerful tool worldwide for provisioning of different services like voice, data and image transmission over the telephone line through the telephone network. An ISDN subscriber can establish two simultaneous independent calls (except when the terminal equipment is such that it occupies two 'B' channels for one call itself like in video conferencing etc.) on existing pair of wires of the telephone line (Basic rate ISDN) where as only one call is possible at present on the analog line /telephone connection. The two simultaneous calls in ISDN can be of any type like speech, data, image etc. ISDN also supports a whole new set of additional facilities, called Supplementary Services.

6.1.1 Services Offered By ISDN
- Normal Telephone & Fax (G3) and G4 Fax
- Digital Telephone -with a facility to identify the calling subscriber number and other facilities.
- Data Transmission at 64 Kbps with ISDN controller card
- VideoConferencing

6.1.2 Variety of supplementary Services supported by ISDN
- Calling Line Identification Presentation(CLIP)
- Calling Line Identification Restriction(CLIR)
- Multiple Subscriber Number(MSN)
- Terminal Portability(TP)
- Call Hold(CH)
- Call Waiting(CW)
- User to User Signaling (UUSI)

6.1.3 Types of Accesses
There are two types of "accesses" (connections) for ISDN.
- Basic Rate Access(BRA): 2B+D 2 Channels of 64 Kbps for Speech And Data.
  1 Channel of 16 Kbps for Signalling
- Primary Rate Access (PRA): 30 B+D 30 Channels of 64 Kbps for speech and data.
  1 Channel of 64 Kbps for signalling.

6.2. Supplementary Services (Phone Plus Services)

1. Abbreviated Dialing

You may be calling a few people very frequently. It is possible to program these numbers as abbreviated codes of 1 or 2 digits. A maximum of 20 numbers can be programmed for abbreviated dialing. It is ideal for STD/ISD.

For registration Dial 110+short code (say15)+destination number(with STD code)

For use Dial 111+short code i.e. 11115

2. Call Waiting
This facility lets you receive incoming calls even when your telephone is busy. You will get a short duration pip-pip tone when you are busy talking, indicating that another call is waiting for you, provided you have activated this facility. You can talk to any one of the callers keeping the other waiting. Complete secrecy of communication between the two callers is maintained.

For activation of the service dial: 118 (wait for the tone)
For deactivation of the service dial: 119 (wait for the tone)

3. Hot Line
You may want to be connected directly to a pre-determined number as soon as you lift the hand set even without dialing. At the same time you may want to have the flexibility to dial any other number of your choice. It is possible to have this facility in the digital exchanges by the delayed hotline feature. The number of your choice can be programmed by the exchange staff at your request. After doing so if you lift the telephone and do not dial within 5 seconds, you will be automatically connected to the programmed number. However if you start dialing within 5 seconds, you can make an outgoing call as usual.

4. Call Transfer (Call Forward)
Useful for very mobile persons who may not want to miss incoming calls. Using this facility Calls can be forwarded to another telephone number designated by you.

For activation Dial 114 and the number for which the call is to be transferred.
For deactivation dial 115 and wait for acceptance tone

5. Automatic Wake-Up/Reminder Call Service
When you want to be given reminder at a specific time, all you have to do is to call the exchange and leave the time you want to be reminded. The facility allows you to initiate a call automatically by the exchange at a fixed time specified by the user of the telephone.

Dial 116 followed by the time you wish to be reminded or woken-up say at 06.15am(06.15hrs), you will dial 1160615.
6. Number/Call Hunting Service
If you have more than one telephone line, this facility is very helpful for your caller. If the called line is engaged, your caller does not have to disconnect and dial other line(s). This facility automatically transfers the incoming call to whichever line is free.

7. Calling Line Identification Presentation (CLIP)
The subscriber has to buy separately the CLIP display device from market. Using this facility you can see the number of the calling party before lifting your telephone. Very useful to trace malicious caller. However, the CLIP instrument shall be procured and installed by the users themselves.

8. Calling Line Identification (CLI) Announcement Service
Dial 164 and listen to the number of the phone line that you have used to make the call. Very useful when in doubt about your phone number.

9. Electronic Locking For STD/ISD (Dynamic Locking Facility)
For 100% protection against improper use, you can lock your telephone electronically. Here, you only know the secret code. You can lock/allow Local, STD or ISD calls in many way viz. all calls allowed, only local calls allowed, only STD & Local calls allowed, all outgoing calls barred etc.
To Register Secret Code **Dial 123 0000 ABCD** then wait for the acceptance tone (ABCD is the secret code chosen by the subscriber)
To use dial 124 ABCD  1  STD/ISD will be barred
dial 124 ABCD  0  STD and ISD will be opened
dial 124 ABCD  3  STD will be opened, ISD barred
dial 124 ABCD  4  STD/ISD and local will be barred
dial 124 ABCD  2  STD/ISD /Trunk call/95 will be barred

10. Call Conferencing
With this service telephonic conference can be set up within 3 or more parties. This service is available subject to technical feasibility.
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Sample Self study Objective type questions

1. Which was the first digital electronic exchange inducted in BSNL.
   A. EWSD   B. OCB-283   C. E10B   D. AXE-10.

2. In BSNL the whole network is divided into how many circles.
   A. 22       B. 25       C. 24       D. 21

3. Initial code for BSNL fixed lines is.
   A. 3             B. 2               C. 6        D. 7.

4. D channel speed in case of BRA is
   A. 16 Kbps   B. 64Kbps  C. 2048 Kbps   D. 128 Kbps.

5. The code for registration of abbreviated dialling is.
   A. 111          B. 110        C. 114         D. 115

6. For activation of call waiting, code is.

7. For activation of call transfer the code is
   A. 115        B. 114      C. 118         D. 110.

8. The code for CLI Announcement service is.
   A. 163         B. 165     C. 164     D. 161.

9. For reminder call service the code is.
   A. 161           B. 116      C. 165         D. 117.

10. V 5.2 connectivity is available in which switch.
    A. OCB-283     B. CDOT-MBM  C. EWSD       D. All of above.