Module

4

Standards

Version 1 ECE , IIT Kharagpur

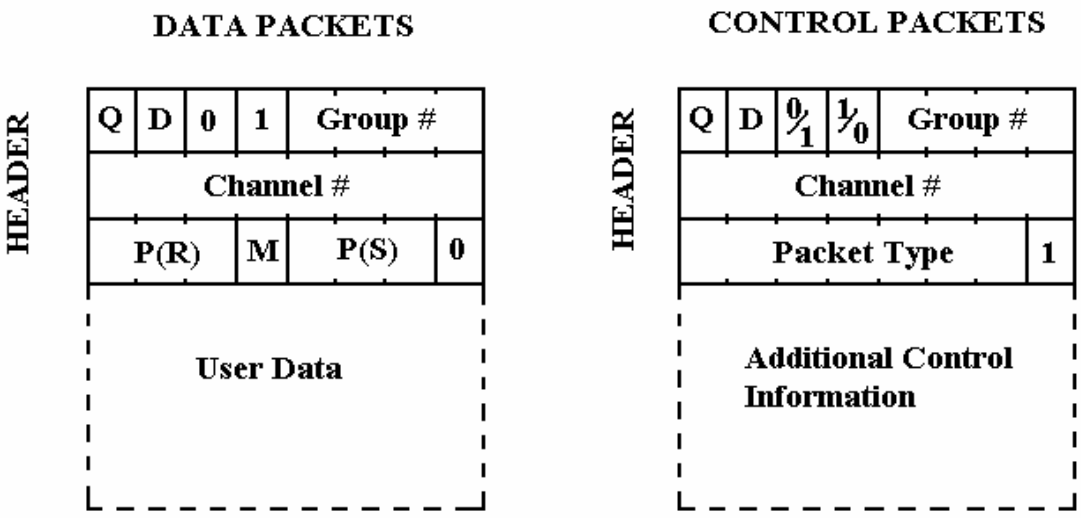
Lesson

12

Network Layer continued,X.25

4.5.1 X.25 HEADER

The X.25 header may be of either 3octets (24 bits) or of 4octets (32bits). Thus some extension is also provisioned.



The Q bit is the general format identifier which is called the Qualifier bit.

D (delivery bit, for acknowledgement) defines whether acknowledgement shall be provided by the DCE (D=0) or the remote DTE (D=1).

The next two bits are used to identify either a control packet, 3 octet data packet, a 4 octet data packet, or an information packet.

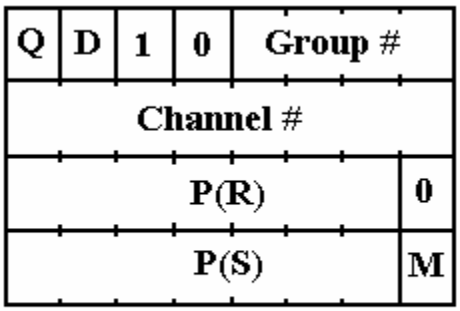
These four bits mentioned above are together sometimes know as ‘Format identifier’.

The M bit indicates that more packets are to be expected after the current packet. It is used to let the receiver know whether more (M=1) packets of

the same data are coming or the there is no more (M=0) packets.

☞Typical size of packet in X.25 is 128 octets of data.

P(S) and N(s) are same as P(R) and N(R) in HDLC. P(S) indicates send packet number and N(R) indicates receive packet number. They can be either of 3bits or of 7 bits. Sequence number is given to each packet not for identifying but for flow control, since in CO service, the packets will be transmitted and received in the same order.



32 Bit header

Virtual circuit number is provided using 12 bits i.e. 4 bits of Group number and 8 bits of Channel number. We can thus have 16 groups each group containing 256 channels. This gives a total of 2^{12} = 4096 VCs simultaneously. The Virtual circuit number on either side of the node is different. The incoming and outgoing VC numbers are different.

For establishing a call one control packet with destination and source address is transmitted. After that no source-destination address is used. A huge number of VCs can be supported in a session, but this does not necessarily increase the bandwidth as all the packets are not transmitted at the same time. They are distributed in time. So statistical multiplexing is employed. It determines the utilization of channel bandwidth. If path is not available then the packets will be stored in the buffer until they are read out during multiplexing.

The billing in X.25 maybe either be on a virtual call basis or Permanent Virtual Circuit basis. The former charges according to the number of Virtual Calls maid by a user, while the latter charges according to the number of PVCs used by the customer.

☞*In telephone billing, the charge is either on call basis (the line is free after the call is over) or on leased-line basis (the line is dedicated for all the time). Similarly in Packet switching, we may have a Virtual call or a Permanent Virtual Circuit.*

4.5.2 X.25 CALL SETUP COMMANDS

CALL SETUP AND CLEARING

DCE → DTE	DTE → DCE
Incoming call	Call request
Call connected	Call accept
Clear indicate	Clear request
DCE clear confirm	DTE clear confirm

DATA AND INTERRUPT

DCE → DTE	DTE → DCE
DCE data	DTE
DCE interrupt	DTE interrupt
DCE interrupt confirm	DTE

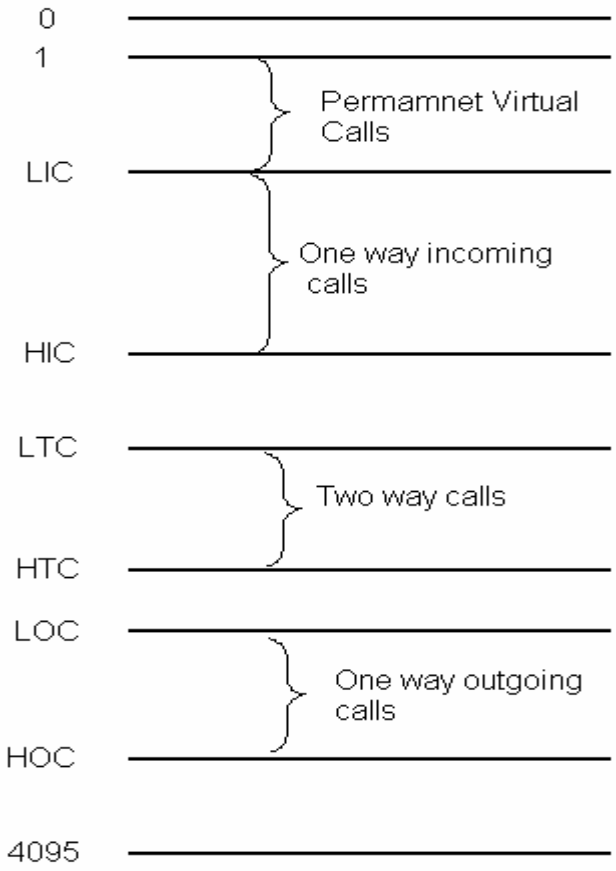
FLOW CONTROL RESET

DCE → DTE	DTE → DCE
DCE RR	DTE RR
DCE RNR	DTE RNR DTE REJ
RST Ind	RST Req
DCE RST Conf	DTE RST Conf

RESTART

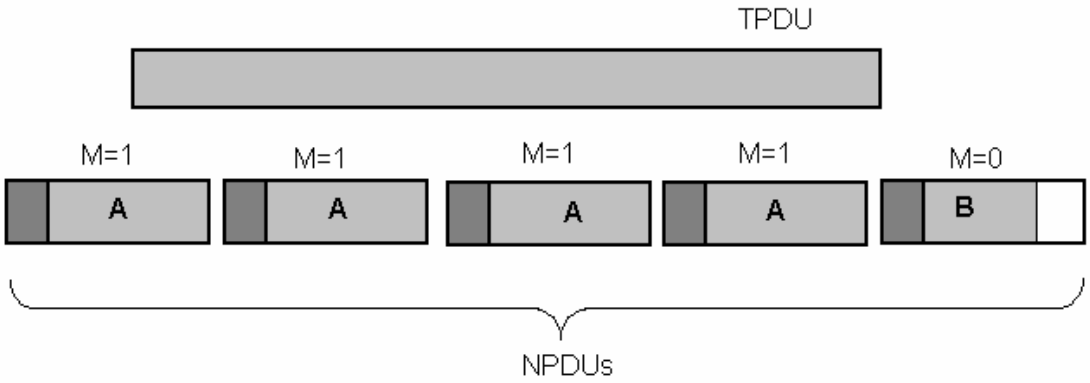
DCE → DTE	DTE → DCE
Restart Ind	Restart Req
DCE Restart Conf.	DTE Restart Conf.

4.5.3 VIRTUAL CIRCUIT NUMBER ALLOCATION



LIC	Lowest Incoming Call
HIC	Highest Incoming Call
LTC	Lowest Two-way Call
HTC	Highest Two-way Call

In X.25 packets are normally referred to as A-packets or B-packets. When an incoming TPDU is divided into packets the packets may be all completely filled up or the last one may be partially empty, depending upon the packet size and the burst size. If the packets are completely filled then they are called A-packets, and if they are partially empty then they are called B-packets. An A packet and B packet are classified according to the values of the D and the M bits in the X.25 packet header as shown in the figure below.



☞ *The D bit is the acknowledgement bit, which may be expected at every packet or at the end of the message.*

☞ *If no X.25 gateway is available then PAD is used. The PAD-PAD protocol is X.29, the PAD-DTE protocol is X.28, and the internal PAD protocol is X.3.*

Objective Questions

12.01

Subjective Questions

12.11

Level 2 Questions

12.21