

## 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**

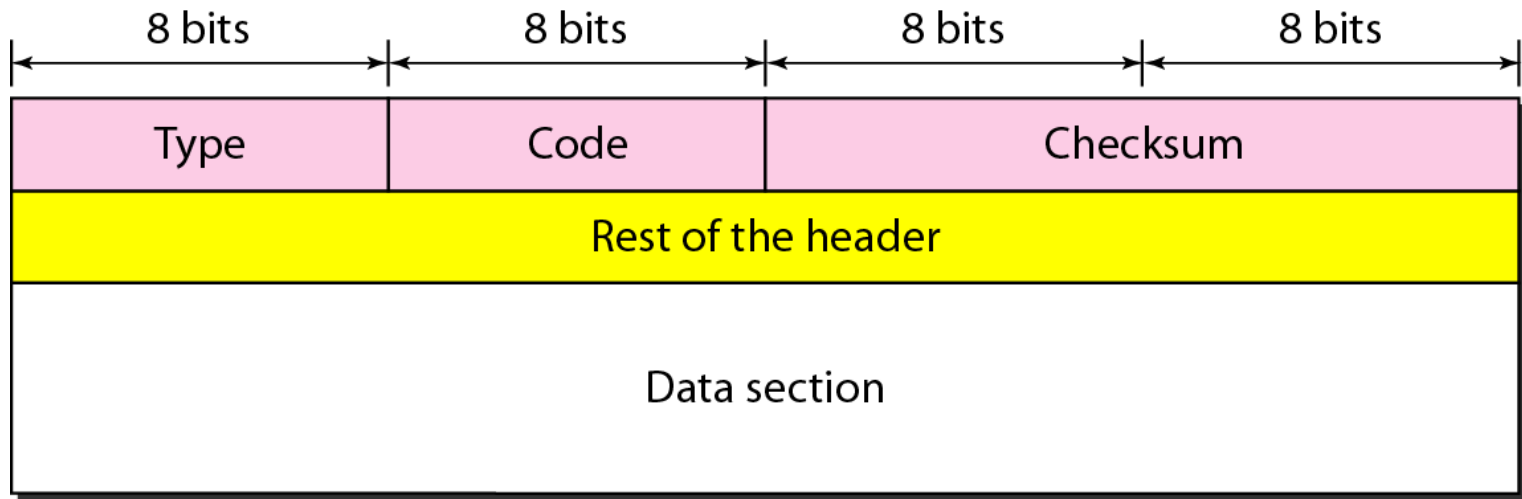
**Error Reporting and Query**

**Debugging Tools**

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## *General format of ICMP messages*

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# Types of Messages

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**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.

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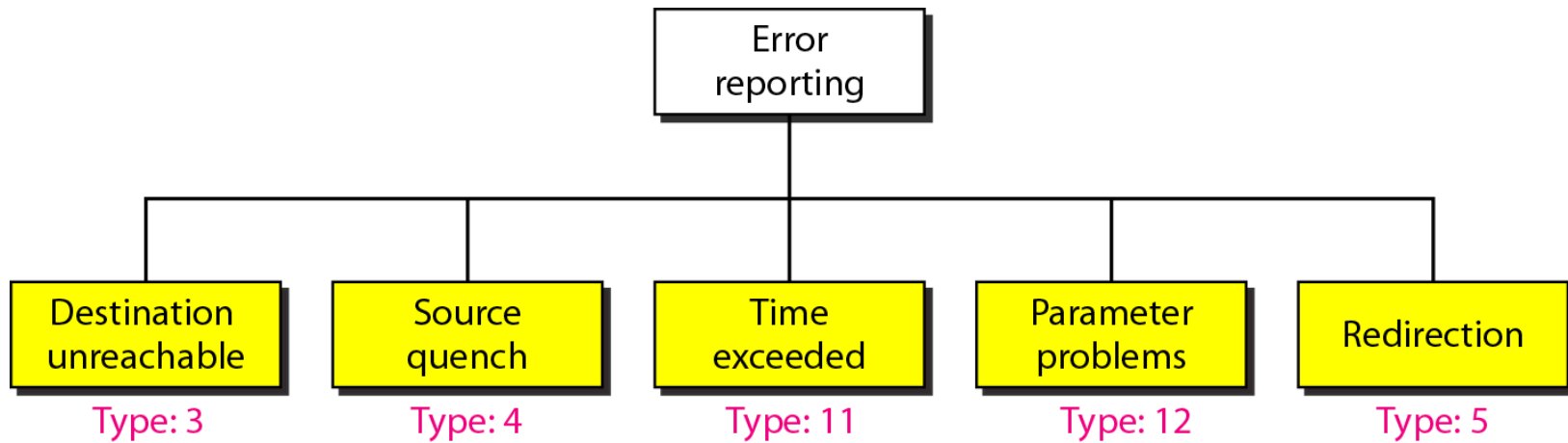
*Note*

**ICMP always reports error messages to the original source.**

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**Figure 21.9** *Error-reporting messages*

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## *Note*

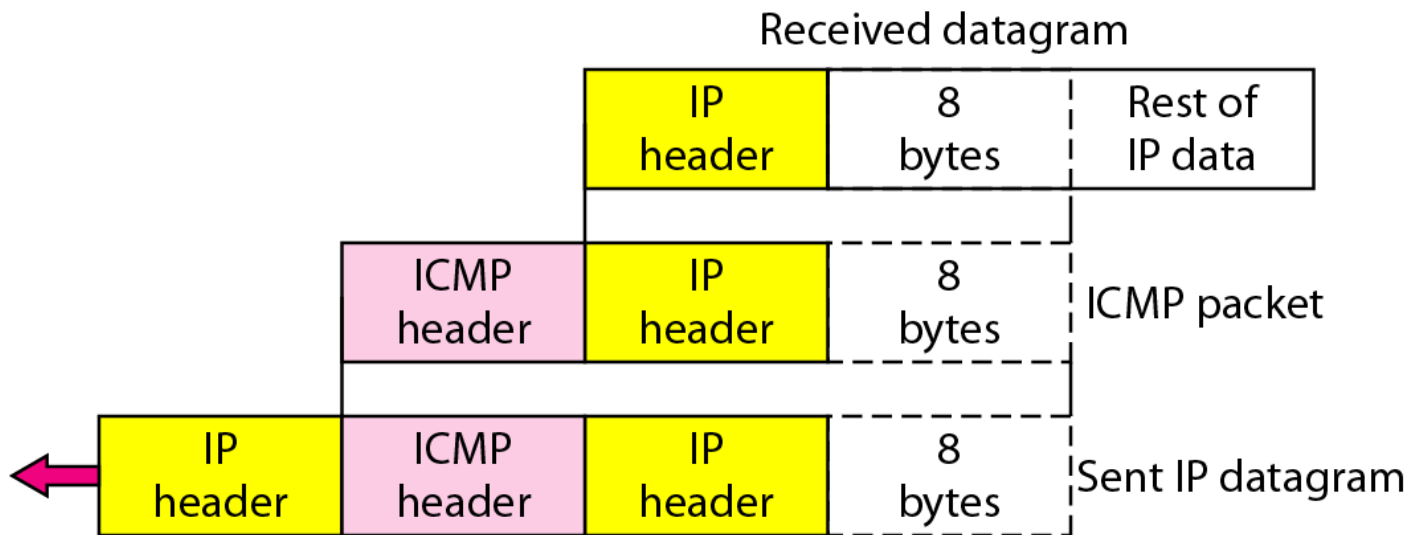
### **Important points about ICMP error messages:**

- ❑ 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.**

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

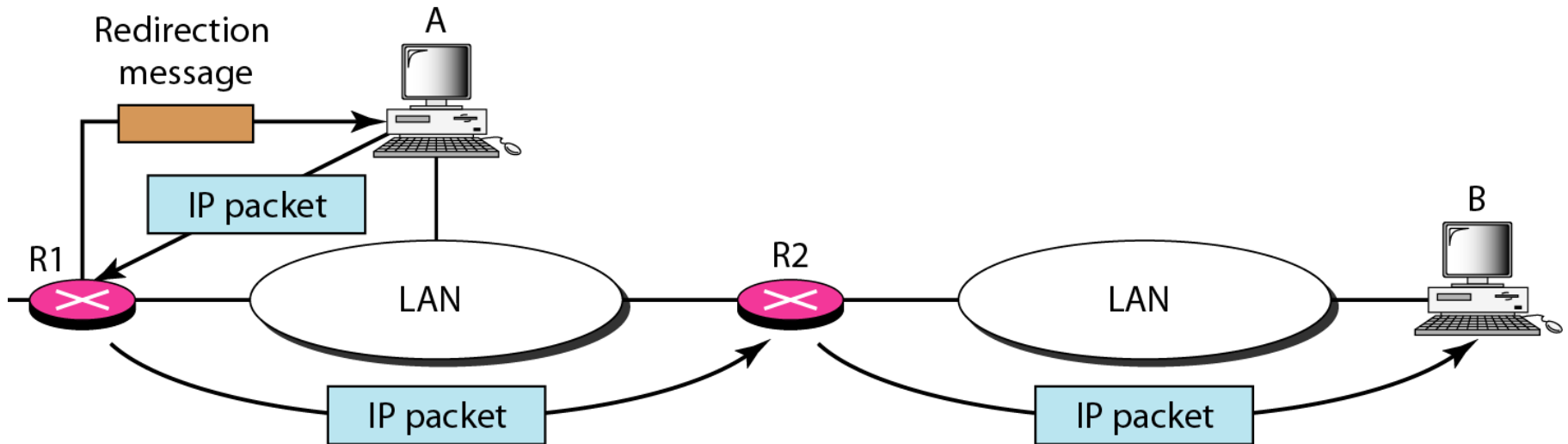
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**Figure 21.11** *Redirection concept*

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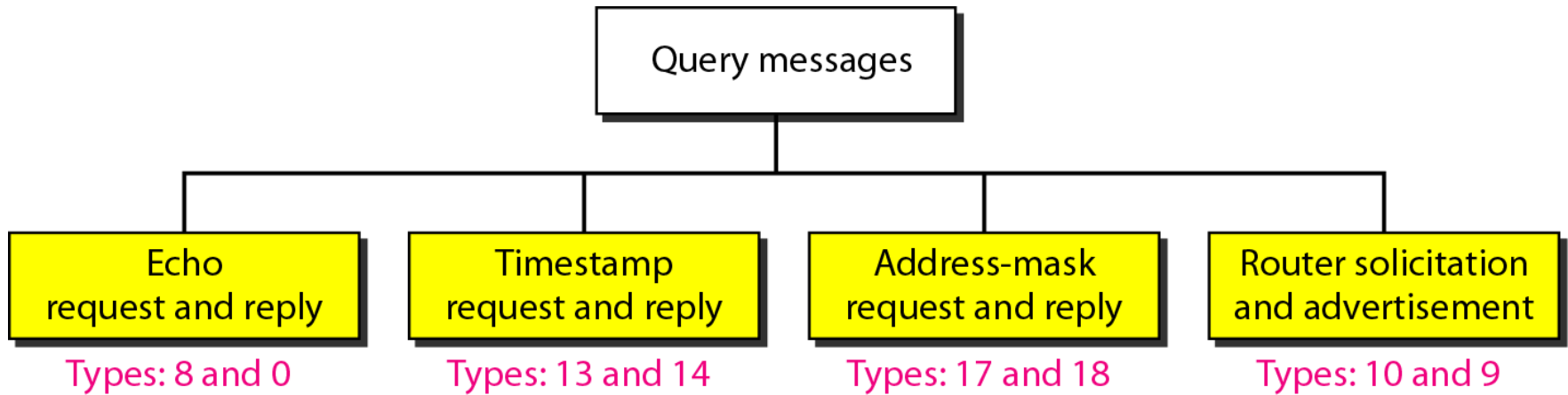




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**Figure 21.12** *Query messages*

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### ***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.

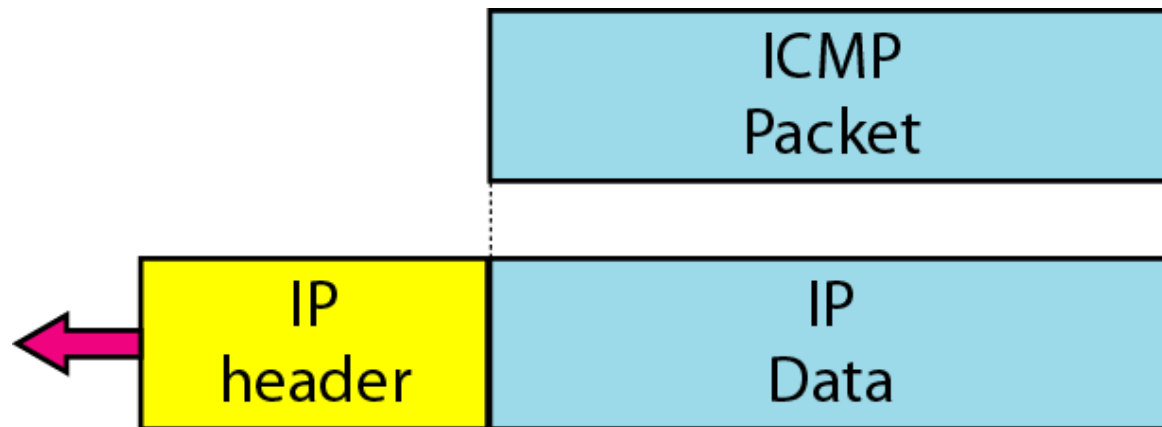
### **checksum**

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

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**Figure 21.13** *Encapsulation of ICMP query messages*

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***Q: Explain General format of ICMP messages with diagram.***

***Q : What is Internet Control Message Protocol (ICMP) in Computer Networks***

## 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.*

### *Topics discussed in this section:*

**Group Management**

**IGMP Messages and IGMP Operation**

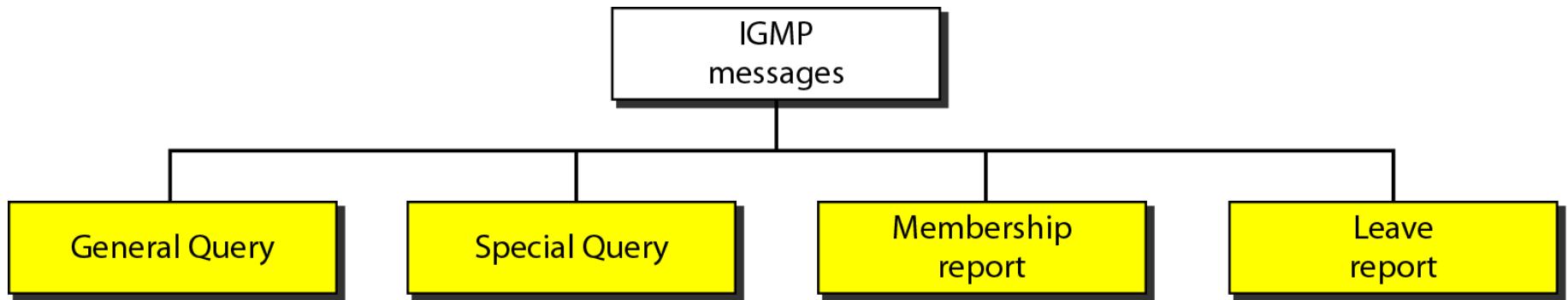
**Encapsulation**

**Netstat Utility**

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**Figure 21.16** *IGMP message types*

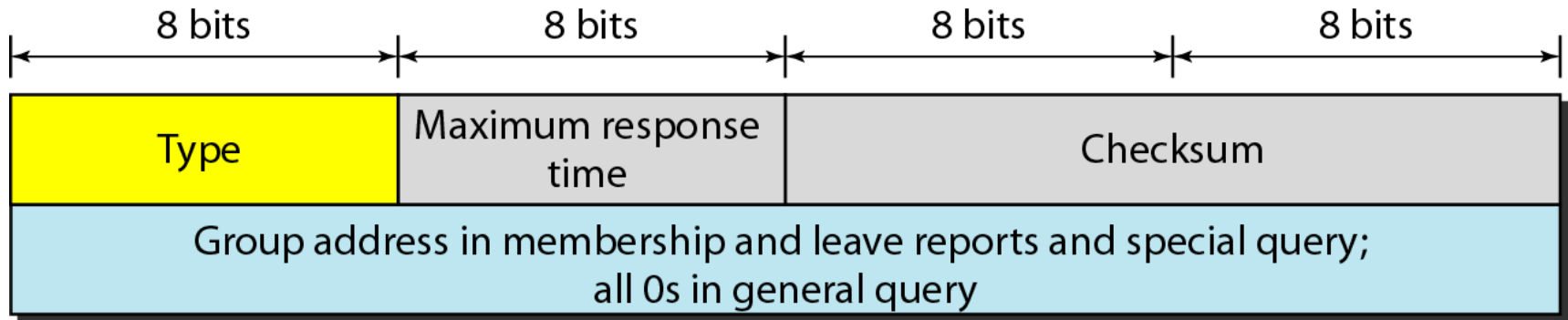
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**Figure 21.17** *IGMP message format*

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## **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.

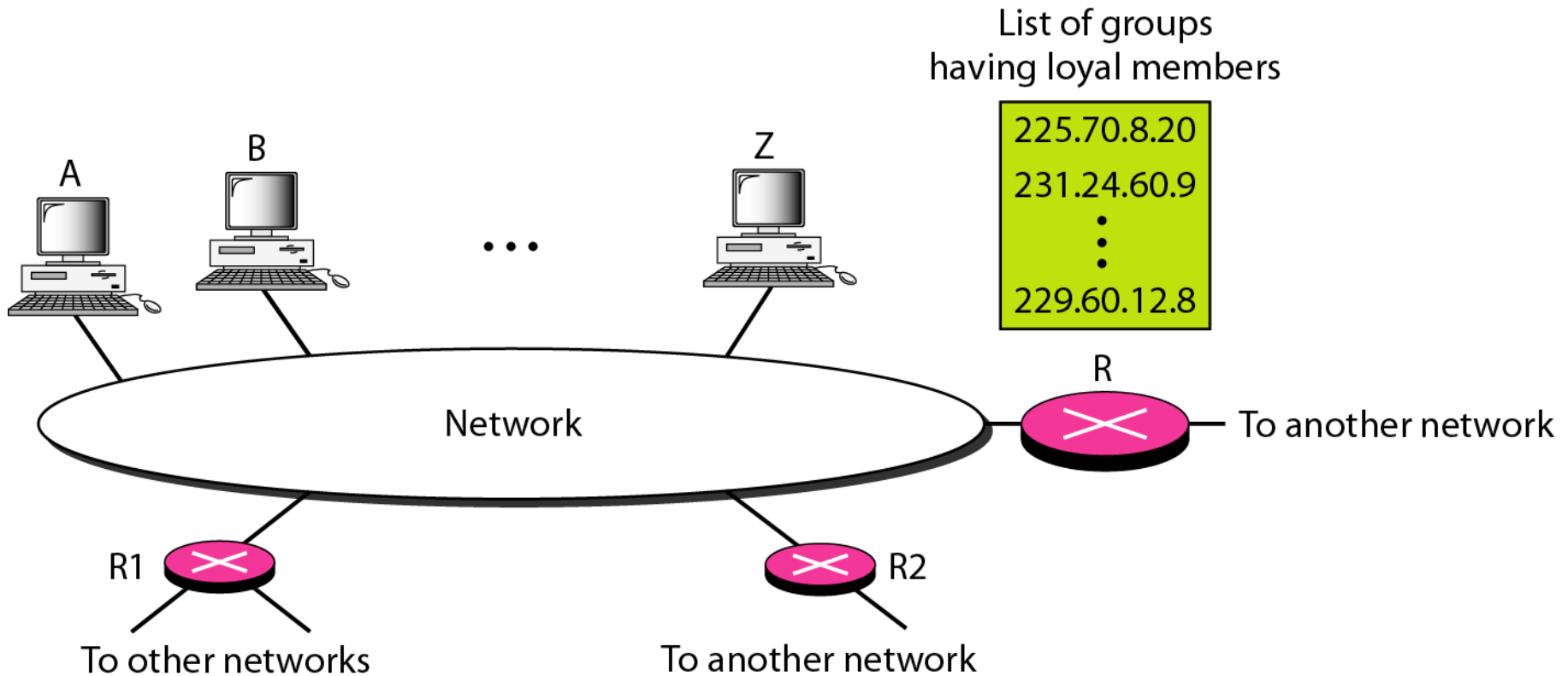
## **Group address**

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.

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**Figure 21.18** *IGMP operation*



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## *IGMP operation*

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*Joining a Group*

*Leaving a Group*

*Monitoring Membership*

*Delayed Response*



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*Joining a Group*

**Note**

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



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*Monitoring Membership*

**Note**

**The general query message does not define a particular group.**