Internet Control Message Protocol (ICMP)

- OSI Layer 3 Internet Protocol (IP) companion “error reporting” protocol within the TCP/IP suite of protocols.
- Just like IP, it’s connectionless.
- Used to generate error messages to the source IP address when network issues prevent the delivery of a packet.
- Typically used by routers to report packet delivery issues, and, most importantly, it can report errors but not correct them.
- Commonly used by IT administrators to troubleshoot network connections with command-line utilities, including ping, pathping, and traceroute.
- For IPv6, it is also used for:
    - Neighbor Solicitation and Advertisement Messages (Similar to ARP)
    - Router Solicitation and Advertisement Messages

(Some) ICMP Message Types

- **Echo Request, Echo Reply**: Tests destination accessibility and status. A host sends an *Echo Request* and listens for a corresponding *Echo Reply*. Commonly done using the **ping** command.
- **Destination Unreachable**: Sent by a router when it can't deliver an IP packet.
- **Source Quench**: Sent by a host or router if it's receiving too much data than it can handle. The message requests that the source reduces its rate of data transmission.
- **Redirect Message**: Sent by a router if it receives a packet that should have been sent to a different router. The message includes the IP address to which future packets should be sent and is used to optimize the routing.
- **Time Exceeded**: Sent by a router if a packet has reached the maximum limit of routers through which it can travel.
- **Router Advertisement, Router Solicitation (IPv6)**: Allow hosts to discover the existence of routers. Routers periodically multicast their IP addresses via *Router Advertisement* messages. Hosts may also request a router IP address by broadcasting a *Router Solicitation* message, then wait for a router to reply with a *Router Advertisement*.