SY110
Networking – Introduction

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Outline

Motivation

So far we've talked about:

- The physical machine – RAM, memory, hard drives, peripherals
- Operating systems – Windows and Unix/Linux
- Programming in JavaScript

Every day we observe:

- The WWW in action: browsers communicating with web servers

But, how is this communication between web clients and servers even possible though?

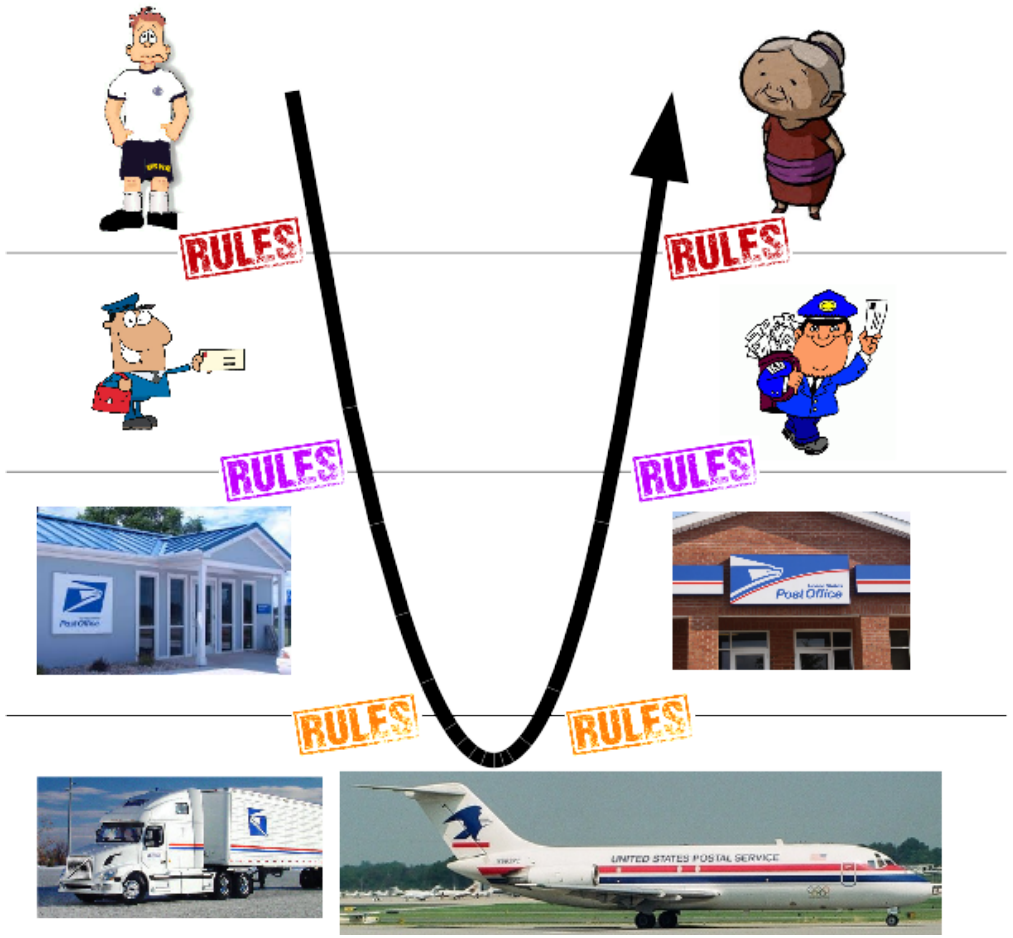
Network Definitions

- **Network** – A collection of interconnected computers such that those computers can pass information between each other.
- **Host** – An individual computer connected to a network.
- **Protocols** – The rules for communicating on the network.
  - Protocols often exist for the purpose of providing a **service** and therefor govern the communication between the computer using the service and the computer providing the service.
  - For many protocols, and their associated services, there are often standard **utilities** for accessing them later.
  - but more on that later...

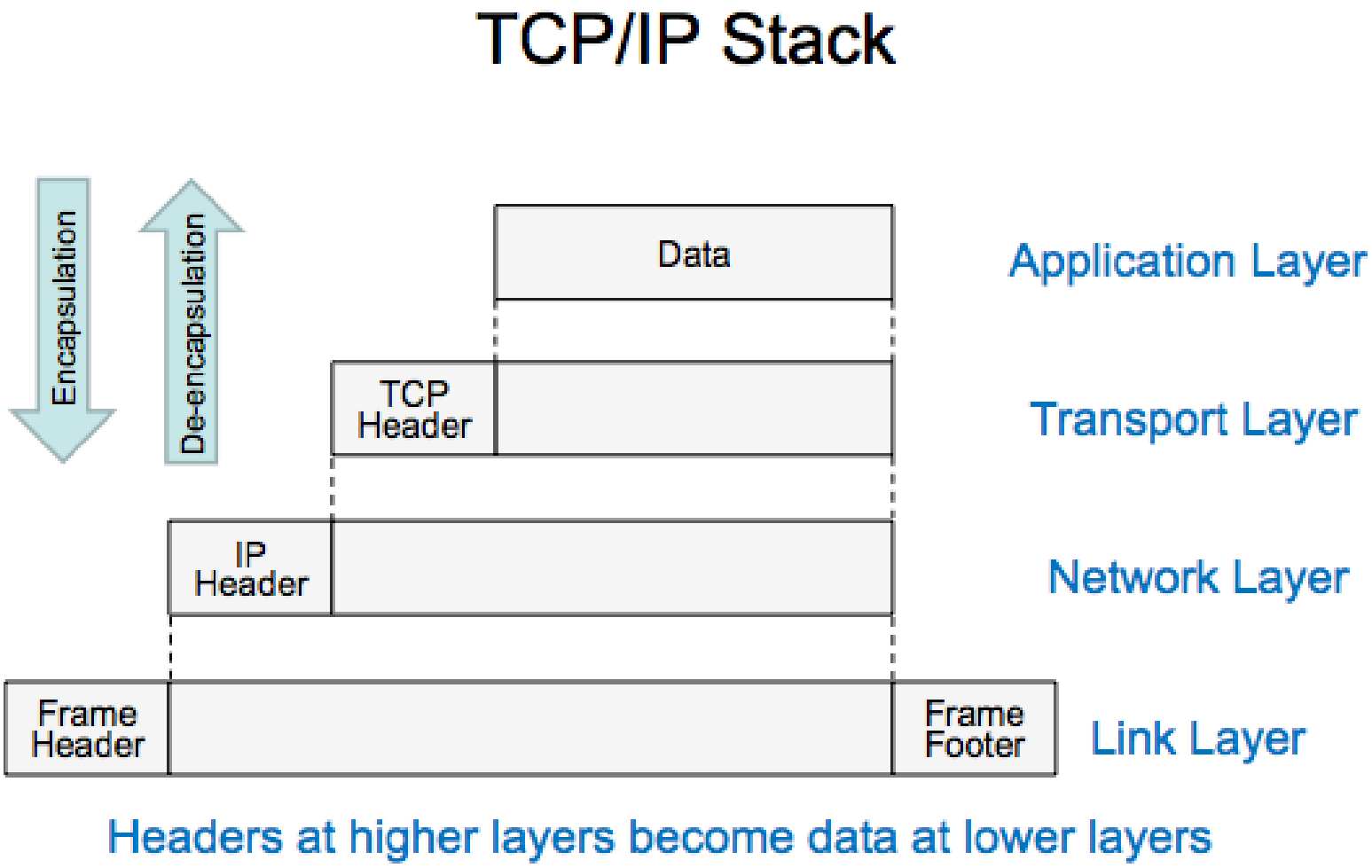
For now lets look at different types of protocols and how they interact.

But first... an analogy

Let's say that your Grandma has no idea what a computer is and you only correspond with her through the good 'ol US Postal Service.



Networking Layers - The TCP/IP Stack



Physical Layer below this (wires and radio waves)

Source: IETF RFC 1122

Layers - Service Oriented

- Application – Actual communications related to the services running on the client and server
- Transport – Breaks up the message into smaller ‘datagrams’, focuses on the end-to-end communications
  - Reliability vs low overhead (connection oriented vs connection less)
  - TCP vs UDP
- Network – Deals with how ’packets’ actual get routed from one network to another, ultimately reaching the destination
  - Internet Protocol
- Link – The Link layer is only focused on point-to-point link forwarding of packets
  - Pass it to the next node or the next guy in the chain (* chains have links)
- Physical – The actual media the bytes/packets traverse (Ethernet, WiFi, fiber, etc.)

Summary - Top 3 Layers

- Application Layer
  - Processes and Programs running on your computer/host (e.g. Chrome, FaceTime, Netflix, etc.)
  - HTTP is an Application Layer protocol.
  - Provides a service to the User.
- Transport Layer
  - Focuses on getting the data between those Application Layer processes running on different hosts.
  - Uses port numbers to identify which data goes with which application.
  - Includes protocols such as TCP and UDP.
  - Provides a service to the Application Layer.
- Network Layer
  - Responsible for getting packets between the different hosts.
  - Internet Protocol (IPv4 and IPv6) operate in the Network Layer
  - Provides a service to the Transport Layer.

Questions

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