how to internet

@tint:tint.red

the problem

making a global network of computers is *hard*.

the approach

split it up into multiple different layers, each handling different aspects of communication

the model

Open Systems Interconnection (OSI)

1. physical
2. data link
3. network
4. transport
5. session
6. presentation
7. application

the other model (DoD)

nobody really uses this but it's nice to know about

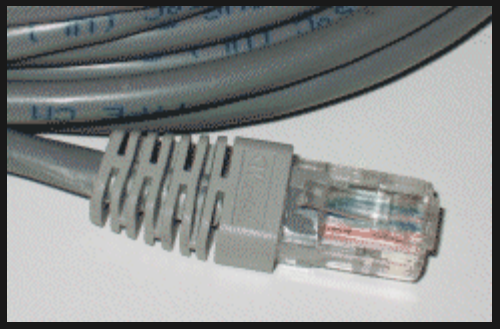
1. network access
2. internet
3. transport
4. application

layer 1: physical

- the actual physical connection between machines
- mostly about the types of cables and ports, and how signals are actually interpreted into bits and bytes

examples

- ethernet cables (RJ45/8P8C connectors with twisted pair cables)

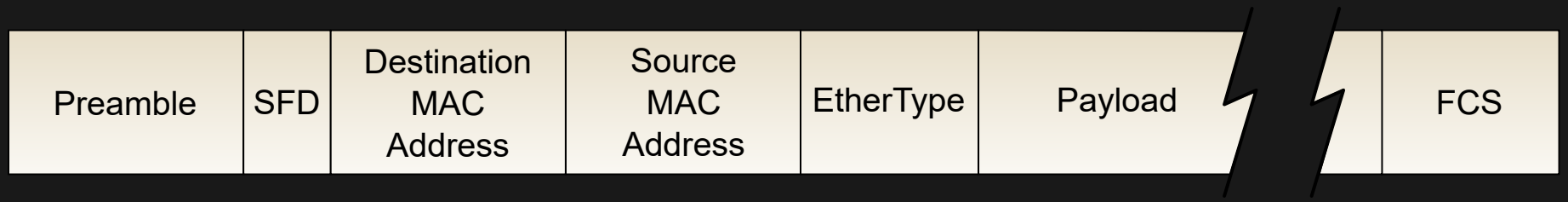


- wifi (2.4GHz or 5GHz radio waves)
- coax cable (for cable internet)

layer 2: data link

- organizes the bits from the physical layer
- forms a Local Area Network (LAN)
- addressing
- collision resolution
- mostly just ethernet

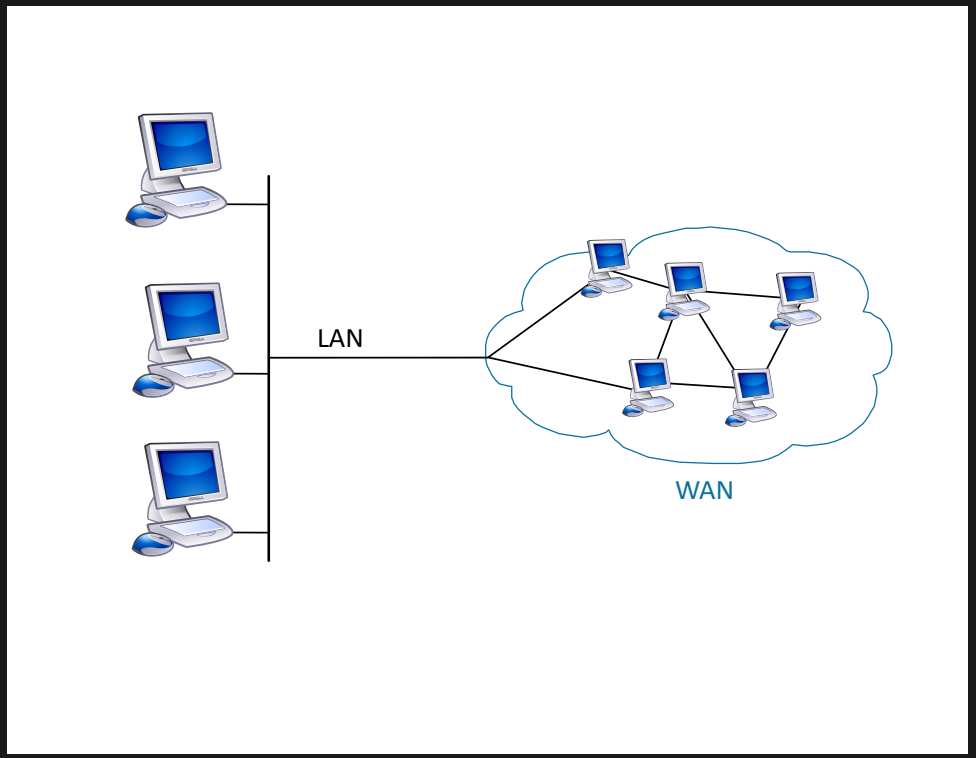
units in the data link layer are called *frames*.



layer 3: network

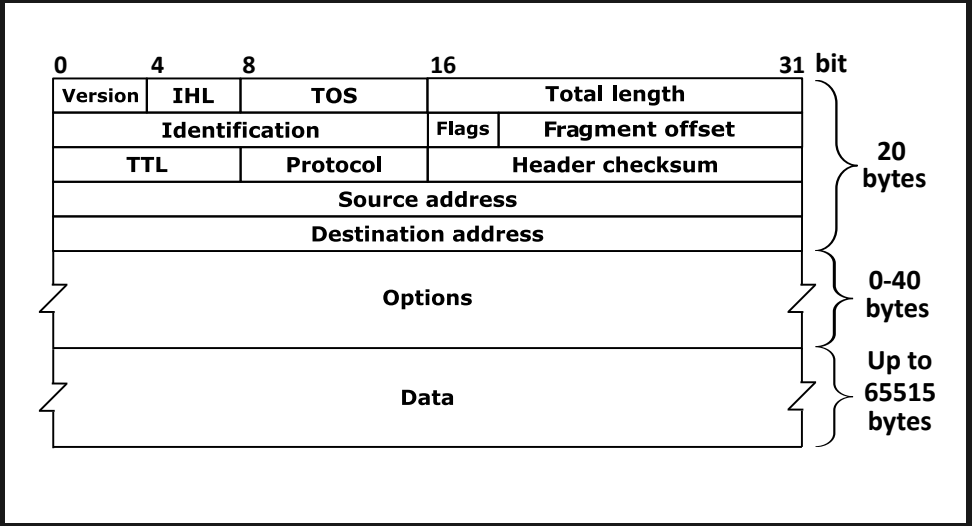
- layer 2 is limited in scale
- layer 3 connects LANs together

units in this layer are called *packets*.



protocols

ipv4 and ipv6



routers

- relay packets between different LANs
- need a table to know which LAN to use

layer 4: transport

- ip only identifies computers
- more granularity is needed, since multiple applications on the same computer can use the network

units in this layer are called *datagrams* (UDP) or *segments* (TCP).

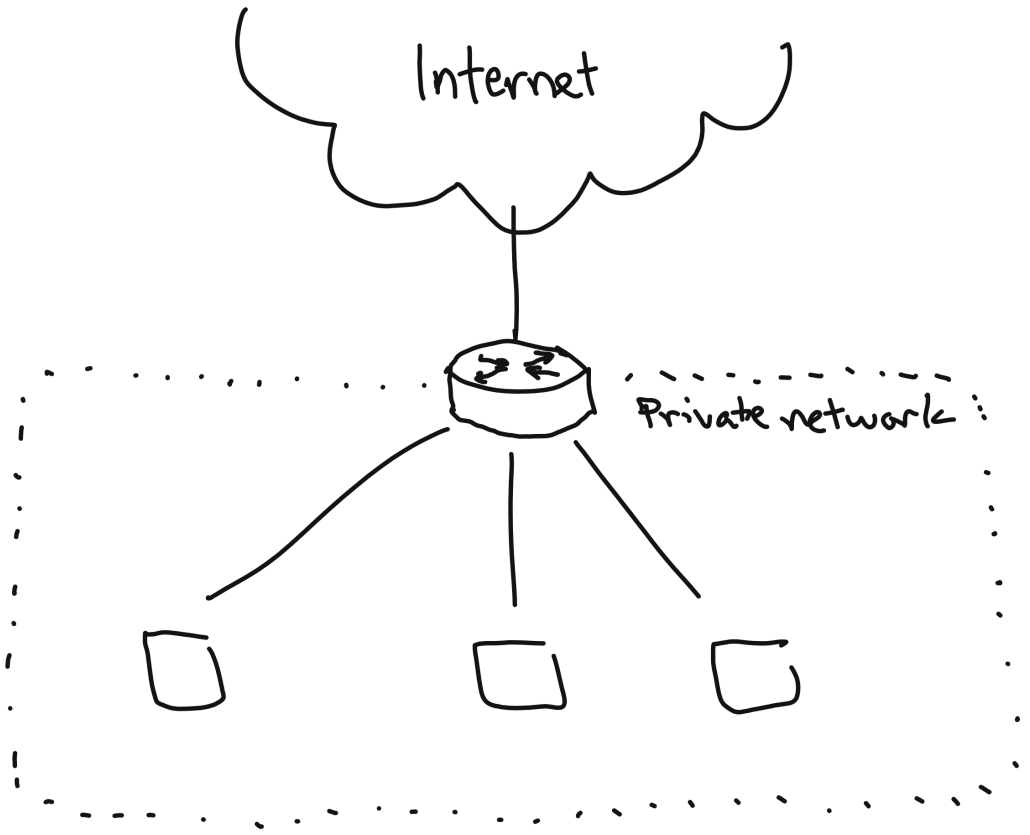
protocols

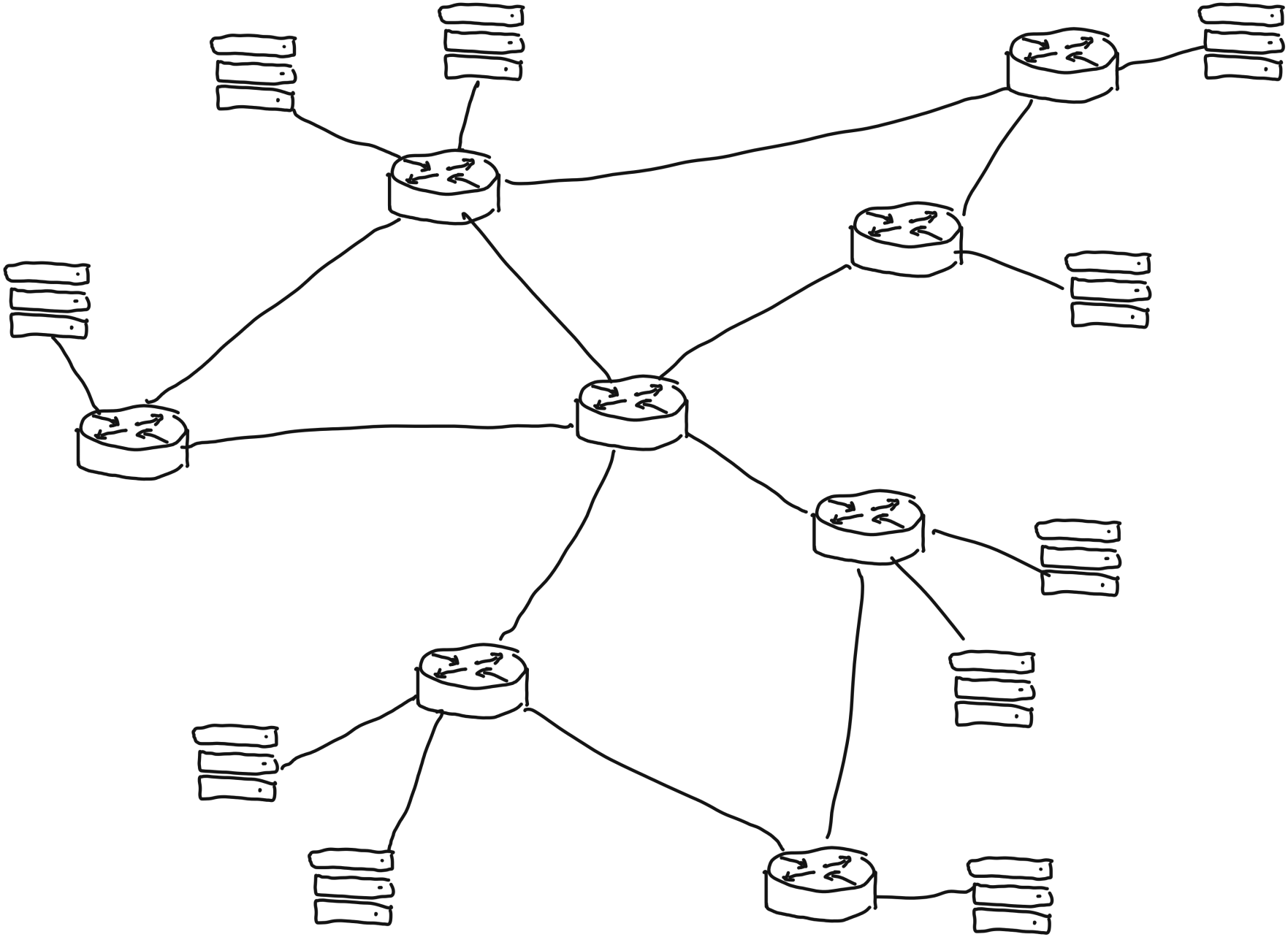
- Transmission Control Protocol (TCP)
  - connection-based
  - ensures segments are received in the same order they were sent
- User Datagram Protocol (UDP)
  - gives you a port number and nothing else

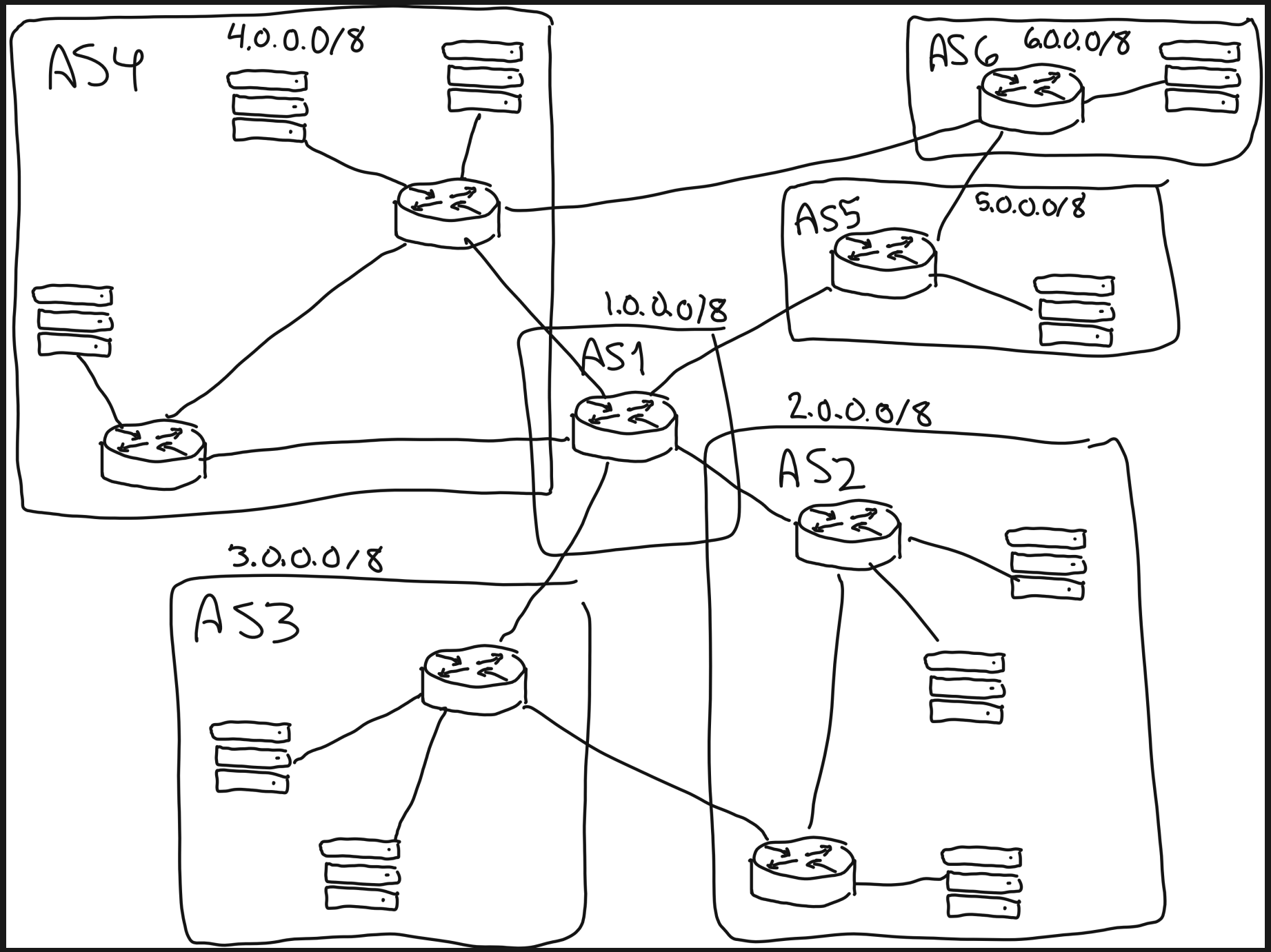
layers 5-7: the rest of it

- TLS
- SMTP
- HTTP
- BGP

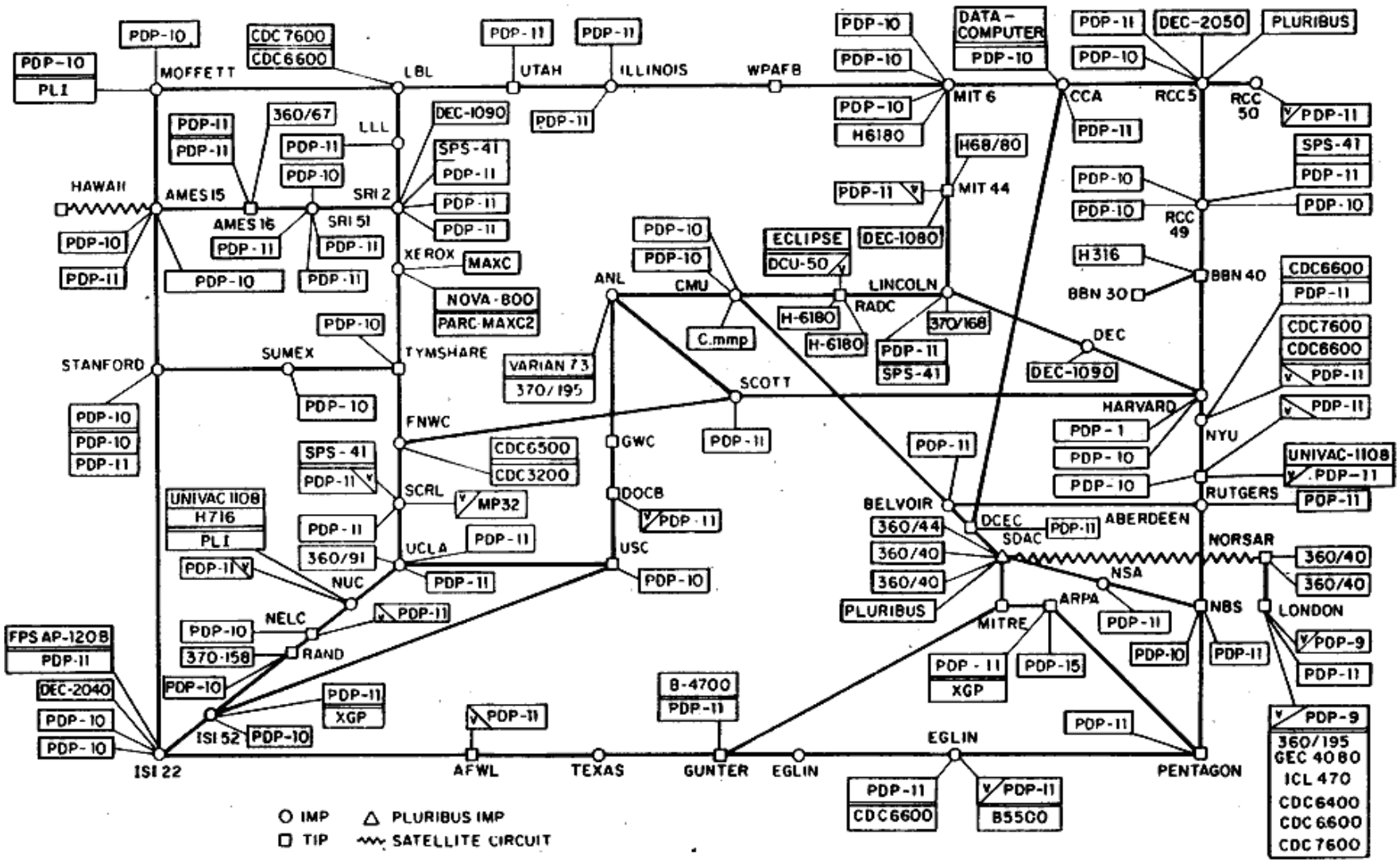
organization in layer 3


Internet
Private network



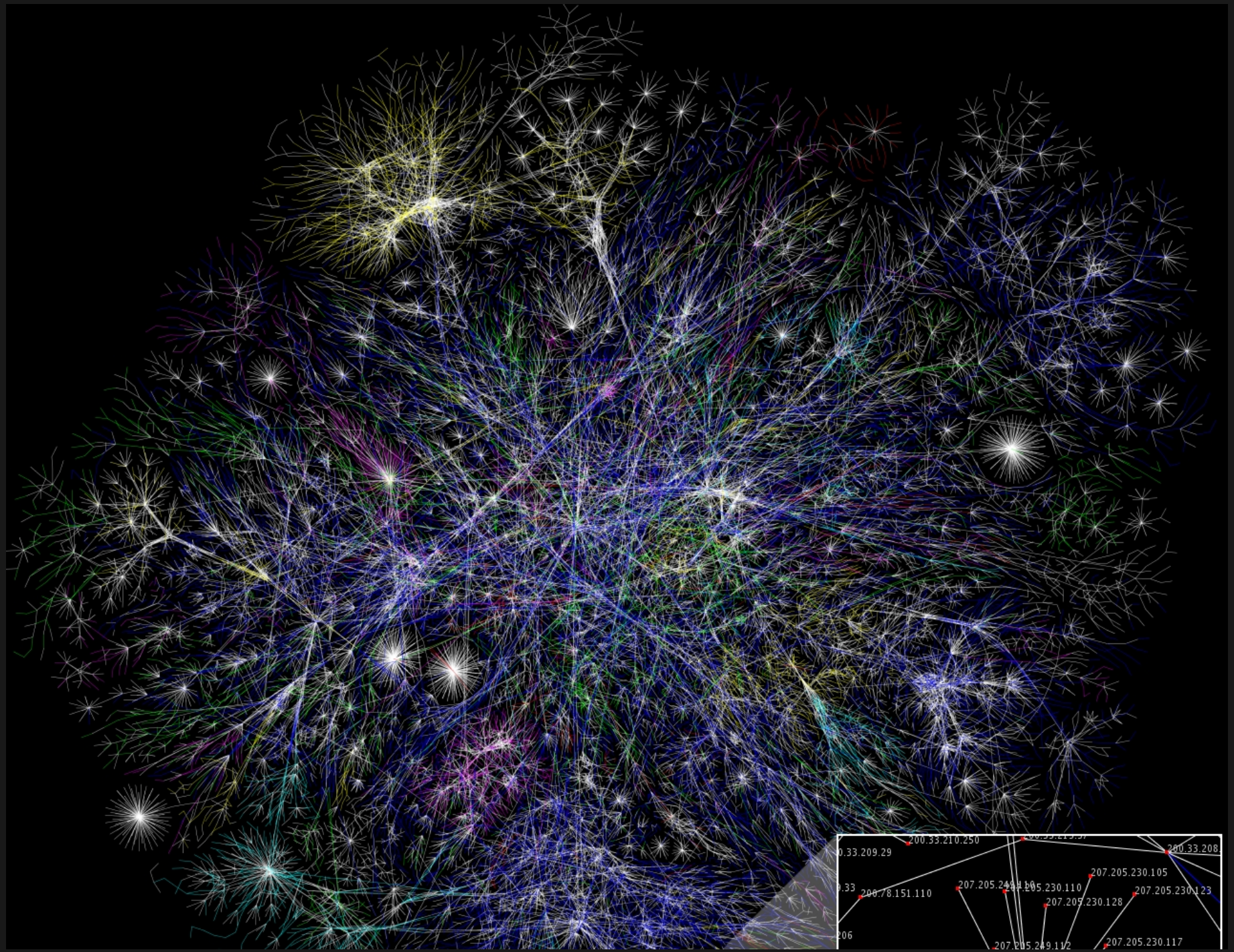

AS4
4.0.0.0/8
AS6
6.0.0.0/8
AS5
5.0.0.0/8
1.0.0.0/8
AS1
2.0.0.0/8
AS2
3.0.0.0/8
AS3

ARPANET LOGICAL MAP, MARCH 1977



(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE HOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES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