# Introduction to Network Security

Chapter 2

Network Protocols



# Topics

- Protocol Specifications
- Protocol Addresses
- Protocol Headers

# Protocol Specifications

- Open vs. Closed
- Specification methods
  - English descriptions
  - Flow & timing diagrams
  - Open to interpretation
- Implementation flaws



# Network Standards

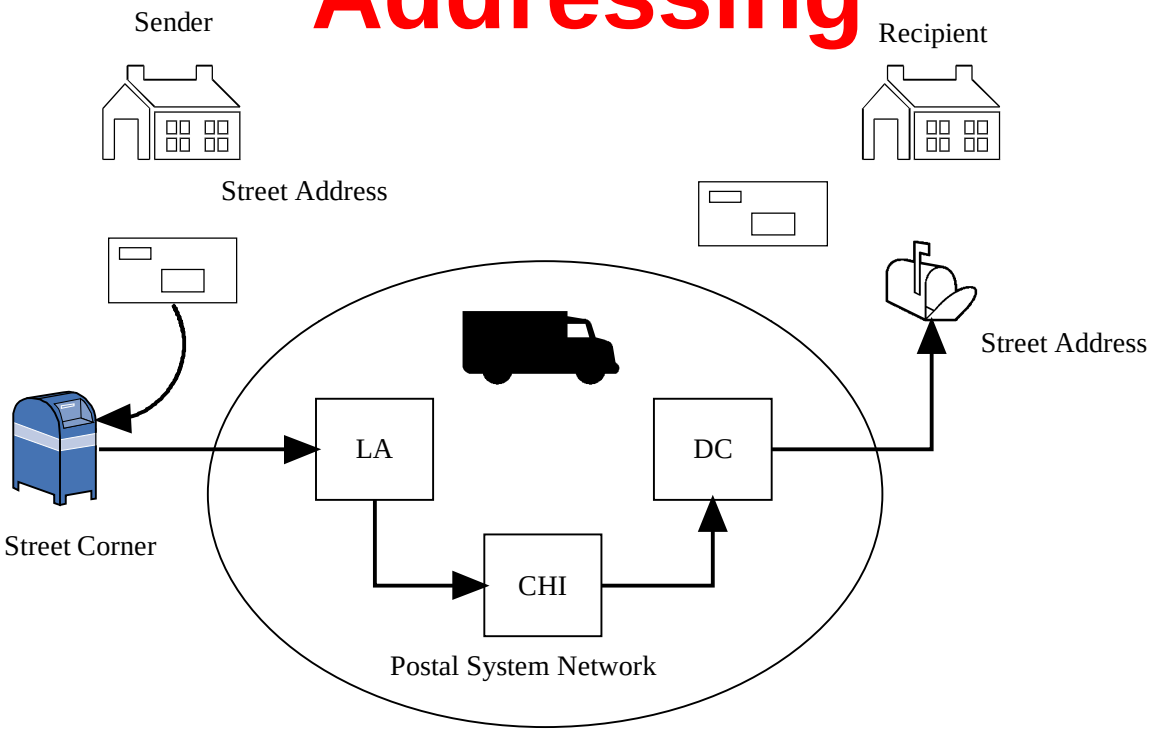
- Specifies
  - Services provided
  - Services expected
  - Functions provided
  - Protocol and packet formats
  - Timing and sequence of the packets

# Standards Organizations

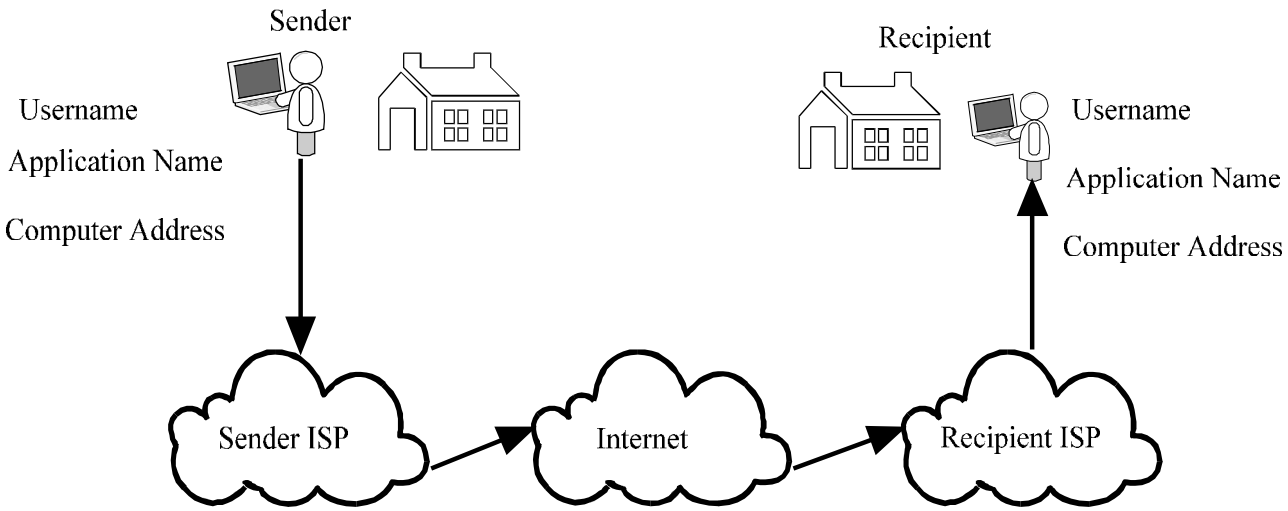
- **American National Standards Institute (ANSI):** ANSI is a private organization whose membership is made up of professional societies, government groups and other associations. They develop standards that help groups complete in the global market.
- **Institute of Electrical and Electronics Engineers (IEEE):** IEEE is an international professional society that creates international standards in many different areas.
- **International Standards Organization (ISO):** A group whose membership is standards committees from across the world. ANSI represents the United States on ISO.
- **International Telecommunications Union-Telecommunications Standards Sector (ITU-T):** A group created by the United Nations that creates standards primarily for the phone system.
- **Internet Engineering Task Force (IEFT):** This group develops standards for the Internet and consists of members from various organizations and is open to any person that has an interest.



# Addressing

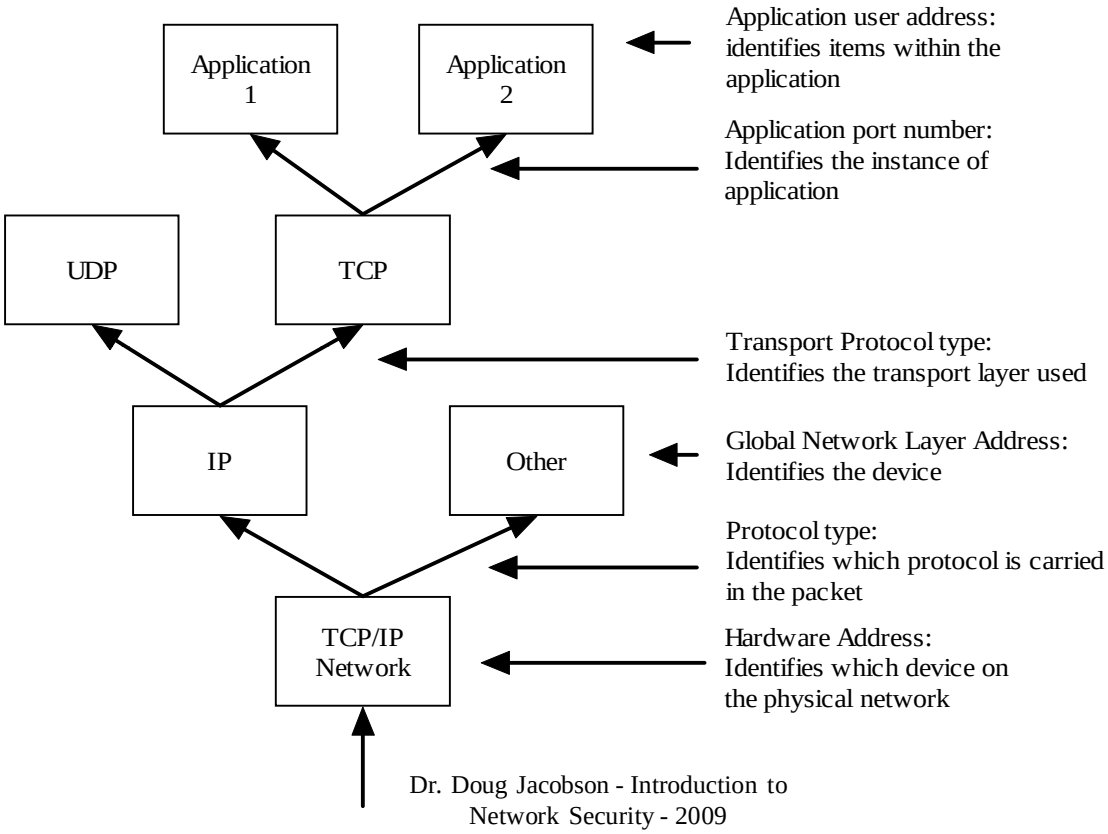


# Addressing






# Addresses



# Address Assignment - How

- Static
  - Configuration
  - Built in
- Dynamic
  - Protocol discovery
  - User provided



# Address Assignment – Who

- Central Authority
- Ad-hoc
- Locally based

# Hardware address assignment

- Hardware
  - Vendor assigned
  - Address used as a filter
  - Address can be changed



# IP address assignment

- Global address allocation
- Address assignment
  - Protocol based (DHCP)
  - Static
  - Locally controlled
- Addresses can be changed

# Application address assignment

- Port Number (much less control)
  - Well know ports
  - Protocol based discovery
  - Configuration based
  - User input based



# Hostname assignment

- Often political and/or commercially driven
- Assignment via central authority
- Protocol to find the IP address given a name (DNS)

# Protocol Headers

- Fixed packet type
  - Easy to parse
  - Limited functionality
- Freeform type
  - Harder to parse
  - Easy to extend



# Fixed packet header

| Fixed | Options | Payload | Trailer |
|---|---|---|---|

Fixed:
- Addresses (Layer addresses and payload type)
- Payload data
- Control data
- Header data

Options:
- Extended fixed data
- Optional control data
- Optional Payload control

Payload: Content is not a concern of the header

Trailer:
Optional field often used for error control

# Freeform header

<Start Header>
<Data type = application 7>
<Data length = 400>
<Data encoding = ASCII>
</End Header>
<Start Data>
(the data)
</End Data>