

# IP Address

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# Outline

- TCP/IP review
- IP Address

# OSI Model and TCP/IP

|   |              |                     |
|---|--------------|---------------------|
| 7 | Application  | Applications        |
| 6 | Presentation |                     |
| 5 | Session      |                     |
| 4 | Transport    | TCP/UDP (Transport) |
| 3 | Network      | IP (Internet)       |
| 2 | Data Link    | Data Link (Network) |
| 1 | Physical     | Physical            |

# TCP/IP Encapsulation

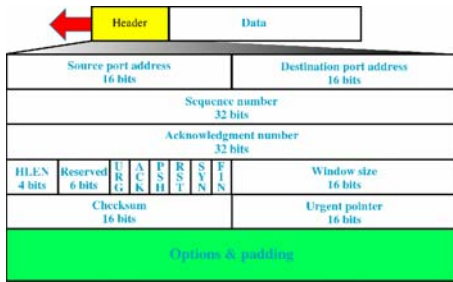
|              |                         |
|--------------|-------------------------|
| Applications | Message                 |
| TCP/UDP      | User Datagram (segment) |
| IP           | Datagram                |
| Data Link    | Frame                   |
| Physical     | Bits                    |

# Data Flow

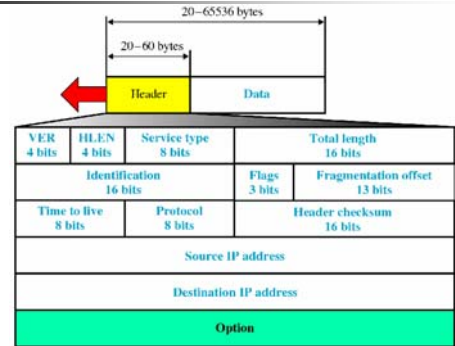
# UDP Datagram format

|                                |                                     |
|--------------------------------|-------------------------------------|
| Source port address<br>16 bits | Destination port address<br>16 bits |
| Total length<br>16 bits        | Checksum<br>16 bits                 |

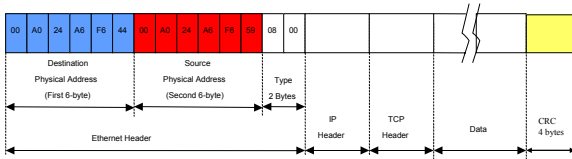
## TCP segment format



## IP Datagram



## Ethernet Frame

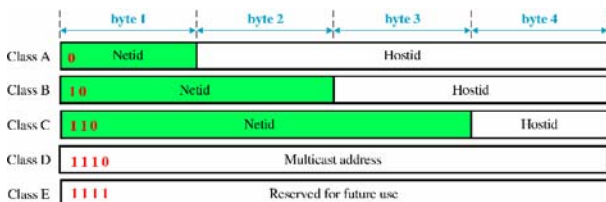


## Internet Address

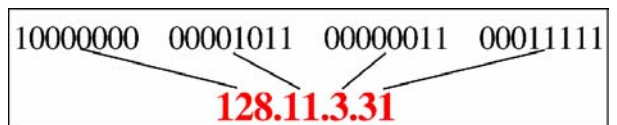
An Internet address is made of four bytes (32 bits) that define a host's connection to a network.



## Internet Classes



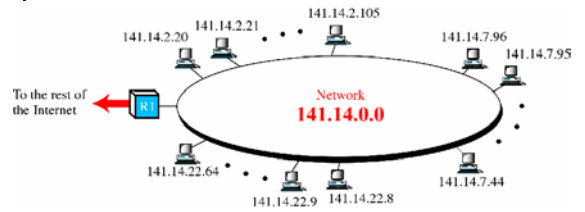
## IP address in decimal notation



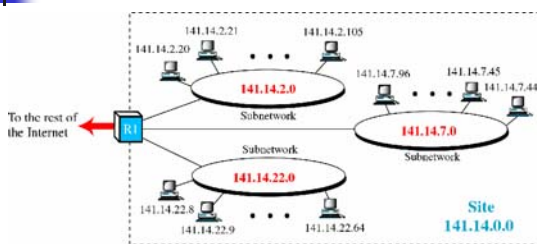
## Class ranges of Internet Address

|         | From                                      | To  |
|---------|---|---|
| Class A | 0.0.0.0<br><small>Netid Hostid</small>    | 127.255.255.255<br><small>Netid Hostid</small>  |
| Class B | 128.0.0.0<br><small>Netid Hostid</small>  | 191.255.255.255<br><small>Netid Hostid</small>  |
| Class C | 192.0.0.0<br><small>Netid Hostid</small>  | 223.255.255.255<br><small>Netid Hostid</small>  |
| Class D | 224.0.0.0<br><small>Group address</small> | 239.255.255.255<br><small>Group address</small> |
| Class E | 240.0.0.0<br><small>Undefined</small>     | 255.255.255.255<br><small>Undefined</small>     |

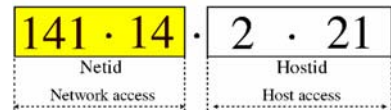
## A Network with Two Levels of Hierarchy



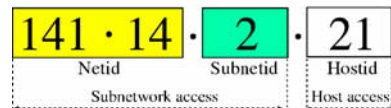
## A Network with Three Levels of Hierarchy



## Addresses with and without Subnetting



a. Without subnetting



b. With subnetting

## Masking



a. Without subnetting



b. With subnetting