SNS College of Engineering
Coimbatore - 641107

UNIT III

NETWORK LAYER

Services, Virtual circuit and Datagram networks, IP: Datagram-

IPV4 Addressing-ICMPv4, IPv6 Protocol,

Routing Algorithms, Unicast Routing Protocols

ICMPV4

- Introduction

- ICMPV4 Message format

- Types of ICMPV4 Messages

Introduction

- The IPv4 protocol doesn't have any mechanism to report errors or correct errors.

- So, IP functions in assistance with ICMP, **report errors**. ICMP never gets involved in correcting the errors.

Reasons for Errors

- A router with a datagram for a host in another network, may not find the next hop (router) to the final destination host.

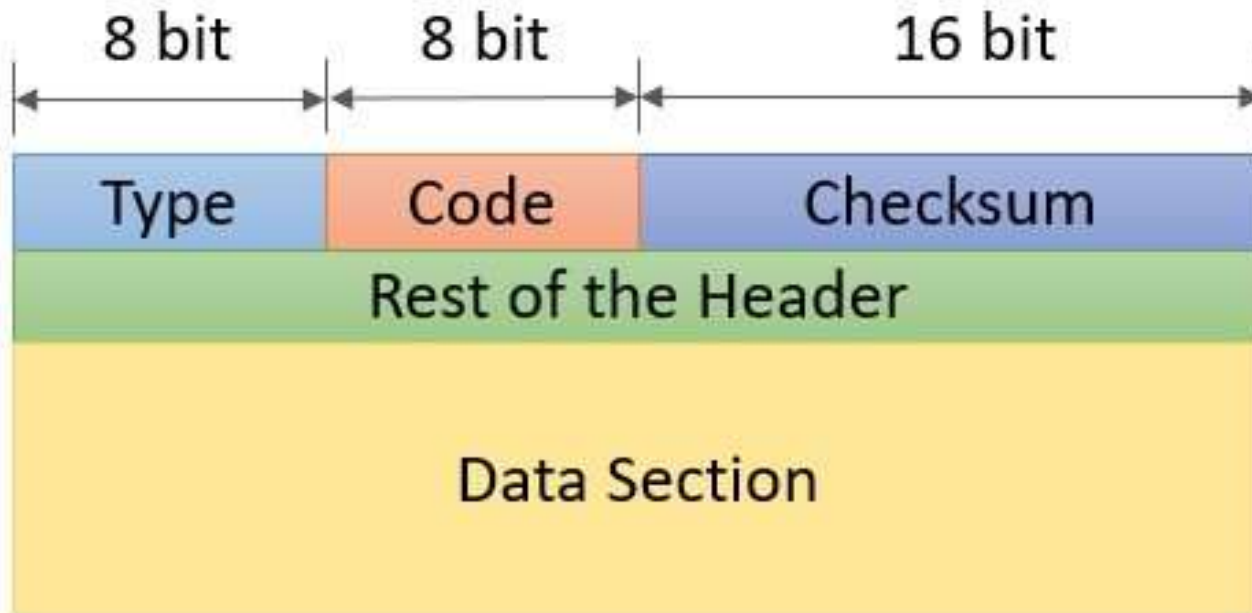- Datagram's time-to-live field has become zero.

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K.Revathi,AP/IT

Contd.,

- There may be ambiguity in the header of the IP datagram.

- It may happen that all the fragments of the datagram do not arrive within a time limit to the destination host.

- K.Revathi,AP/IT

ICMPv4 Message Format

General Format of ICMP Messages

Fields

- **1ˢᵗ byte** - '**type**' of the message.

- **2ⁿᵈ byte** - the **reason** behind the 'type' of the message.

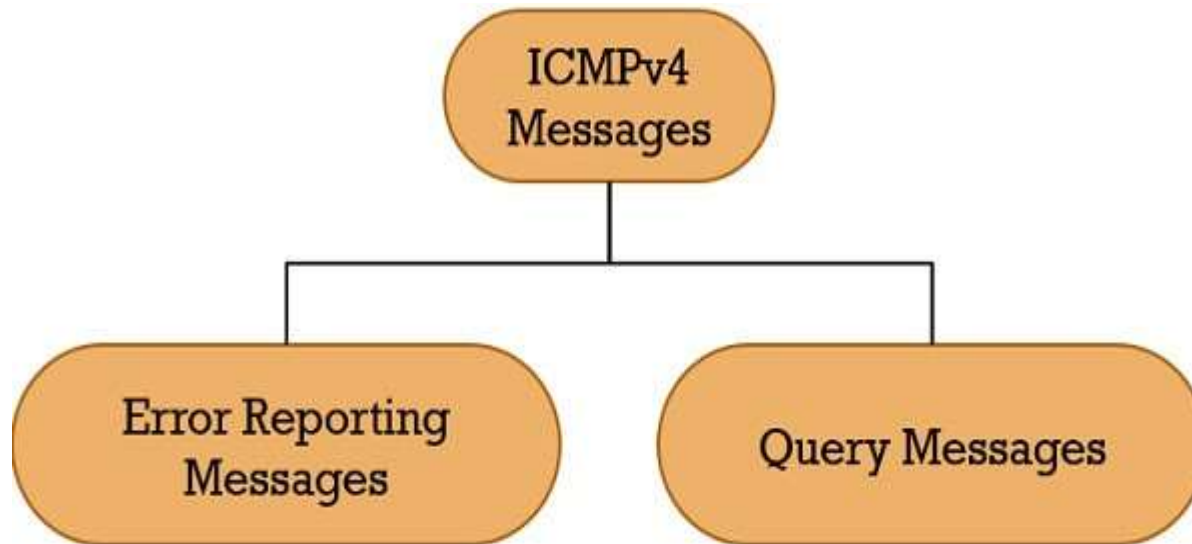- The next **two bytes** define the **checksum** field

Fields

- The rest **4 bytes** defines the rest of the **header** which is **specific** for each **message type**.

- The **data section** of the **query message** holds more information regarding the type of query.
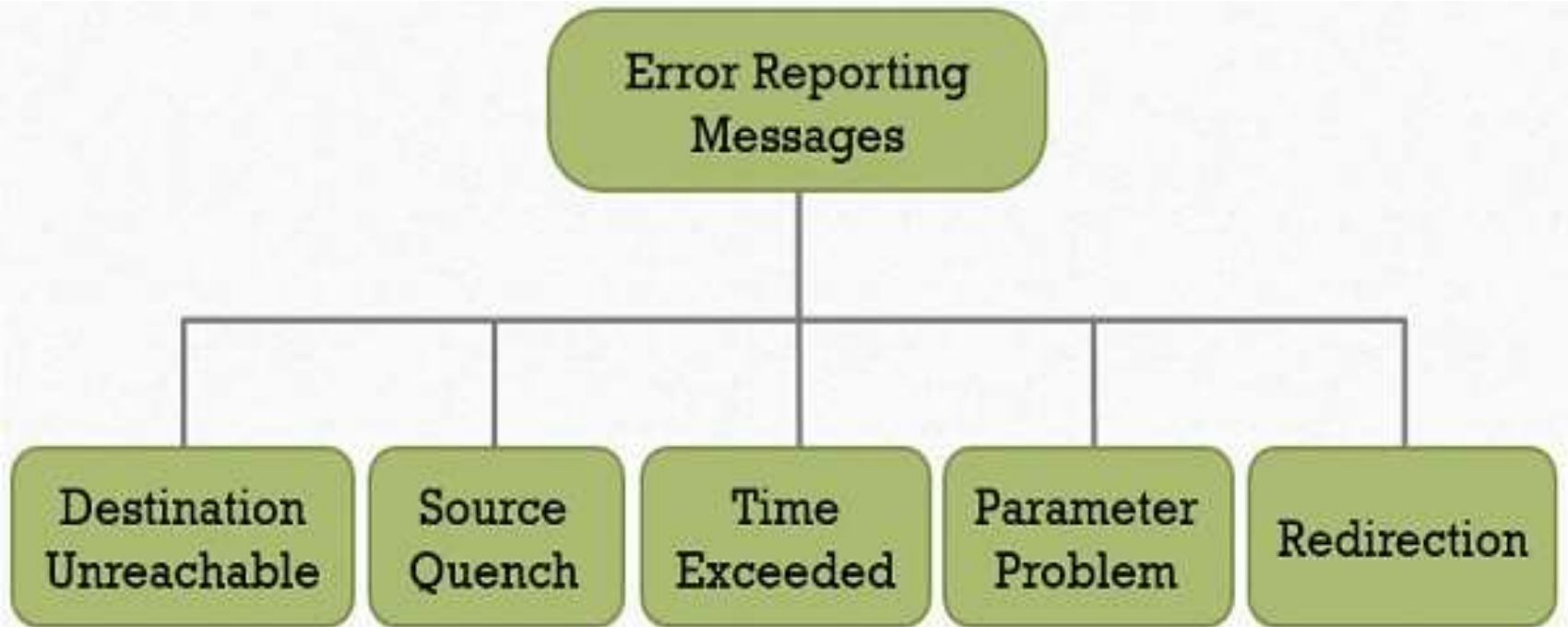
Types of ICMPV4

Error Reporting Messages

- The most important function of ICMPv4 is to **report the error**.
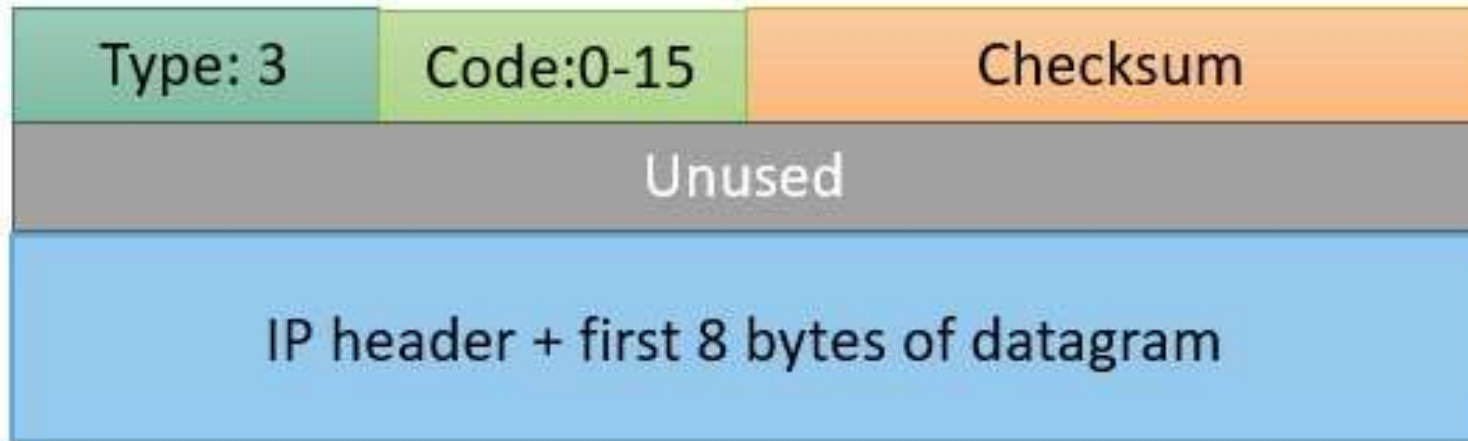
- Although it is not responsible to correct the errors.
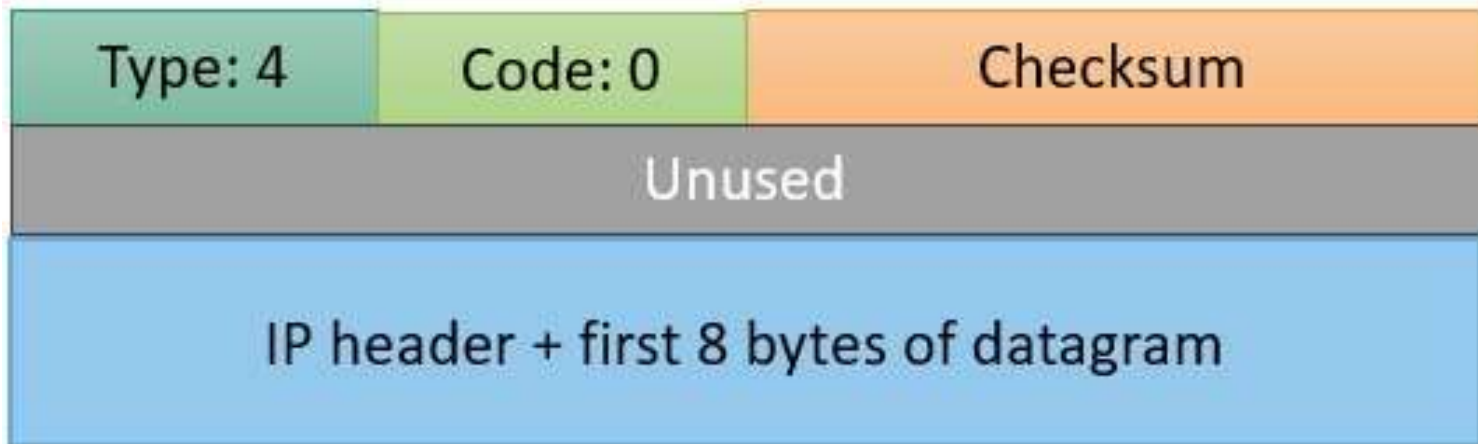
Types of error messages

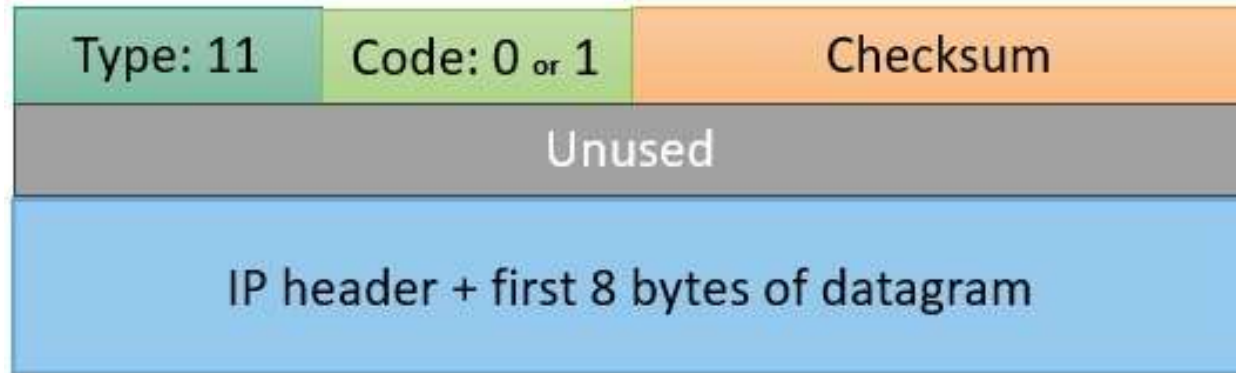# Destination Unreachable

Destination Unreachable Format

Source Quench

Type: 4	Code: 0	Checksum
Unused		
IP header + first 8 bytes of datagram		

Source Quench Format

Time Exceeded

Time Exceeded Message Format

Code 0 – When this **time-to-live field decrements to zero**

Code 1 – If the destination host doesn't receive all the fragments of a datagram in a set time.

Parameter Problem

Type: 12	Code: 0 or 1	Checksum
Pointer	Unused	
IP header + first 8 bytes of datagram		

Parameter Problem Message Format

Code 0 defines that there is ambiguity in the header field

Code 1 defines that the required part of the **header** is missing

Redirection

Redirection Message Format

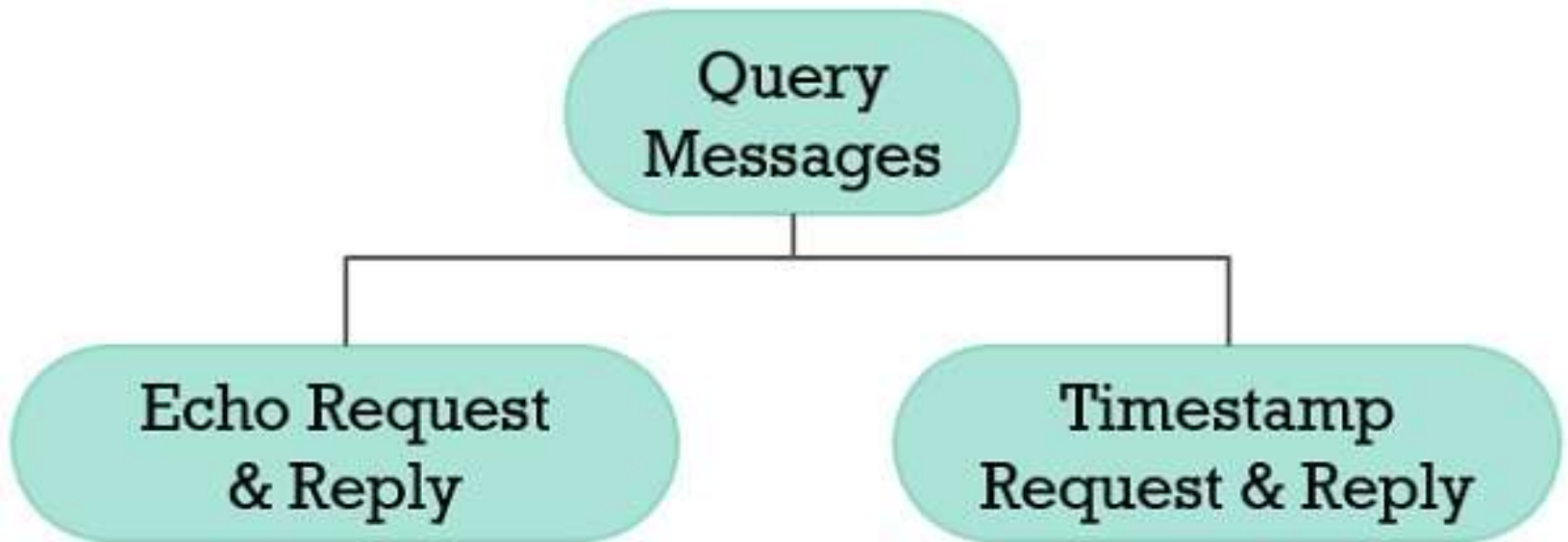**code 0** redirects for the network-specific route

code 1 redirects for the host-specific route

code 2 redirects to the network-specific route

code 3 redirects for the host-specific route

Query Messages
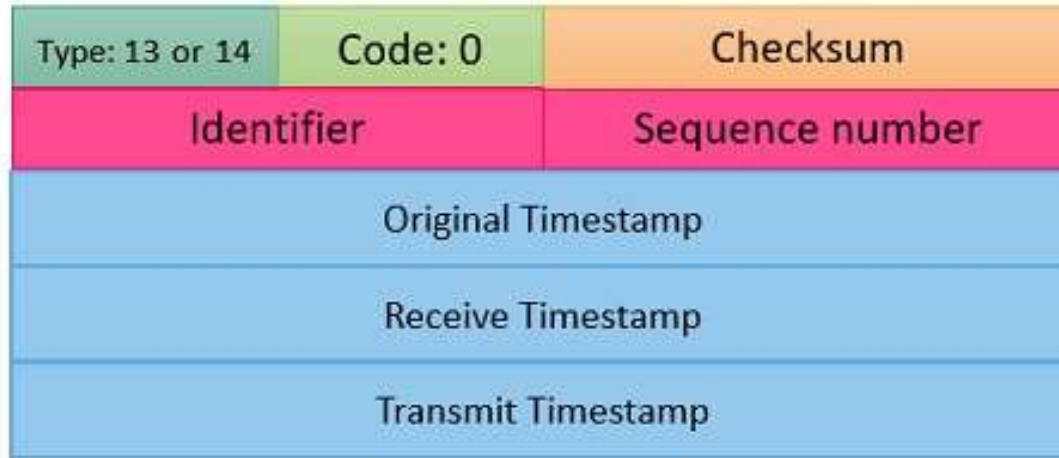
Echo request and reply

Echo Request and Reply Message Format

Timestamp request and reply

- Timestamp request and reply messages calculate the round trip time. It is the time required by an IP datagram to travel between two hosts or routers.

Type 13: Request
Type 14: Reply

Type: 13 or 14	Code: 0	Checksum
Identifier		Sequence number
Original Timestamp		
Receive Timestamp		
Transmit Timestamp		

Timestamp Request and Reply Message Format