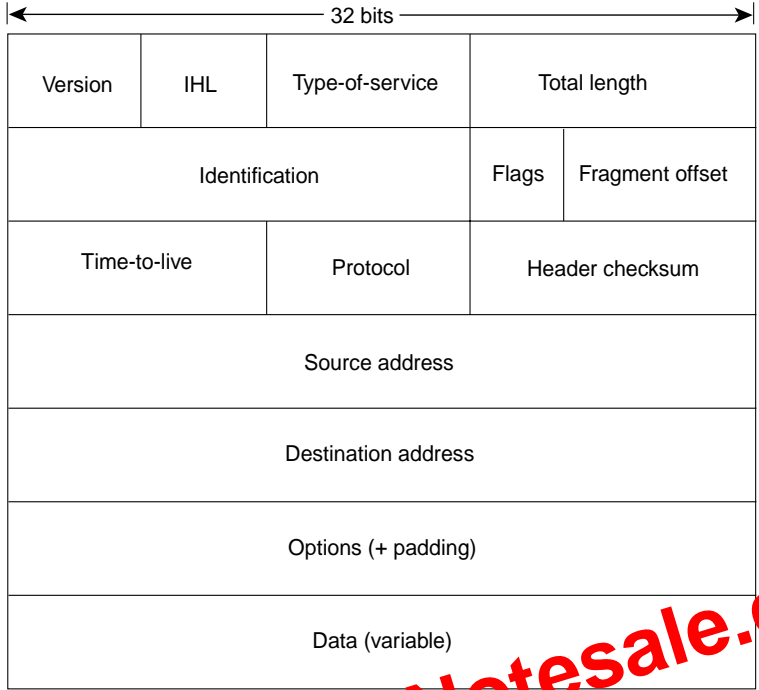


Figure 30-2 Fourteen fields comprise an IP packet.



The following discussion describes the IP packet fields illustrated in Figure 30-2:

- *Version*—Indicates the version of IP currently used.
- *Header Length (IHL)*—Indicates the datagram header length in 32-bit words.
- *Type-of-Service*—Specifies how an upper-layer protocol would like a current datagram to be handled, and assigns datagrams various levels of importance.
- *Total Length*—Specifies the length, in bytes, of the entire IP packet, including the data and header.
- *Identification*—Contains an integer that identifies the current datagram. This field is used to help piece together datagram fragments.
- *Flags*—Consists of a 3-bit field of which the two low-order (least-significant) bits control fragmentation. The low-order bit specifies whether the packet can be fragmented. The middle bit specifies whether the packet is the last fragment in a series of fragmented packets. The third or high-order bit is not used.
- *Fragment Offset*—Indicates the position of the fragment’s data relative to the beginning of the data in the original datagram, which allows the destination IP process to properly reconstruct the original datagram.
- *Time-to-Live*—Maintains a counter that gradually decrements down to zero, at which point the datagram is discarded. This keeps packets from looping endlessly.
- *Protocol*—Indicates which upper-layer protocol receives incoming packets after IP processing is complete.
- *Header Checksum*—Helps ensure IP header integrity.
- *Source Address*—Specifies the sending node.
- *Destination Address*—Specifies the receiving node.

Preview from Notesale.co.uk
page 3 of 16

- *Options*—Allows IP to support various options, such as security.
- *Data*—Contains upper-layer information.

IP Addressing

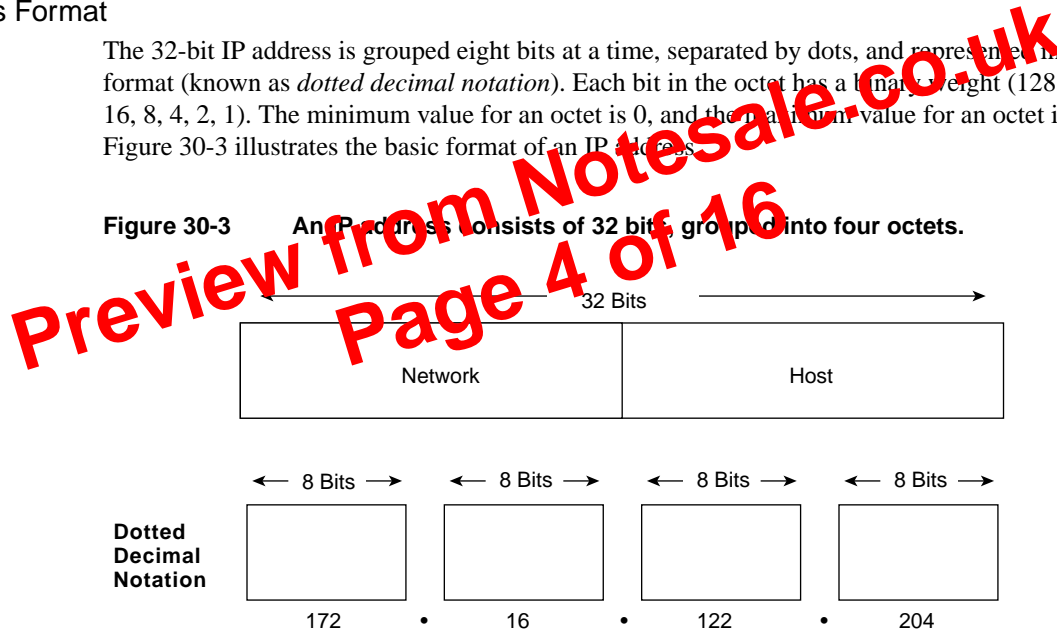
As with any other network-layer protocol, the IP addressing scheme is integral to the process of routing IP datagrams through an internetwork. Each IP address has specific components and follows a basic format. These IP addresses can be subdivided and used to create addresses for subnetworks, as discussed in more detail later in this chapter.

Each host on a TCP/IP network is assigned a unique 32-bit logical address that is divided into two main parts: the network number and the host number. The network number identifies a network and must be assigned by the Internet Network Information Center (InterNIC) if the network is to be part of the Internet. An Internet Service Provider (ISP) can obtain blocks of network addresses from the InterNIC and can itself assign address space as necessary. The host number identifies a host on a network and is assigned by the local network administrator.

IP Address Format

The 32-bit IP address is grouped eight bits at a time, separated by dots, and represented in decimal format (known as *dotted decimal notation*). Each bit in the octet has a binary weight (128, 64, 32, 16, 8, 4, 2, 1). The minimum value for an octet is 0, and the maximum value for an octet is 255. Figure 30-3 illustrates the basic format of an IP address.

Figure 30-3 An IP address consists of 32 bits, grouped into four octets.



IP Address Classes

IP addressing supports five different address classes: A, B, C, D, and E. Only classes A, B, and C are available for commercial use. The left-most (high-order) bits indicate the network class. Table 30-1 provides reference information about the five IP address classes.