TCP IP networking

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Contents

Markdown version on *github*
Compiled using *pandoc* and *`gpdf` script*

General

- **Application layer** helps people and machines communicates
- **Transport layer** helps Application layer
  - Provides programming interface to application layer
    - **UDP**
    - **TCP**
  - **Port numbers** allow to differentiate source/destination processes on one machine
    - Source and destination port number are carried in UPD/TCP header
- **Network layer** provides full connectivity
  - **IPv4** (32 bits)
  - **IPv6** (128 bits)
- Data is broken into chunks called **IP packets** of size ≤ 1500 bytes
- **Names** are human readable synonyms for IPv4 and IPv6 address
  - Mapped to address by **DNS** servers
- **Link layer** = MAC layer
  - Interconnects a small number of devices without any configuration
  - **MAC address** are hardware address (48 bits, set by manufacturer)
- **Local Area network** : A set of devices that are connected at the MAC layer
- LANs can be interconnected by **routers** : devices that forward packets based on IP address
- **Bridges** or **Switch** : A system that forwards packets based on MAC addresses
- Every machine must know the IP address of the next router (**default gateway**)
- The IP address of all machines in one subnetword must have same **subnet prefix**
- The size of IP subnet prefix is often specified using a **network mask**
- **MAC frame**
  - MAC header (detination MAC address + other things)
  - MAC payload
- **IP packet** is included in MAC payload
  - IP header (IP destination address + other things)
  - IP payload
- **TCP segment** is included in IP paylaod
  - TCP header (source and dest port nb + other things)
  - TCP payload
- TCP payload can include encryption header + encrypted bytes of an HTML file

- The **bit rate** of a channel is the numbber of bits per seconds.
- The **bandwidth** is the width of the frequency range that can be used for transmission over the channel
- In computer science, many people use *bandwidth* instead of *bit rate*
- **Throughput** is the number of useful data bits / time unit
- **Stop and Go Protocol**
  - Wait acknoledgement before sending a new packet