Like most protocols, a message is divided into two conceptual parts: a header that contains meta-data and a payload area that carries data. Figure 11.7 shows the TCP segment format.

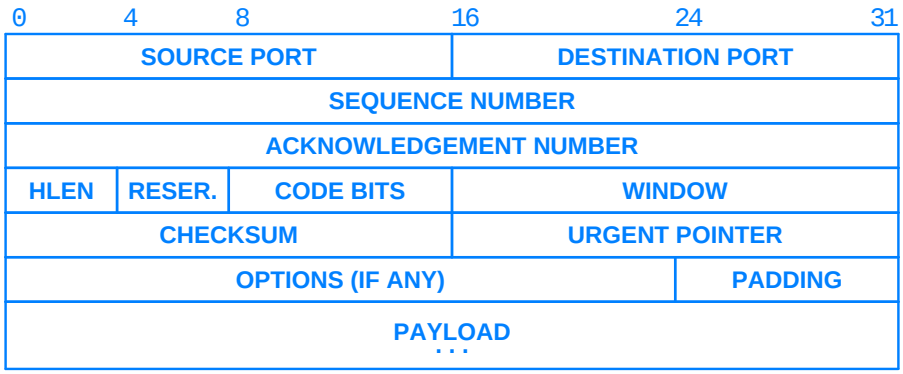

Figure 11.7 TCP segment format with a TCP header followed by a payload.

The header, known as the *TCP header*, consists of at least 20 octets and may contain more if the segment carries options. The header has the expected identification and control information. Fields *SOURCE PORT* and *DESTINATION PORT* contain the TCP port numbers that identify the application programs at the ends of the connection. The *SEQUENCE NUMBER* field identifies the position in the sender's octet stream of the data in the segment. The *ACKNOWLEDGEMENT NUMBER* field identifies the number of the octet that the side sending the segment expects to receive next. Note that the sequence number refers to the stream flowing in the same direction as the segment, while the acknowledgement number refers to the stream flowing in the opposite direction from the segment.

The *HLEN*† field contains an integer that specifies the length of the segment header measured in 32-bit multiples. It is needed because the *OPTIONS* field varies in length, depending on which options are included. Thus, the size of the TCP header varies depending on the options selected. The 4-bit field marked *RESER* is reserved for future use (a later section describes a proposed use).

Some segments carry only an acknowledgement, while some carry data. Others carry requests to establish or close a connection. TCP software uses the 8-bit field labeled *CODE BITS* to determine the purpose and contents of the segment. The eight bits tell how to interpret other fields in the header according to the table in Figure 11.8.

TCP software advertises how much data it is willing to accept every time it sends a segment by specifying its buffer size in the *WINDOW* field. The field contains a 16-bit unsigned integer in network-standard byte order. Window advertisements provide an example of piggybacking because they accompany all segments, including those carrying data as well as those carrying only an acknowledgement.

†The TCP specification says the *HLEN* field is the *offset* of the data area within the segment.