

# Internet Control Message Protocol (ICMP)

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- ❑ What is ICMP?
- ❑ ICMP Messages
- ❑ ICMP applications: Ping, Traceroute, Path MTU discovery
- ❑ Ref: Chap 6

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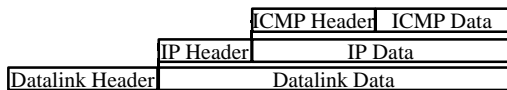
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## ICMP Features

- ❑ Used by IP to send error and control messages
- ❑ Uses IP to send its messages
- ❑ Does not report errors on ICMP messages.
- ❑ ICMP message are not required on datagram checksum errors.
- ❑ ICMP reports error only on the first fragment



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## ICMP Message Format

IP Header	
Type of Message	8b
Error Code	8b
Checksum	16b
Parameters, if any	Var
Information	Var

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## Sample ICMP Messages

- Source Quench:** Please slow down! I just dropped one of your datagrams.
- Time Exceeded:** Time to live field in one of your packets became zero." or "Reassembly timer expired at the destination.
- Fragmentation Required:** Datagram was longer than MTU and "No Fragment bit" was set.
- Address Mask Request/Reply:** What is the subnet mask on this net? Replied by "Address mask agent"

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## Other ICMP Messages

- Redirect:** Send to router X instead of me.
- Time Stamp Request/Reply:** Can be used to find current time or RTT.
- ICMP error messages normally include the IP header of the datagram that generated the error, plus at least 8 bytes following the IP header => ICMP message sizes = 70 bytes**

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## ICMP: Message Types Summary

Type	Message
0	Echo reply
3	Destination unreachable
4	Source quench
5	Redirect
8	Echo request
11	Time exceeded
12	Parameter unintelligible
13	Time-stamp request
14	Time-stamp reply
15	Information request
16	Information reply
17	Address mask request
18	Address mask reply

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## Ping and Traceroute

- Ping: Used to test**
  - destination reachability,
  - compute round trip time
  - count the # of hops to destination
  - may provide record route option. **Sample output:**  
Reply from 164.107.144.3: 48 bytes in 47 msec. TTL: 253
- Traceroute: Exploit TTL and ICMP**
  - Send the packet with time-to-live = 1 (hop)
  - The first router discards the packet and sends an ICMP "time-to-live exceeded message"
  - Send the packet with time-to-live = 2 (hops) etc...
  - Does not use optional features like record route

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## Path MTU Discovery

- Send a large IP datagram with "No fragment" bit set.
- Reduce size until success (No ICMP message received)

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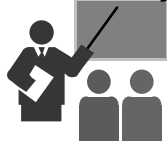
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## Summary



- ❑ **ICMP is the control sibling of IP**
- ❑ **ICMP is used by IP and uses IP as network layer protocol**
- ❑ **ICMP is used for ping, traceroute, and path MTU discovery.**

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