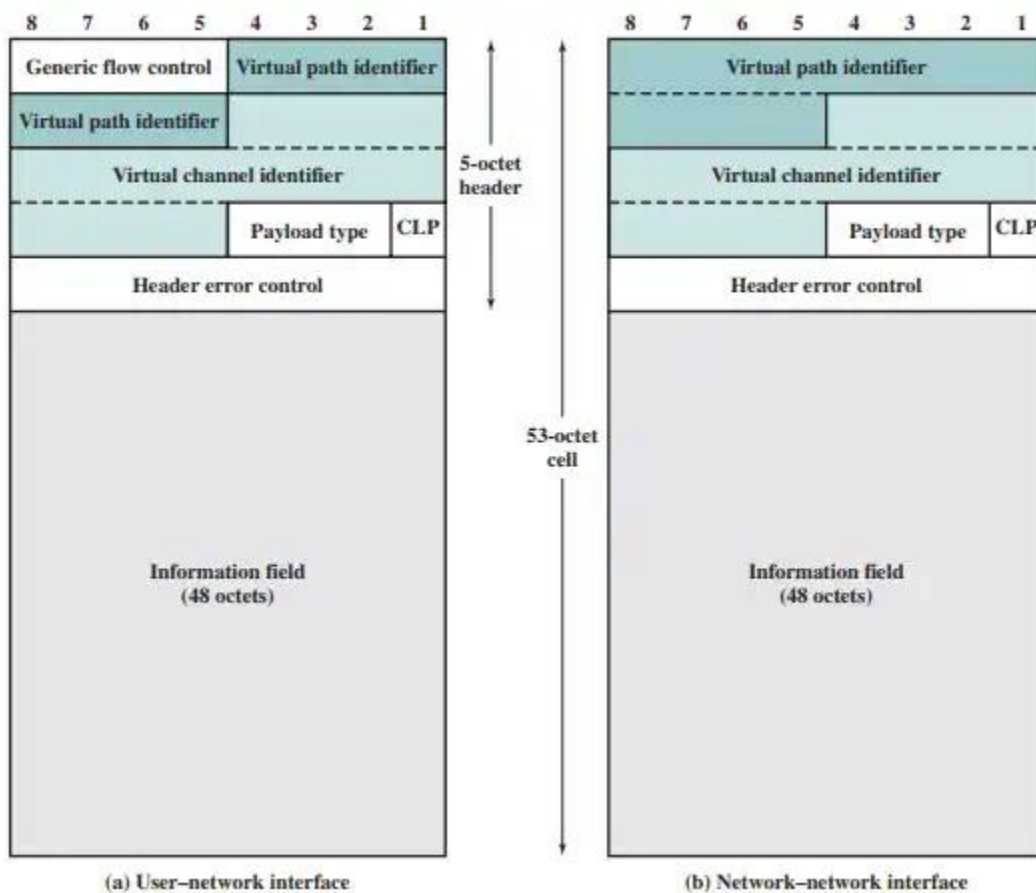


ATM Cells

ATM makes use of fixed-size cells, consisting of a 5-octet header and a 48-octet information field. There are several advantages to the use of small, fixed-size cells. First, the use of small cells may reduce queuing delay for a high-priority cell, because it waits less if it arrives slightly behind a lower-priority cell that has gained access to a resource (e.g., the transmitter). Second, fixed-size cells can be switched more efficiently, which is important for the very high data rates of ATM. With fixed-size cells, it is easier to implement the switching mechanism in hardware.

The Generic Flow Control (GFC) field does not appear in the cell header internal to the network, but only at the user–network interface. Hence, it can be used for control of cell flow only at the local user–network interface. The field could be used to assist the customer in controlling the flow of traffic for different qualities of service. In any case, the GFC mechanism is used to alleviate short-term overload conditions in the network.



The virtual path identifier (VPI) constitutes a routing field for the network. It is 8 bits at the user–network interface and 12 bits at the network–network interface. The latter allows support for an expanded number of VPCs internal to the network, to include those supporting subscribers and those required for network management. The virtual channel identifier (VCI) is used for routing to and from the end user. The Payload Type (PT) field indicates the type of information in the information field. A value of 0 in the first bit indicates user information (i.e., information from the

next higher layer). In this case, the second bit indicates whether congestion has been experienced; the third bit, known as the Service Data Unit (SDU) type bit, is a one-bit field that can be used to discriminate two types of ATM SDUs associated with a connection. The term SDU refers to the 48-octet payload of the cell. A value of 1 in the first bit of the Payload Type field indicates that this cell carries network management or maintenance information. This indication allows the insertion of network-management cells onto a user's VCC without impacting the user's data. Thus, the PT field can provide inband control information.

The Cell Loss Priority (CLP) bit is used to provide guidance to the network in the event of congestion. A value of 0 indicates a cell of relatively higher priority, which should not be discarded unless no other alternative is available. A value of 1 indicates that this cell is subject to discard within the network. The user might employ this field so that extra cells (beyond the negotiated rate) may be inserted into the network, with a CLP of 1, and delivered to the destination if the network is not congested. The network may set this field to 1 for any data cell that is in violation of an agreement concerning traffic parameters between the user and the network. In this case, the switch that does the setting realizes that the cell exceeds the agreed traffic parameters but that the switch is capable of handling the cell. At a later point in the network, if congestion is encountered, this cell has been marked for discard in preference to cells that fall within agreed traffic limits.

The Header Error Control (HEC) field is an 8-bit error code that can be used to correct single-bit errors in the header and to detect double-bit errors. In the case of most existing data link layer protocols, such as LAPD and HDLC, the data field that serves as input to the error code calculation is in general much longer than the size of the resulting error code. This allows for error detection. In the case of ATM, there is also sufficient redundancy in the code to recover from certain error patterns.