

21-2 ICMP

*The IP protocol has no error-reporting or error-correcting mechanism. The IP protocol also lacks a mechanism for host and management queries. The **Internet Control Message Protocol (ICMP)** has been designed to compensate for the above two deficiencies. It is a companion to the IP protocol.*

Topics discussed in this section:

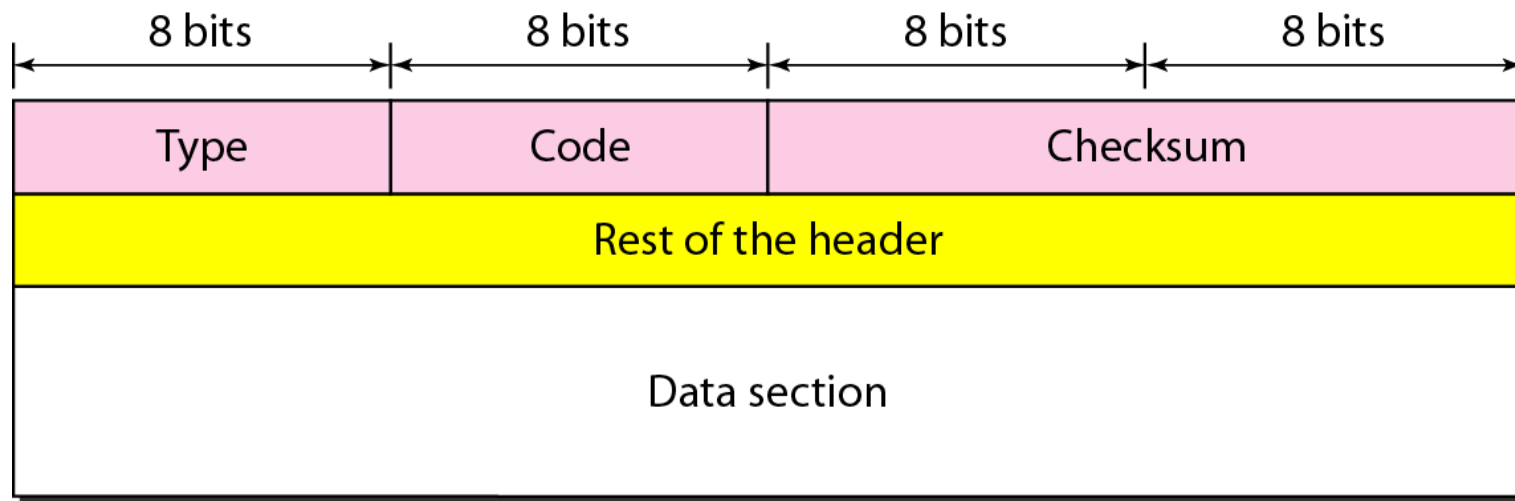
Types of Messages

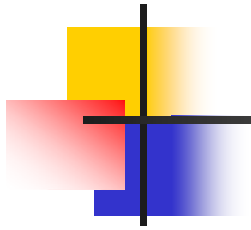
Message Format

Error Reporting and Query

Debugging Tools

Figure 21.8 *General format of ICMP messages*

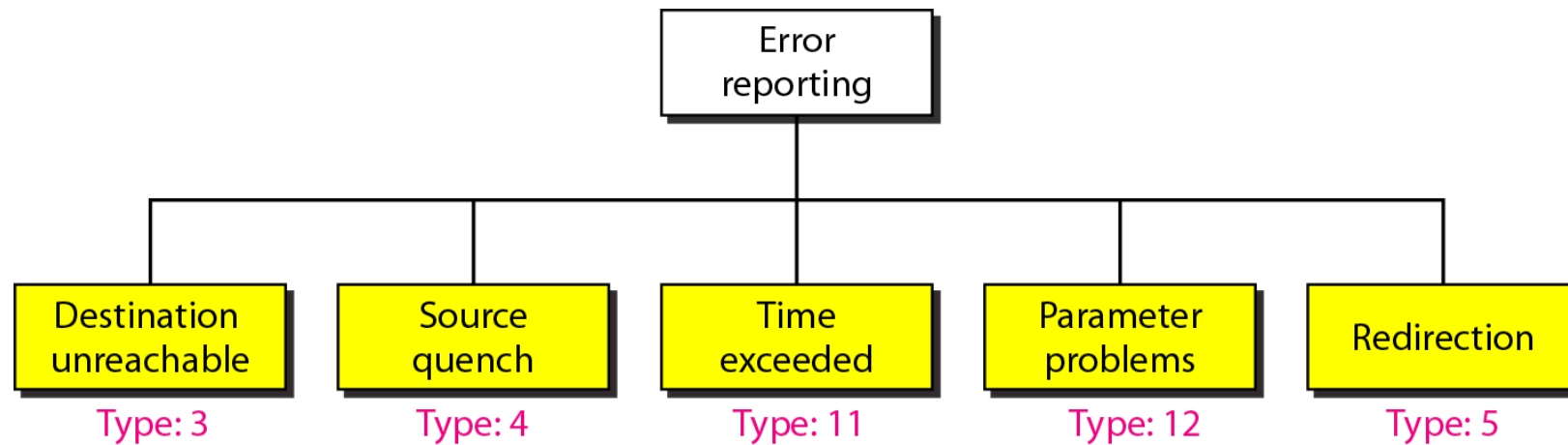




Note

ICMP always reports error messages to the original source.

Figure 21.9 *Error-reporting messages*





Note

Important points about ICMP error messages:

- ☐ No ICMP error message will be generated in response to a datagram carrying an ICMP error message.
- ☐ No ICMP error message will be generated for a fragmented datagram that is not the first fragment.
- ☐ No ICMP error message will be generated for a datagram having a multicast address.
- ☐ No ICMP error message will be generated for a datagram having a special address such as 127.0.0.0 or 0.0.0.0.

Figure 21.10 *Contents of data field for the error messages*

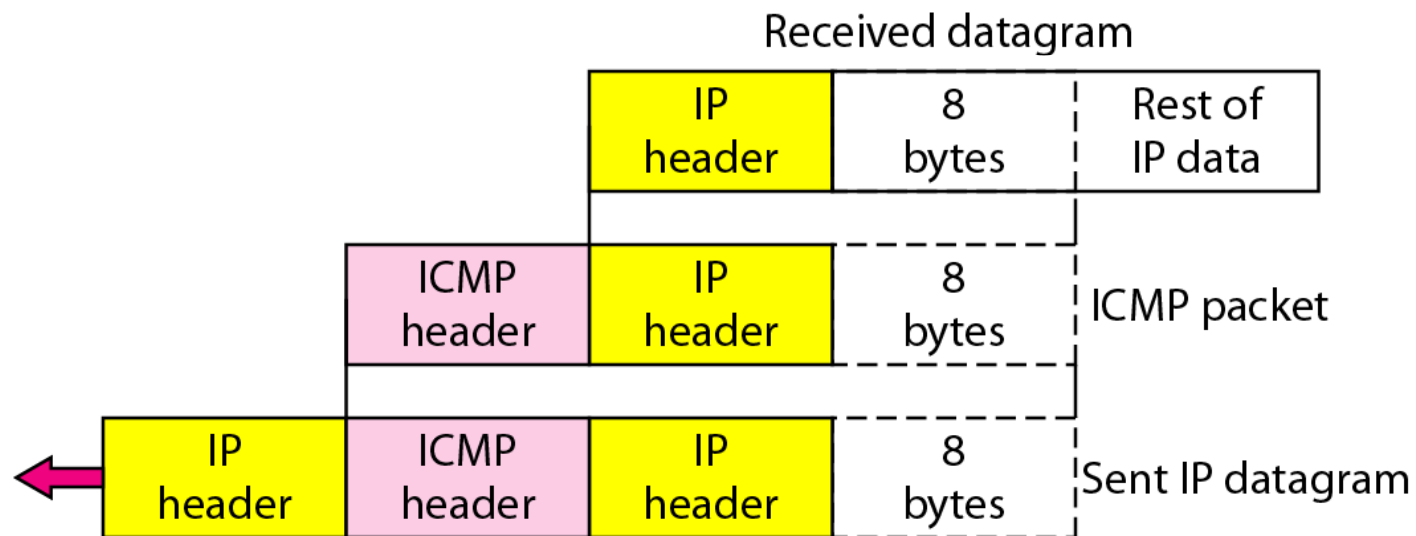


Figure 21.11 *Redirection concept*

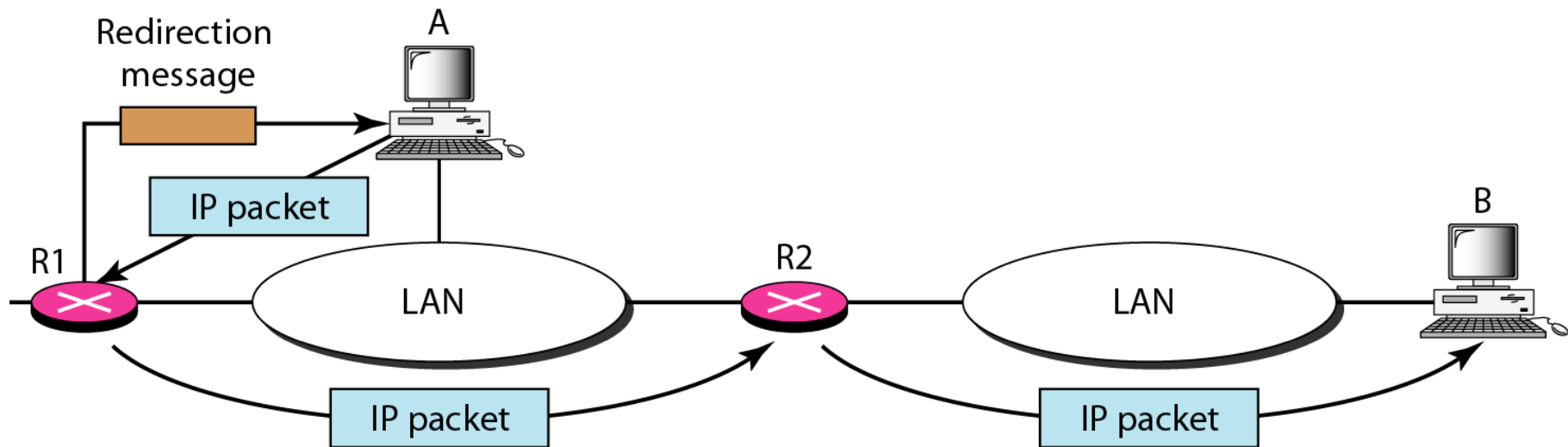


Figure 21.12 *Query messages*

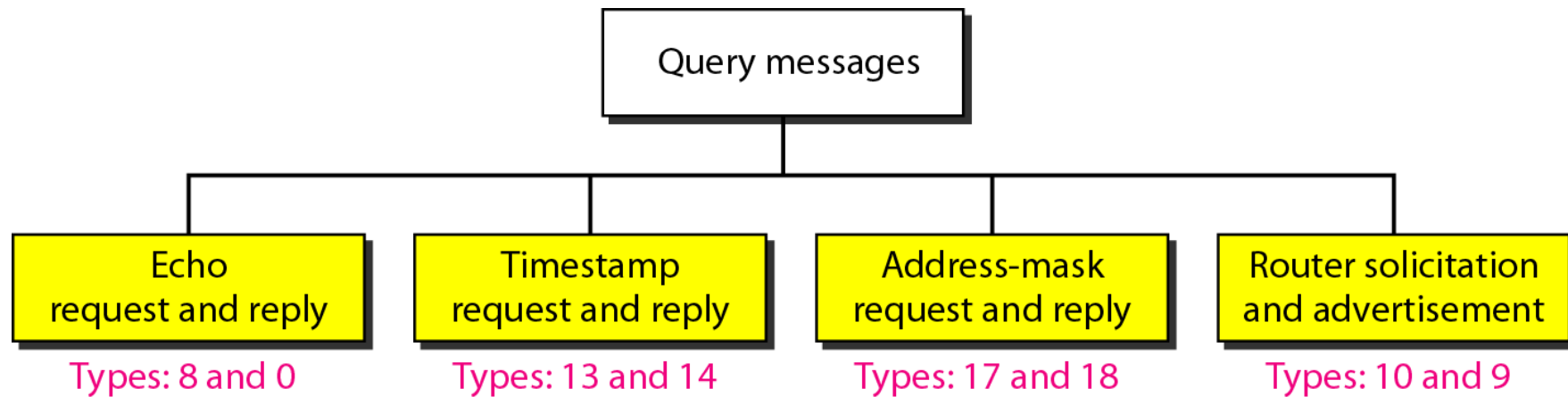
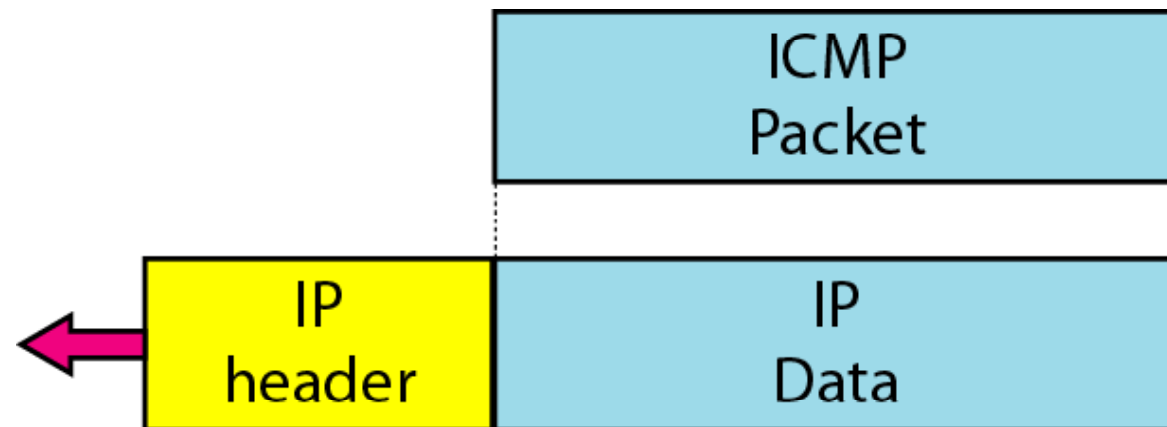


Figure 21.13 *Encapsulation of ICMP query messages*





Example 21.2

Figure 21.14 shows an example of checksum calculation for a simple echo-request message. We randomly chose the identifier to be 1 and the sequence number to be 9. The message is divided into 16-bit (2-byte) words. The words are added and the sum is complemented. Now the sender can put this value in the checksum field.

Figure 21.14 *Example of checksum calculation*

