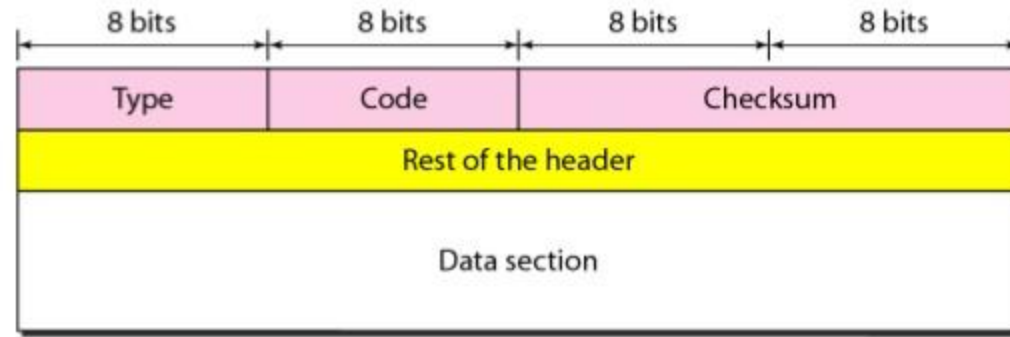


ICMP & IGMP

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.*

General format of ICMP messages



Types of Messages

ICMP messages are divided into two broad categories:

Error-reporting messages and
Query messages

Code Field

The code field specifies the reason for the particular message type

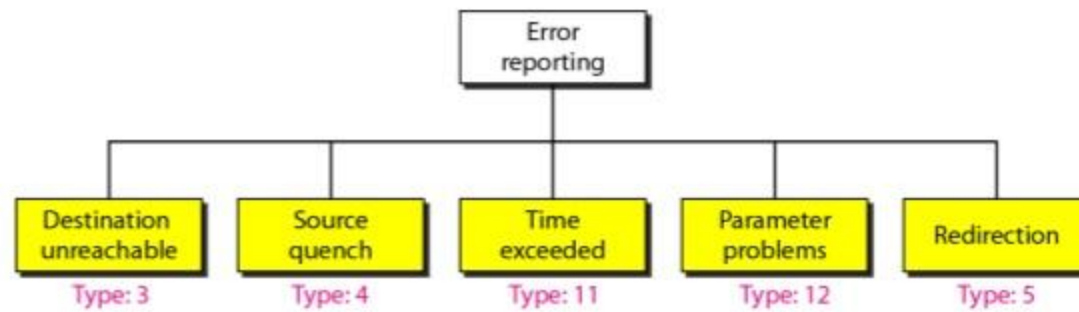
Data Section

The data section in error messages carries information for finding the original packet that had the error.
In query messages, the data section carries extra information based on the type of the query.

Note

ICMP always reports error messages to the original source.

Error-reporting messages

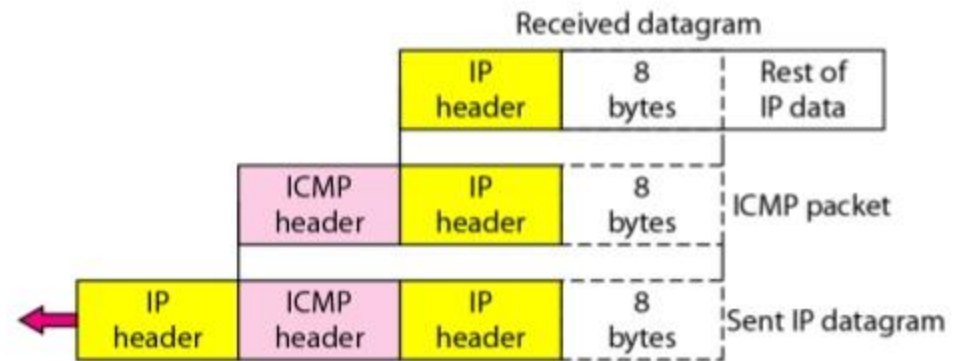


Note

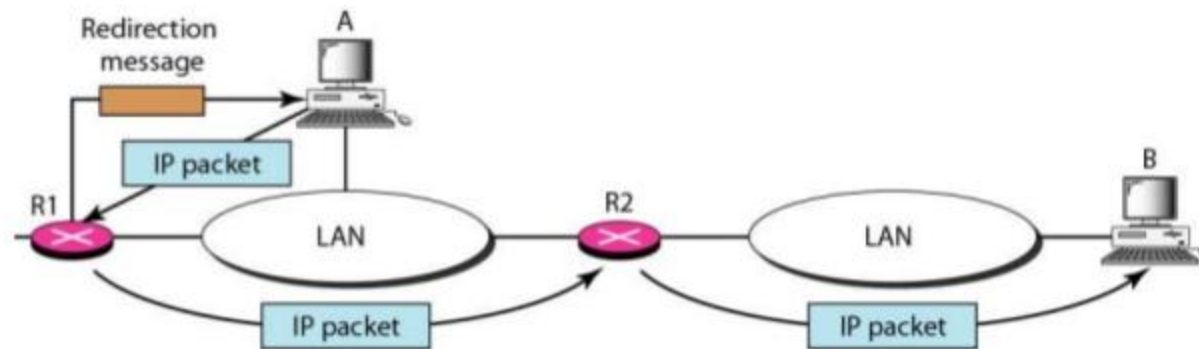
Important points about ICMP error messages:

- ❑ 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.

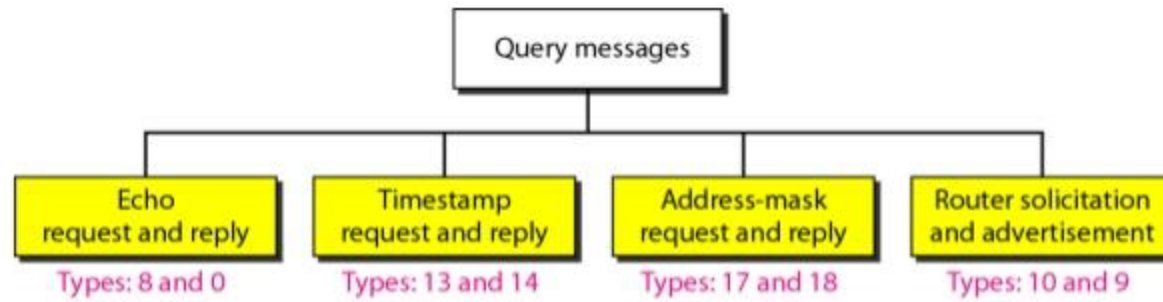
Contents of data field for the error messages



Redirection concept



Query messages



Echo Request and Reply

The echo-request and echo-reply messages are designed for diagnostic purposes.

Timestamp Request and Reply

Two machines (hosts or routers) can use the timestamp request and timestamp reply messages to determine the round-trip time needed for an IP datagram to travel between them. It can also be used to synchronize the clocks in two machines

Address-Mask Request and Reply

A host may know its IP address, but it may not know the corresponding mask.

Router Solicitation and Advertisement

a host that wants to send data to a host on another network needs to know the address of routers connected to its own network.

checksum

In ICMP the checksum is calculated over the entire message (header and data).

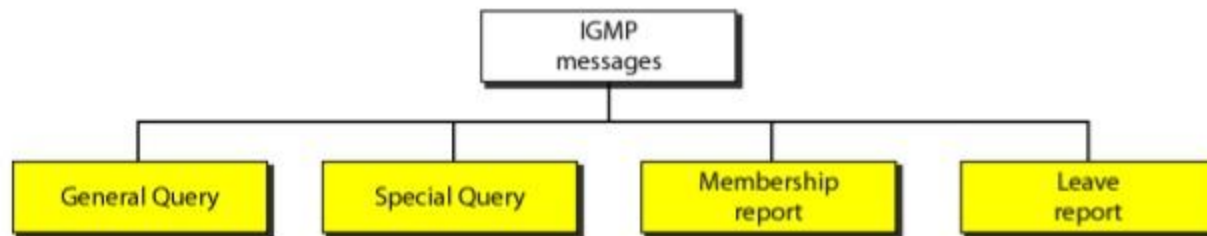
Encapsulation of ICMP query messages



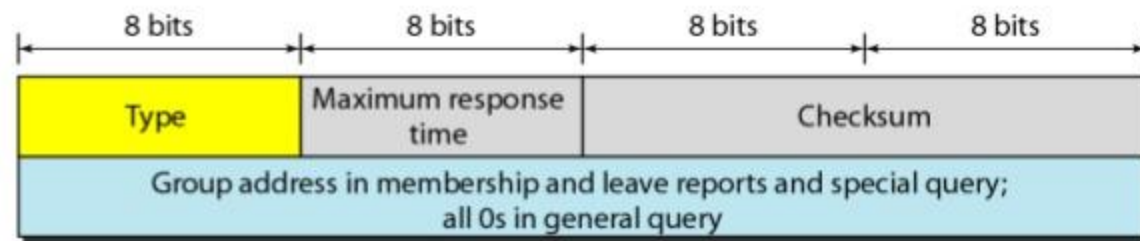
21-3 IGMP

The IP protocol can be involved in two types of communication: unicasting and multicasting. The Internet Group Management Protocol (IGMP) is one of the necessary, but not sufficient, protocols that is involved in multicasting. IGMP is a companion to the IP protocol.

IGMP message types



IGMP message format



Type

This 8-bit field defines the type of message, as shown in Table. The value of the type is shown in both hexadecimal and binary notation.

| <i>Type</i> | <i>Value</i> |
|--------------------------|------------------|
| General or special query | 0x11 or 00010001 |
| Membership report | 0x16 or 00010110 |
| Leave report | 0x17 or 00010111 |

Maximum Response Time

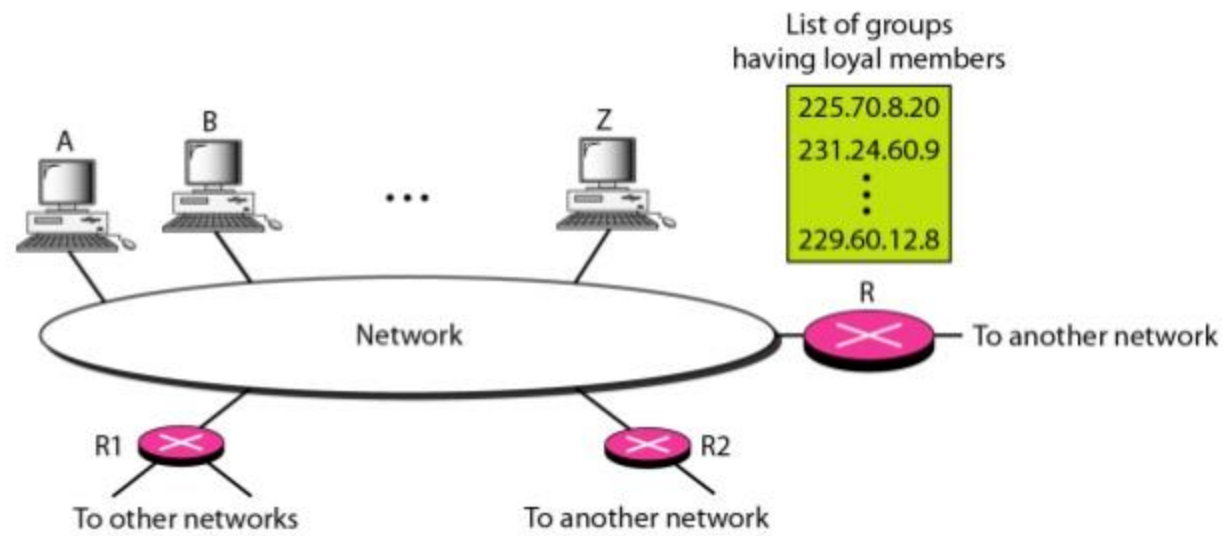
This 8-bit field defines the amount of time in which a query must be answered

Checksum This is a 16-bit field carrying the checksum. The checksum is calculated over the 8-byte message.

Group address

The value of this field is 0 for a general query message. The value defines the groupid (multicast address of the group) in the special query, the membership report, and the leave report messages.

IGMP operation



IGMP operation

Joining a Group

Leaving a Group

Monitoring Membership

Delayed Response

Joining a Group

Note

In IGMP, a membership report is sent twice, one after the other.

Monitoring Membership

Note

The general query message does not define a particular group.

END