Protocols and the Layered Model

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September 27, 2024

1 Protocols

1.1 Morse Code

Invented by Samuel Finley Breese Morse, morse code is an example of a *protocol* that simplifies communication by standardizing messages into a known format.

- A *protocol* is a set of rules that guide how devices communicate with each other.
- Defines the format (syntax) and meaning (semantics) of the data being exchanged.

Expected characteristics of a network

1. Scalable
2. Secure
3. Reliable

1.2 TCP/IP

Transmission Control Protocol (TCP) ensures reliable data transfer and performs error-checking between devices.

Internet Protocol (IP) is responsible for addressing and routing between devices on a network or across the internet.

Internet Architecture Board (IAB) is responsible for defining the standards that make up the internet.

- Coordinated the technical direction of the internet.
- Set official policies for its development.
- Determined which protocols were essential to the TCP/IP suite.

1.2.1 IETF and RFCs

The IAB was reorganized into the *Internet Engineering Task Force (IETF)*.

1.3 IPv4

IP Addresses is a 32-bit unsigned integer. Eg:

1. `3,232,235,777`
2. We convert to `11000000 11110000 00000000 00000001`
3. Each is then converted to decimal and separated by a period.
4. `192.168.1.1`

2 Layered Model

5 Application Layer

4 Transport Layer

- Ensures reliable data between applications across networks.
- Uses UDP Datagrams or Segments.

3 Internetwork Layer

- Responsible for logical addressing (IP), routing, and forwarding data *between networks*.
- Determines best path for data to travel.

2 Link Layer

- Responsible for local network communication.
- Controls how data is packaged into frames.
- MAC Address

1 Physical Layer

- Responsible for the transmission of raw bits from A to B.
- Does not care about addresing; whoever is listening will receive the message.
- Wires