

# Module

11

## Narrowband and Broadband ISDN

# Lesson

37

ISDN: Reference Points,  
Services And Standards

## OBJECTIVE

### General

This lesson is continued on giving the reader the concept and definition of Integrated Services Digital Network.

### Specific

On completion of this lesson, the learner shall be able to

1. Identify the ISDN references.
2. Enumerate the ISDN channels.
3. Describe ISDN standards.
4. Depict N-ISDN.

Video was left out initially because of high data rate. Narrow band ISDN serves up to 2 Mbps, which provided data, voice and slow scan video (with compression, up to 2Mbps). For higher bit rate Optical Fiber Cable is used as the digital pipe. H<sub>0</sub> provides slightly poor quality video at 384 kbps.

## REFERENCE POINTS

CCITT defined four reference points, called R, S, T, and U, between the various devices. The U reference point is the connection between the ISDN exchange in the carrier's office and NT1. At present it is a two-wire copper twisted pair, but at some time in the future it may be replaced by the fiber optics. The T reference point is what the connector on NT1 provides to the customer. The S reference point is the interface between the ISDN PBX and the ISDN terminals. The R reference point is the connection between the terminal adapter and non-ISDN terminals. Many different kinds of interfaces will be used at R.

## CHANNELS FOR ISDN

No exchange can handle circuit and packet switched data simultaneously. So the ISDN exchange separates the incoming traffic into circuit switched and packet switched streams. The ITU standards different channels

Bearer	B	64 kbps	Packet/ circuit switched
Data	D	16 kbps	Packet switched only. Low speed data and signaling.

High bit rate (H)	H0	384 kbps	For Transport Networks
	H11	1.536 Mbps	
	H12	1.92 Mbps	

Apart from those, there are:

A – 4 kHz analog telephone channel

C – 8 or 16 kbps digital channel

E – 64 kbps digital channel for internal ISDN signaling

Various combinations of the above channels are possible as shown below.

BASIC rate: 2B+D

PRIMARY rate: 23B+D or 30B+1D

HYBRID rate: 1A + 1C

and many others.

The basic rate should be reviewed as a replacement for POTS (pail old telephone service) for home or small business use. Each of the 64 kbps B channels can handle a single PCM voice channel with 8-bit samples made 8000 times a second. Signaling is on a separate 16 kbps D channel, so full 64 kbps are available to the user.

The primary rate interface is intended for use at the T reference point for businesses with a PBX. It has 23 B channels and 1 D channel (at 64 kbps) is the US and Japan and 30 B channels and 1 D channel (at 64 kbps) is Europe. The 23B + 1D choice was made to allow an ISDN frame fir nicely on AT&T's T1 system. The 30B + 1D choice was to allow an ISDN frame fit in CCITT's 2.048 Mbps E1 system. The 32<sup>nd</sup> time slot in the CCITT system is used for framing and general network maintenance. Note that the amount of D channel per B channel in the primary rate is much less than in the basic rate, as it is not expected that there will be much telemetry or low bandwidth packet data there.

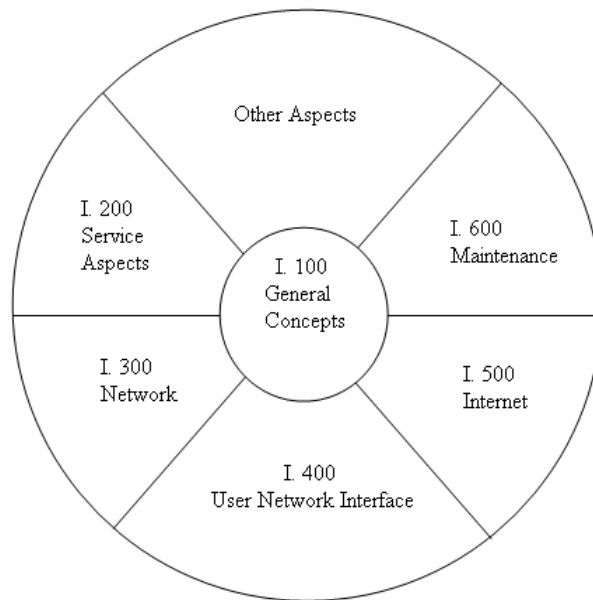
The ISDN standard defines 'Basic access' service as 2B+D (192 kbps). 'Primary access' service is 30B+D  $\equiv$  H12 (1.92 Mbps)



*NOW-A-DAYS VIDEO CONFERENCING IS NORMALLY THROUGH ISDN.*

## Upper Layers

Network	Call Control I. 451 / Q. 931	X.25	Further Study		X.25	
Data link	LAP-D I. 441 / Q. 921			I. 465 / V. 120 / Frame relay	LAP B	
Physical	I. 430 Basic Interface + I. 431 Primary Interface					
	Signal	Packet	Telemetry	Circuit Switching	Semi Permanent	Packet Switching
	D Channel			B Channel		



## PERSPECTIVE ON N-ISDN

We will mainly discuss here about narrowband ISDN, while the broadband version will be discussed later. N-ISDN was a massive attempt to replace the analog telephone system with a digital one suitable for both voice and nonvoice traffic. Achieving worldwide agreeability requires standardization. But unfortunately standardization process took years and the technology in this area moved very rapidly. For home use, one of the most popular features would have been video-on-demand. But the basic datarate in N-ISDN lacks the necessary bandwidth by far. For businesses, offering

data rate in kbps in 1990s when LANs have already marching towards Mbps is non-acceptable. The bleak picture, however, was brightened with only one prospect: Internet access. Various companies now sell ISDN adaptors that combine the 2B+D channels into a single 144 kbps digital channel. Many internet services providers also support these adaptors. The result is the facility to upgrade your download speed up to 5 times over the basic 28.8 kbps for analog modem links. This option, of course, was commercially viable, though, is no comparison with B-ISDN.

## Objective Questions

- 37.01 CCITT defined \_\_\_\_\_ reference points for ISDN.
- 37.02 Which reference point connects the terminal adapter and various non-ISDN terminals?
- 37.03 The B channel has a data rate of \_\_\_\_\_.
- 37.04 Define basic and primary access services.

## Subjective Questions

- 37.11 Enlist the different reference points for ISDN.
- 37.12 What are the various channel types in ISDN?
- 37.13 Why has N-ISDN lagged behind?

## Level 2 Questions

37.21