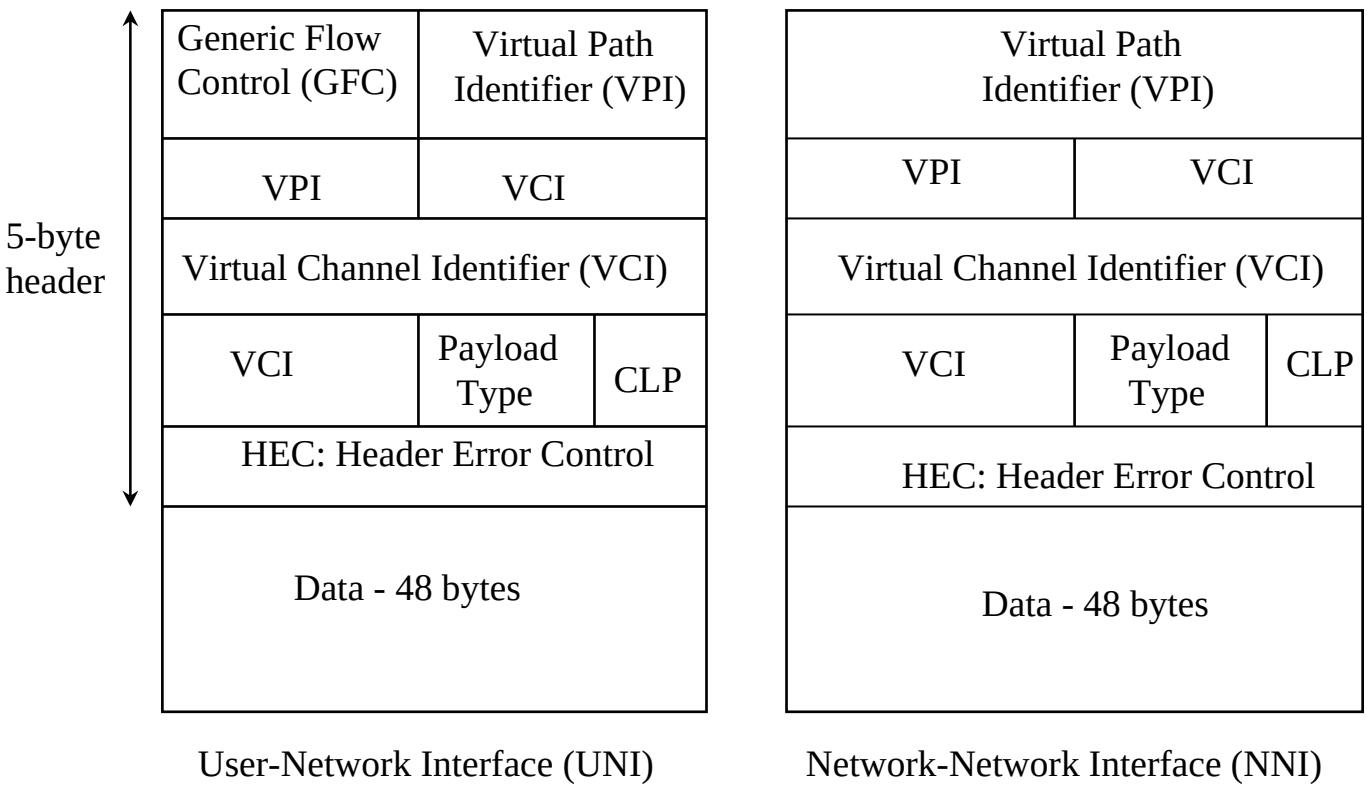
EE4004: Telecommunications
Answers for Summer 2004

Question 2(b)

(i) 4 marks

Either one of the following diagrams is acceptable:



User-Network Interface (UNI)

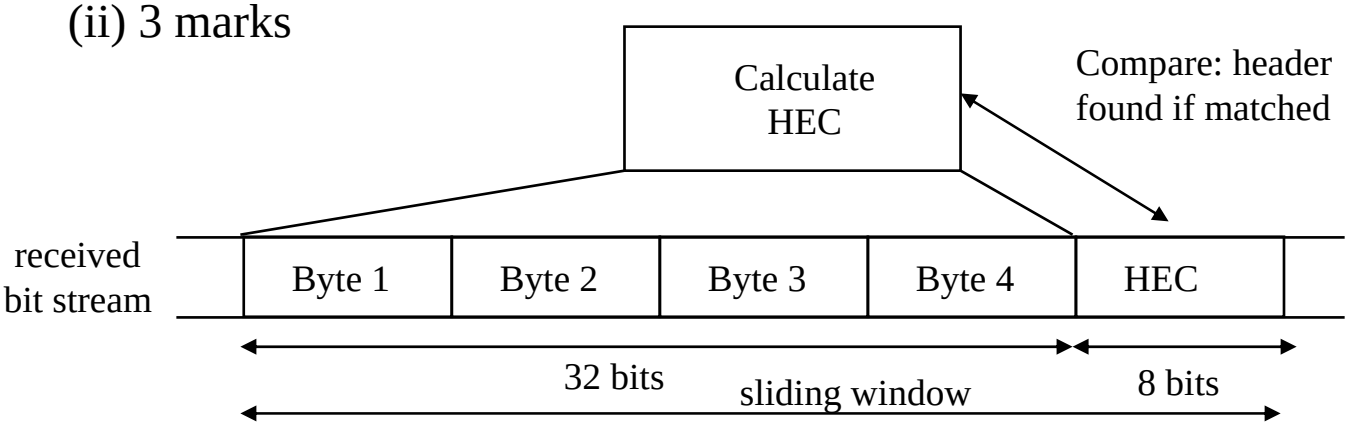
Network-Network Interface (NNI)

GFC: Used to control flow at the user-network interface
VPI/VCI: Used for routing the cell through the newtork
Payload Type: Indicates the type of data contained in the data field
- e.g. control or user data

CLP: Cell Loss Priority: Indicates if a cell may be deleted in case of congestion
HEC: Header Error Control: Used for error detection/corection on the 5-byte header only.

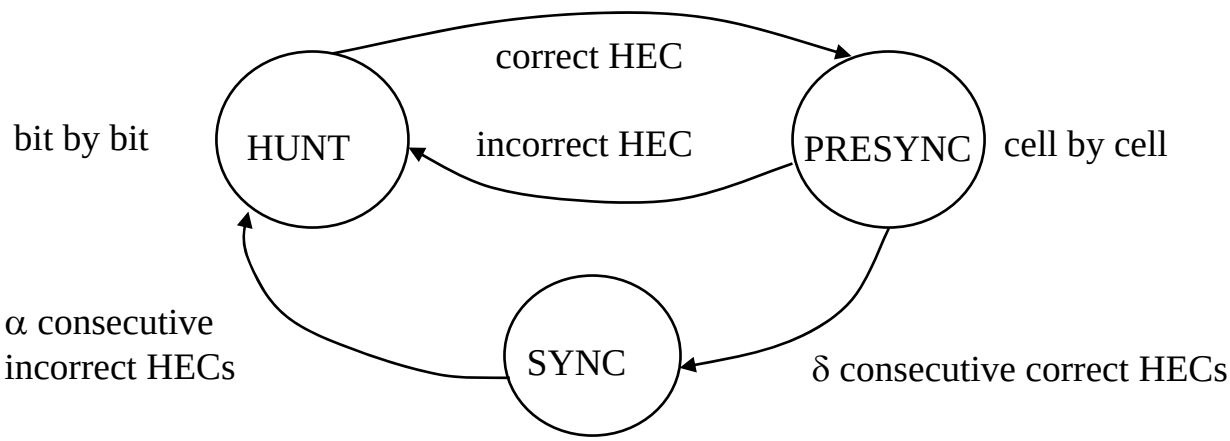
Question 2(b)

(ii) 3 marks



The HEC is used to determine where an ATM cell starts. The receiver uses a 40 bit sliding window and assumes that the first 32 bits are the first 4 bytes of the ATM header and the next 8 bits are the header error control (HEC). For no errors, the HEC should give a known pattern. If this is achieved then the receiver has found the cell boundaries, if not it moves the sliding window and tries again. Once the cell boundaries have been found, succeeding cell boundaries are determined by counting bits.

(iii) 3 marks

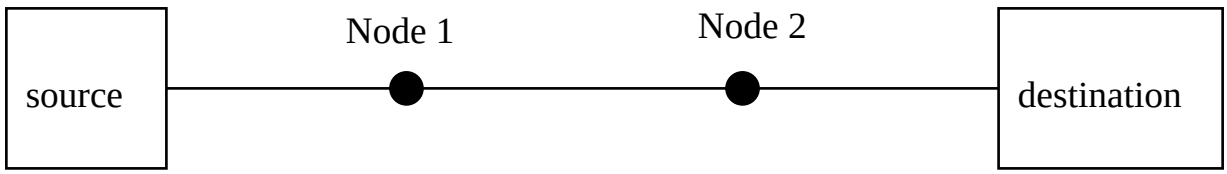


α and δ are numbers chosen to give the best performance – usually less than 10.

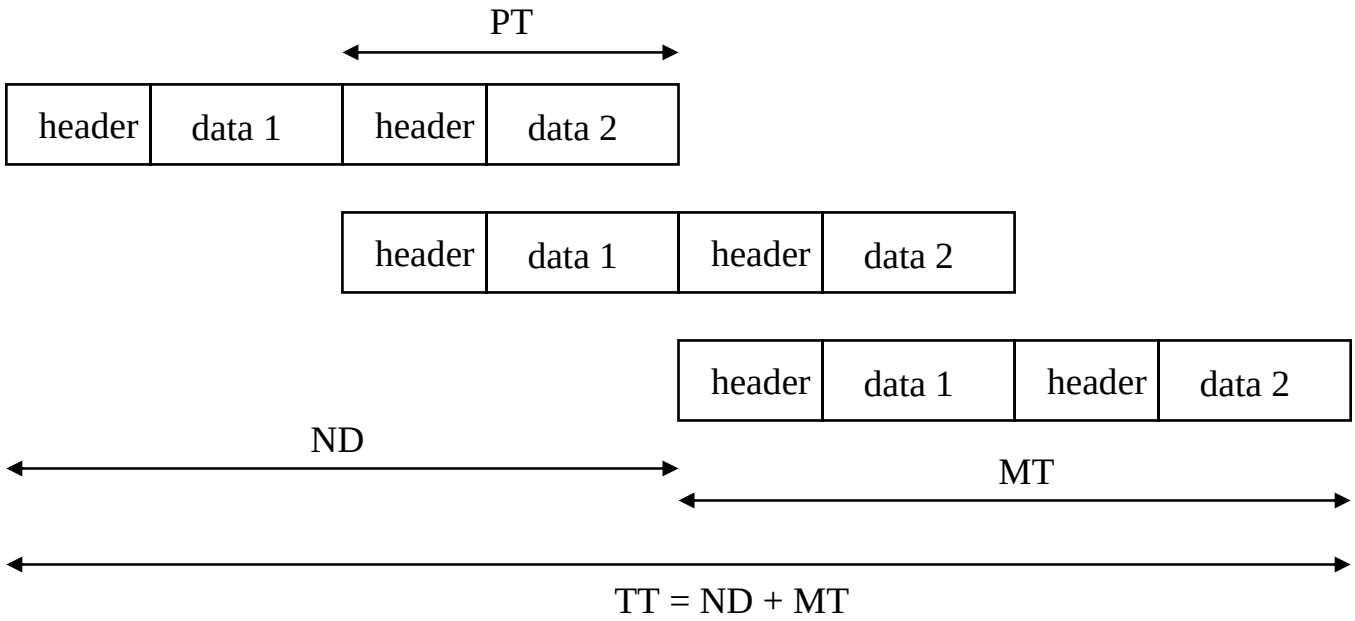
Synchronisation is based on the HEC. The receiving node alternates between HUNT, PRESYNC and SYNC states. The receiver is considered to be synchronized if it has received δ consecutive cells with no HEC errors. It is considered to have lost synchronization if α consecutive HECs have errors and it then enters a HUNT stage.

Question 3

(a) 12 marks



Example of message broken into two packets:



PT: Packet Time = Time to send/receive one packet
= No of bits in packet/Bit rate
ND: Network Delay = No of nodes x Packet Time
MT: Message time: Time to send all packets in message
= No. of packets x PT
TT: Total time for message to be received = ND + MT

3(b) 8 marks

No .of packets	Packet Size	PT	ND	MT	TT
1	1100	1.1ms	2.2ms	1.1ms	3.3ms (i)
5	300	0.3ms	0.6ms	1.5ms	2.1ms (ii)
10	200	0.2ms	0.4ms	2.0ms	2.4ms (iii)

Comment : Initially as the message is broken intro smaller packets the total transmission time decreases. However, a stage is reached where the overhead associated with the header prevents further reductions.