# Data Communication (CE14773)

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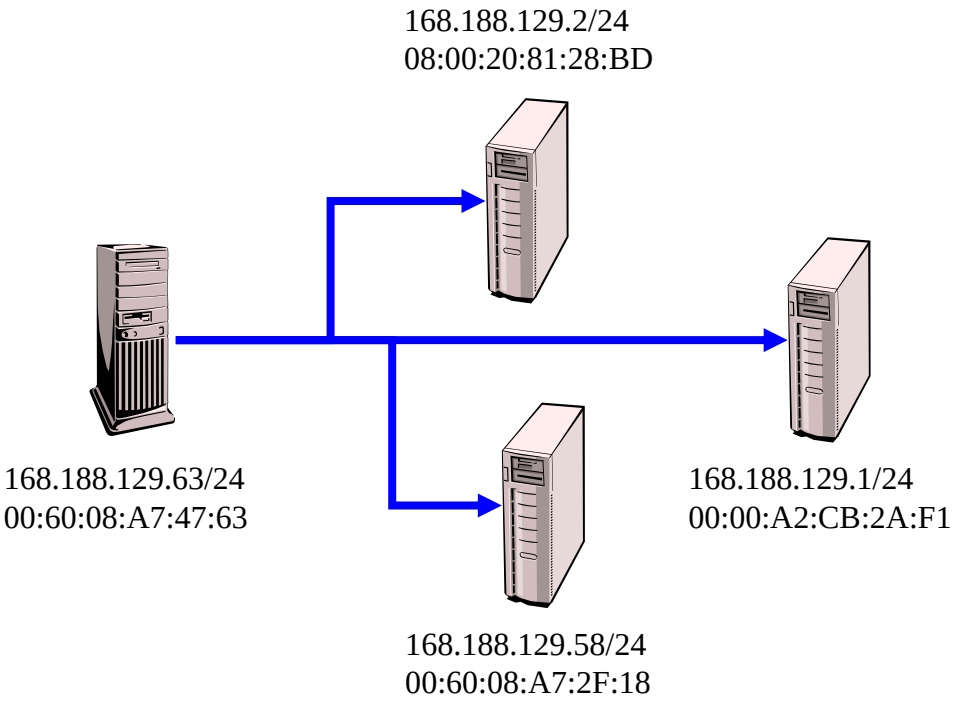
# Gratuitous ARP

| | |
|---|---|
| | **ff:ff:ff:ff:ff:ff** |
| | 00:60:08:A7:47:63 |
| | 0x0806 |
| Hardware type | 1 |
| Protocol type | 0x0800 |
| Length of hardware address | 6 |
| Length of protocol address | 4 |
| Opcode (ARP Request) | 1 |
| Sender's hardware address | 00:60:08:A7:47:63 |
| Sender's protocol address | **168.188.129.63** |
| Target's hardware address | ??????? |
| Target's protocol address | **168.188.129. 63** |



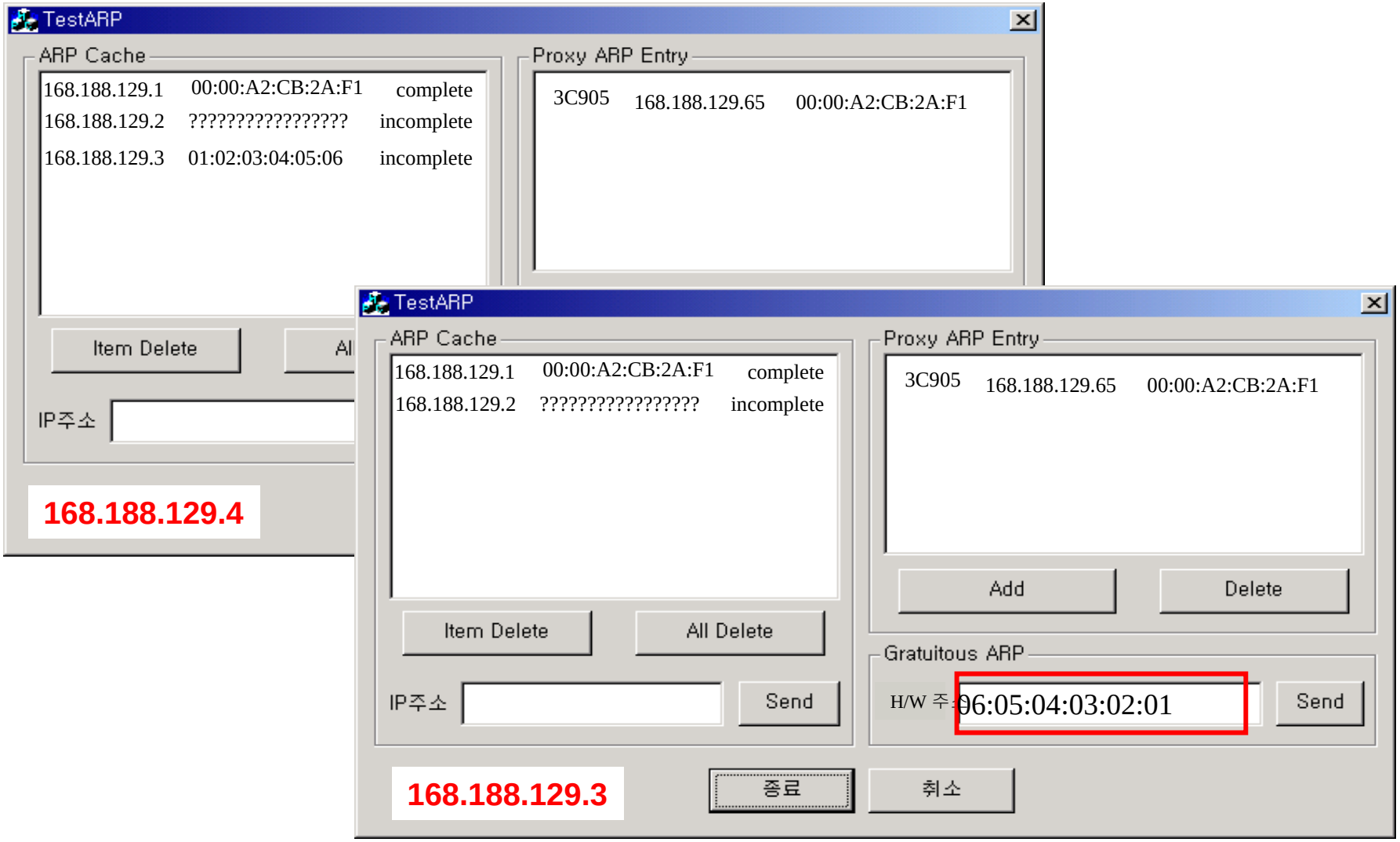
# Features of gratuitous ARP

- It occurs when a host sends an ARP request looking for its own IP address.
- This is usually done when the interface is configured at bootstrap time.
- It lets a host determine if another host is already configured with the same IP address.
- If a reply is received, the error message “duplicate IP address sent from Ethernet address: a:b:c:d:d:f” is logged on the console.

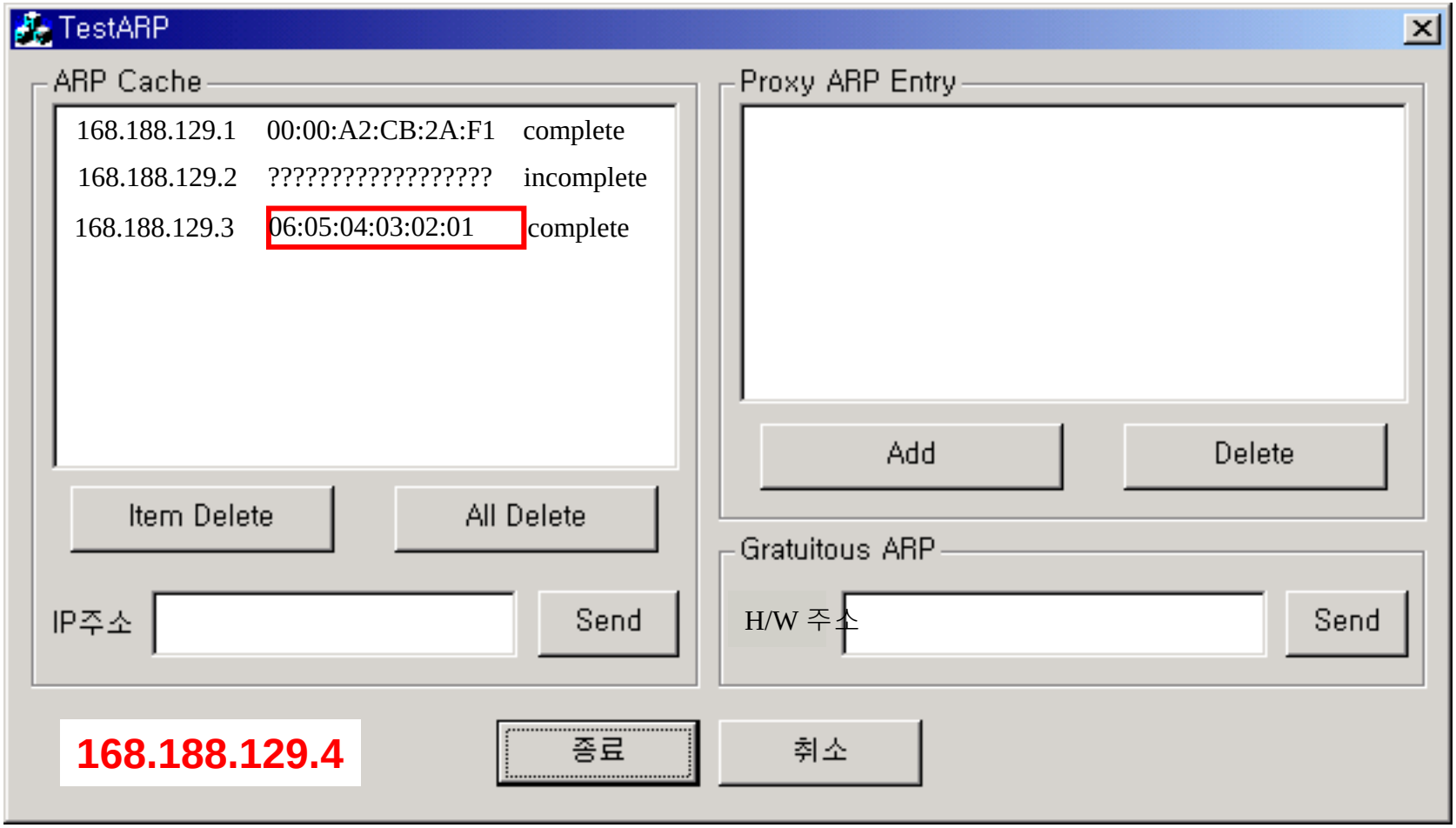
# Features of gratuitous ARP

- If the host sending the gratuitous ARP has just changed its hardware address.
  - If Interface card replaced or Host Changed.
- Update old hardware address Entry in ARP cache
  - if a host receives an ARP request from an IP address that is already in the receiver's cache,
  - then that cache entry is updated with the sender's hardware address from the ARP request.
- This is done for any ARP request received by the host.

# Gratuitous ARP Operation



# Gratuitous ARP Operation



# IP (Internet Protocol)

- IP is the workhorse protocol of the TCP/IP protocol suite.
- IP provides an unreliable, connectionless datagram delivery service.
  - Unreliable
    - There are no guarantees that an IP datagram successfully gets to its destination.
    - IP provides a best effort service.
    - When something goes wrong, such as a router temporarily running out of buffers, IP has a simple error handing algorithm.
  - Connectionless
    - IP does not maintain any state information about successive datagrams.
    - This means that IP datagrams can get delivered out of order.

# Protocol Format - IP

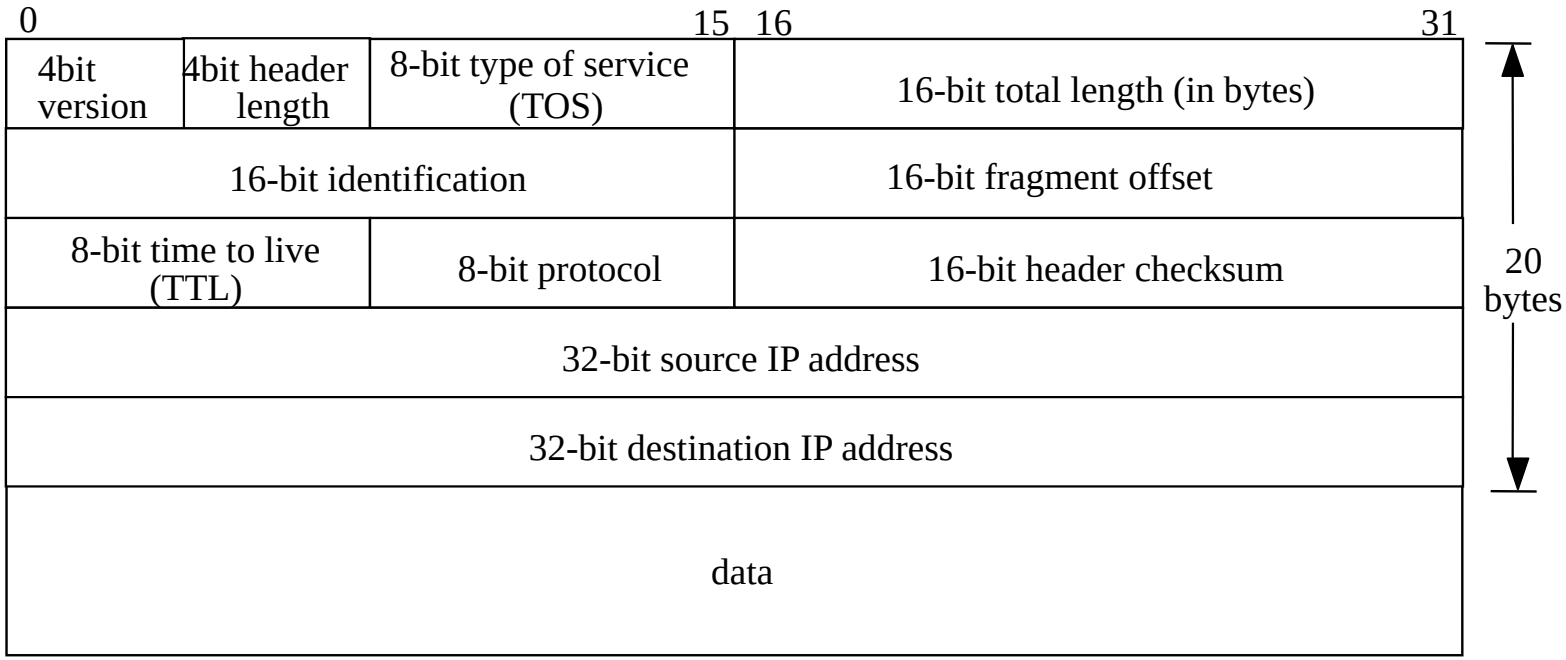



Figure 6. IP datagram, showing the fields in the IP header

# Description of IP Field

- IP Header(1)
  - version
    - The current protocol version : 4 -> IPv4
  - header length
    - The number of 32-bit words in the header, including any options.
      - Since this is a 4-bit field, it limits the header to 60 bytes.

# Description of IP Field

- IP Header(2)
  - type of service(TOS)
    - 3-bit precedence field
      - This is ignored today.
    - 4 TOS bits
      - Minimize delay
      - Maximize throughput
      - Maximize reliability
      - Minimize monetary cost
    - an  unused bit
      - Must be 0.

# Description of IP Field

- IP Header(3)
  - total length(in bytes)
    - The total length of the IP datagram in bytes
    - Using this field and the header length field, we know where the data portion of the IP datagram starts, and its length.
    - Since this is a 16-bit field, the maximum size of an IP datagram is 65535 bytes.
    - This field also changes when a datagram is fragmented.
  - Identification
    - Uniquely identifies each datagram sent by a host.
    - It normally increments by one each time a datagram is sent.

# Description of IP Field

- IP Header(4)
  - Flags
    - Relative fragmentation
  - fragment offset
    - Relative fragmentation
  - time to live(TTL)
    - Sets an upper limit on the number of routers through which a datagram can pass.
    - It limits the lifetime of the datagram.
  - Protocol
    - It identifies which protocol gave the data for IP to send.

# Description of IP Field

- IP Header(5)
  - header checksum
    - This is calculated over the IP header only.
    - It does not cover any data that follows the header.
  - source IP address & destination IP address
    - 32-bit value
  - option(if any)
    - Is variable-length list of optional information for the datagram.
    - Option field always ends on a 32-bit boundary.
    - This assures that the IP header is always a multiple of 32 bits.