

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

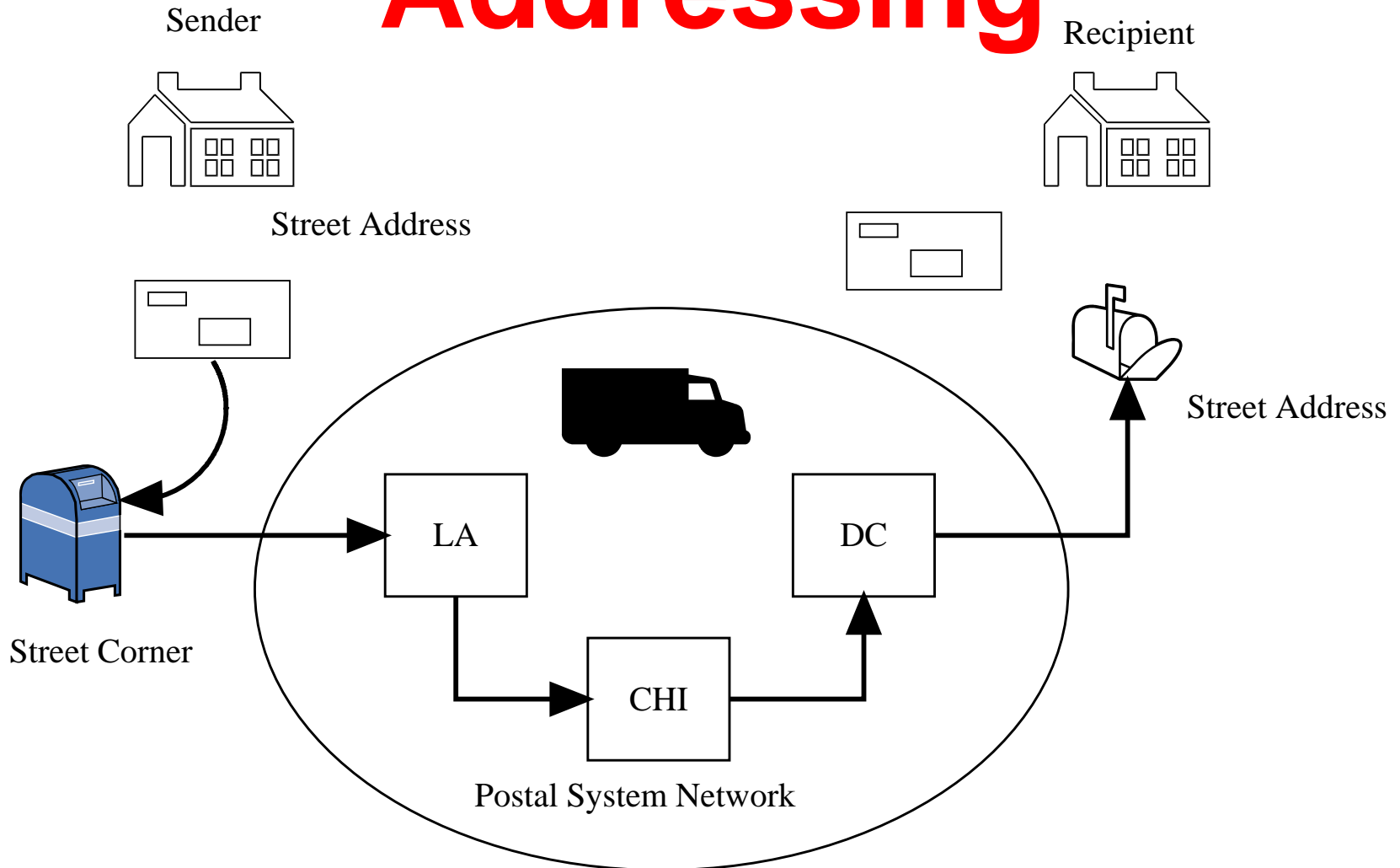
Network Standards

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

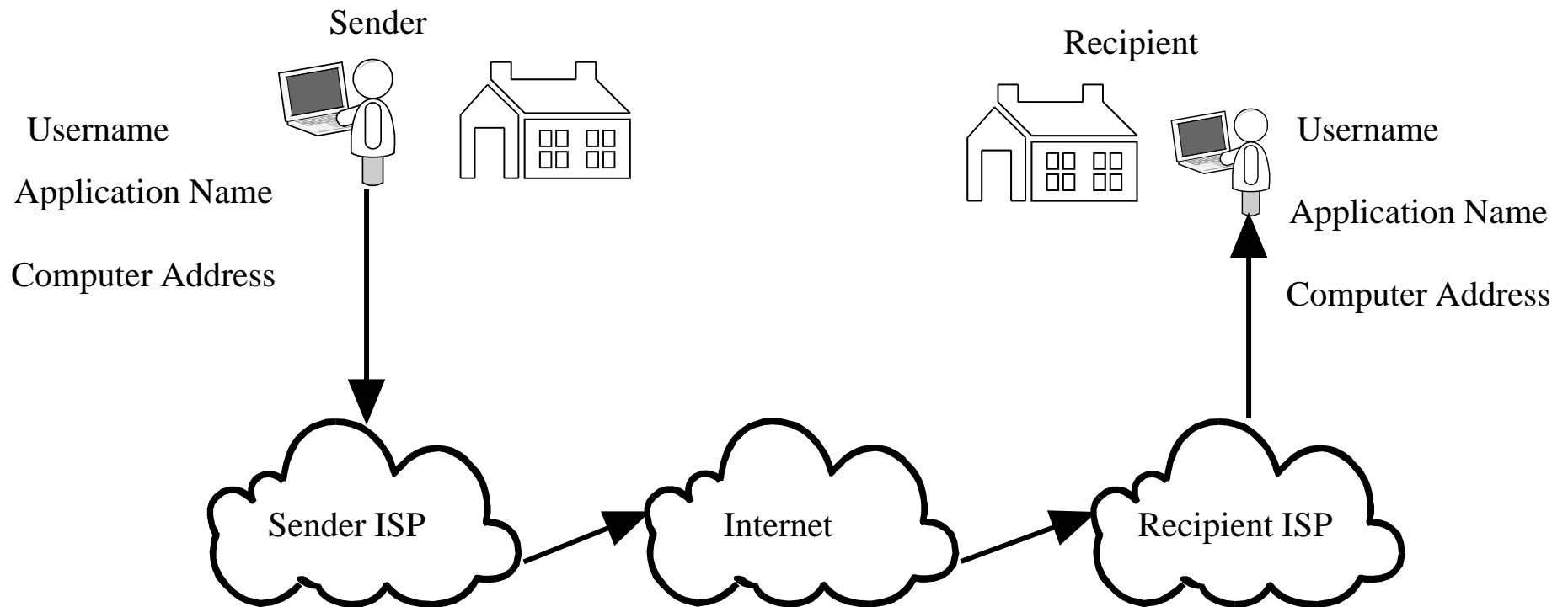
Standards Organizations

- **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 compete 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 (IETF):** This group develops standards for the Internet and consists of members from various organizations and is open to any person that has an interest.

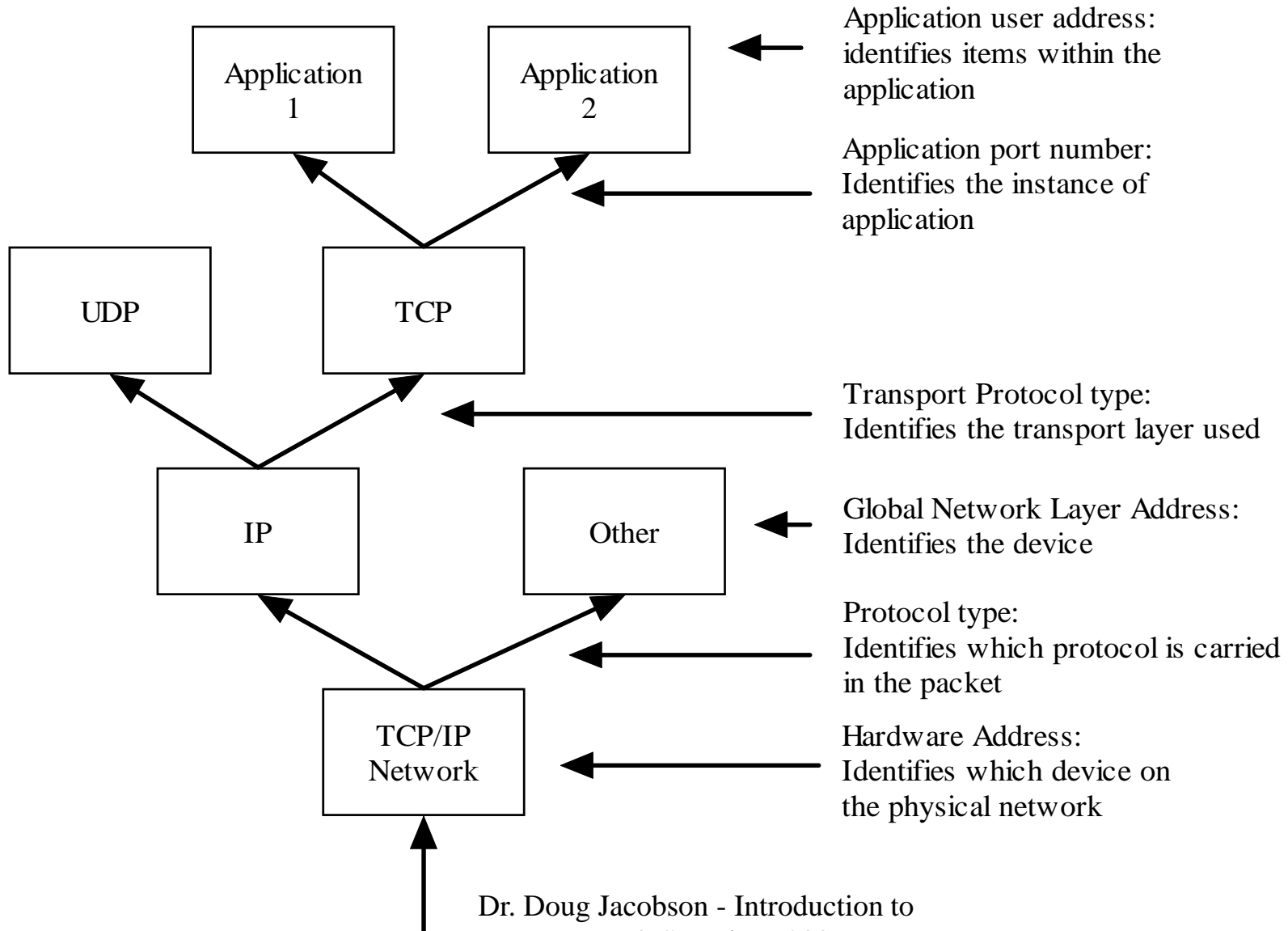
Addressing



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

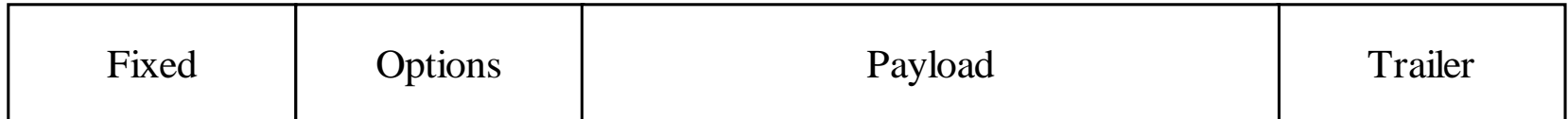
Hostname assignment

- 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:

- 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>