Reconciling the Broadcast Model with the Internet

And other impossible tasks

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Three levels of media

- All media of communication can be analyzed as having 3 levels: infrastructural, logical, and content.
  - Speakers' corner (Hyde park) - the english language- what is said
  - Telephone wires and switches- the SS7- private conversations
  - Radio spectrum – NTSC – television programs
  - Wires and routers –TCP/IP – applications
  - Printing presses – a language – paid articles

Each layer can be common or privately owned

- Each layer may be publicly or privately owned, and each may have different forms of ownership.
- Some layers may need government licences.
- The big distinctions are:
  - Do you need a government licence?
  - Are the economic barriers to entry high or low?
- Where barriers to entry are low, such as with printing and webpage publishing, society has favoured no licensing.

Medium / Layer	The Internet	Broad-casting	Telephony
Infra Structural layer	Diverse ownership. Thousands of networks	Radio spectrum, government owned, licensed	PSTN, few owners, controlled interconnection
Logical layer	TCP/IP, a common resource (shareware), BIND shareware	NTSC?	Signalling System 7, owned by Telcordia
Content layer	Privately held, millions of speakers, unlicensed	Few speakers, all licensed by government	Millions of speakers, unlicensed

How many decide what content is?

- Media of communication can be categorized by how many get to publish, speak, or create services:
  - Telephone companies decide what “services” are;
  - Broadcasters decide what “programs” are;
  - No one decides what “applications” are.
- This is the fundamental difference between the Internet and the two older 20th century media: *no central planning at the content level.*

Broadcasting as a medium of signal distribution

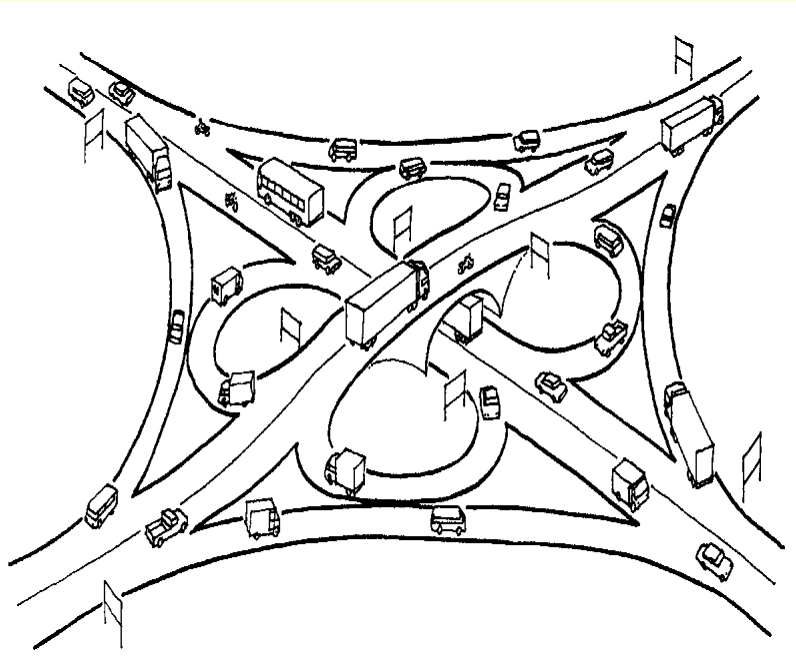
- Broadcasting is a pre-computer idea
  - No intelligence in the technical system; smart centre, dumb terminals
- Property rights in programming are tailored to the propagation characteristics of the medium, as amended by cable TV
  - Locality (signals have a definite range)
  - Limited time slots (no storage within the system)
  - Signals are broadcast (no addressability)

By contrast, the Internet

- Completely dissociates content delivery from a schedule, which derives from
- Abundance of sources, which derives from
- low costs to content creation & vast set of IP addresses.

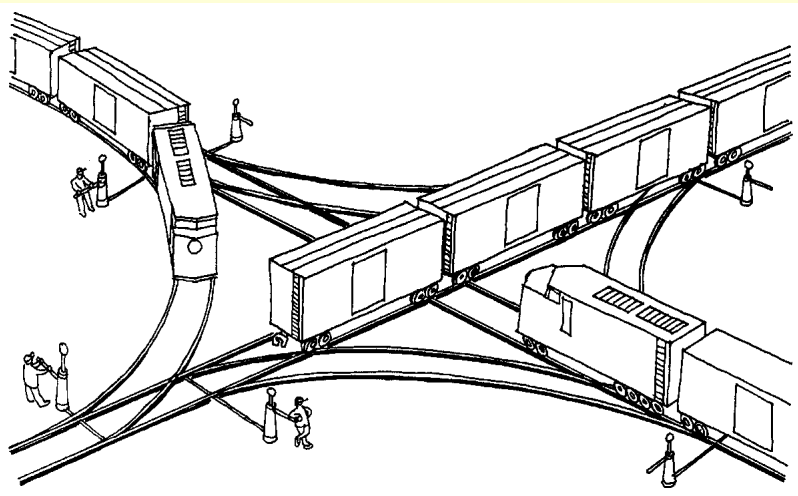
- Addressability: only computers with IP (internet protocol) addresses are on the Internet. IP addresses can be expanded (viz IP version 6).
- Intelligence: The terminal is intelligent, the network has a minimum of functionality built into it (the end-to-end principle, the stupid network)

The Internet is like a highway



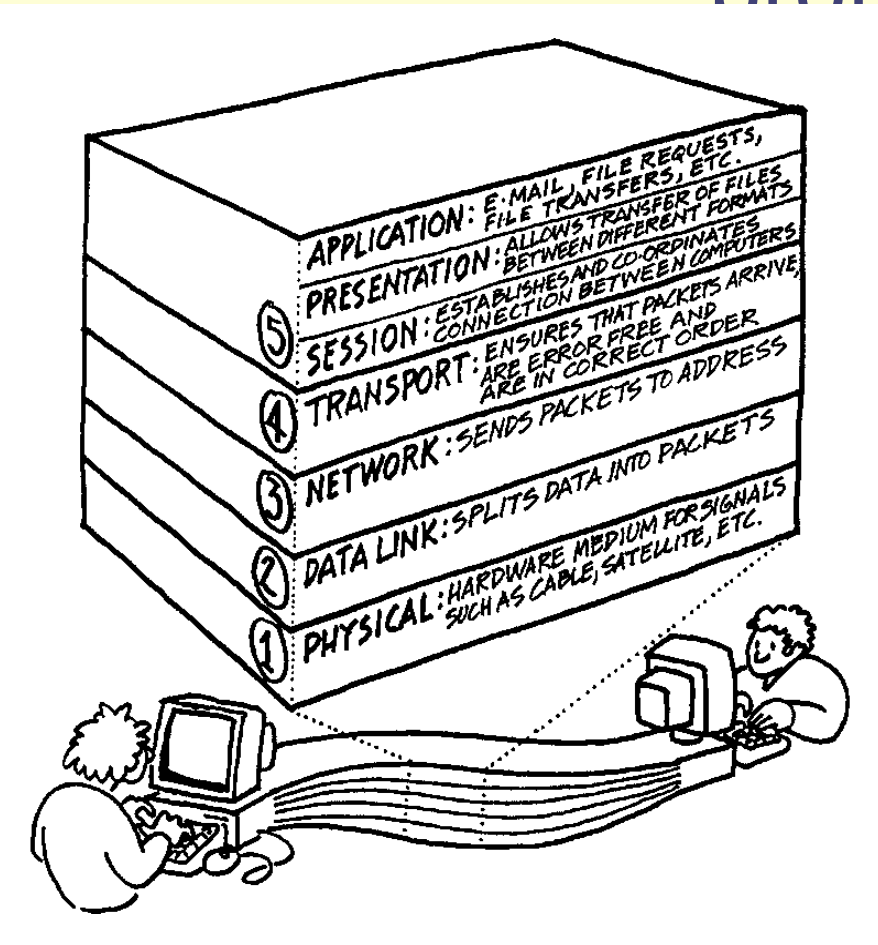
- No central control of the movement of packets;
- Packet loss is the only feedback;
- No specification of routes packets will travel.

Telephone systems work like railways



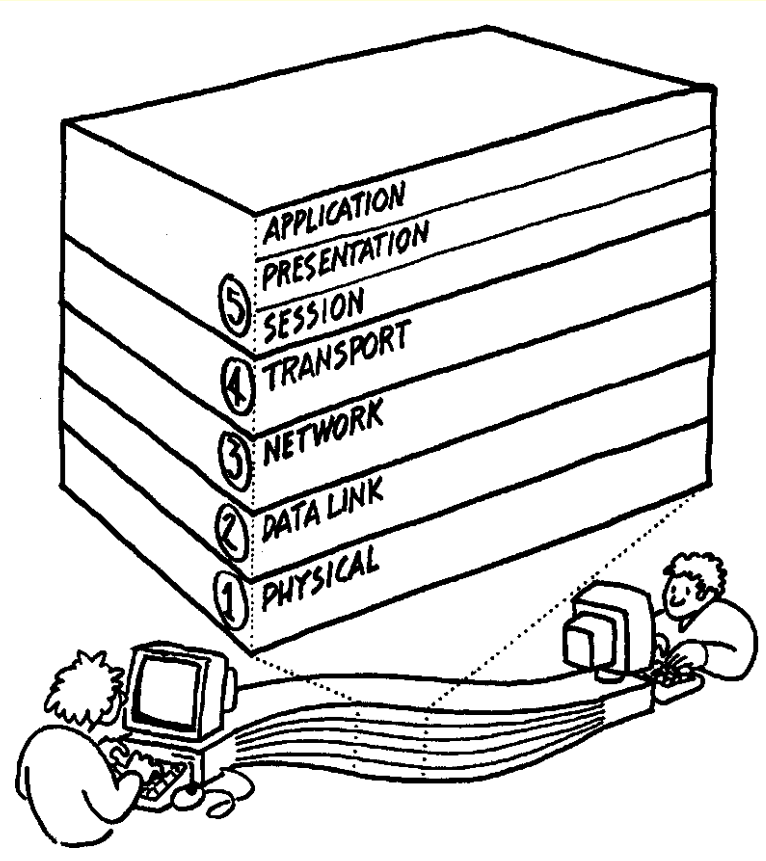
- The phone system must maintain central control of the call from end-to-end to maintain its integrity;
- The phone system completely specifies the outcome, timing, and routing of the message.

The Internet works through different layers of software instructions, or protocol



- The Internet is a set of computers linked at the logical layer through TCP/IP
- The TCP/IP is “transport control protocol over Internet protocol”;
- “transport” layer 4 over “network” layer 3
- The data link layer is provided by carriers

The applications are separated from the transport medium



- Everything end users are interested in lie in the top layers (#5);
- The lowest layers make the least specification of what the system should do (end-to-end principle)
- This produces a **commons** open to business and technical innovation.

Internet versus legacy systems

Internet

- Separation of “content” (applications) from the transport medium via a logical layer, TCP/IP;
- Lowest layers make fewest assumptions about what system does
- A “commons” of open architecture floats above the carrier layer.

Legacy systems

- Integration of content with transport medium
- Ownership or control of transport media permits owners to control of “content” or “services”
- Significant government regulation results or is justified by this fact.

The Basic Contrasts

- The Internet assembles all the resources of the world's computers to the user as a single system.
- The broadcasting system is a pre-computer idea: no intelligence in the terminal, central planning = appointment television;
- Use of supposedly scarce resources (spectrum) drove need for government licensing and technical coordination.

What protects the Internet?

- What protects the Internet from the imposition of the property-rights ideas appropriate to broadcasting? (locality, lack of storage, lack of addressability)
  - CRTC decision to declare the Internet not broadcasting
  - ACLU v. Reno

What protects the Broadcasting System?

- Inadequate bandwidth reaching the home from rival technical systems.
- As soon as effective video delivery is possible on an addressable, Internet basis, broadcasting will be obsolete as a technical system. But this could take 20 years.
- In the meantime, cable and satellite delivery have been fully subordinated to broadcasting regulatory goals, and remain adequate for programming.