Protocol Problems and Architectural Issues

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Different Kinds of Problems

- Directory versus lookup
- Surprising results
- Chokepoints
- Preemption

Directory Versus Lookup

- A directory provides an imprecise, often interactive service
- A lookup system provides reproducible, predictable answers, suitable for use by programs
- The DNS was designed to be the latter

Surprising Results

- Programs no longer do what you expect
- Sometimes there is incorrect behavior; sometimes, an error presents itself differently

Preemption

- The Internet empowers the endpoints, not the middle
- Endpoints – applications, hosts, etc. – can best decide how to handle error cases such as non-existent host name
- Wildcards pre-empt that ability and put control in the center

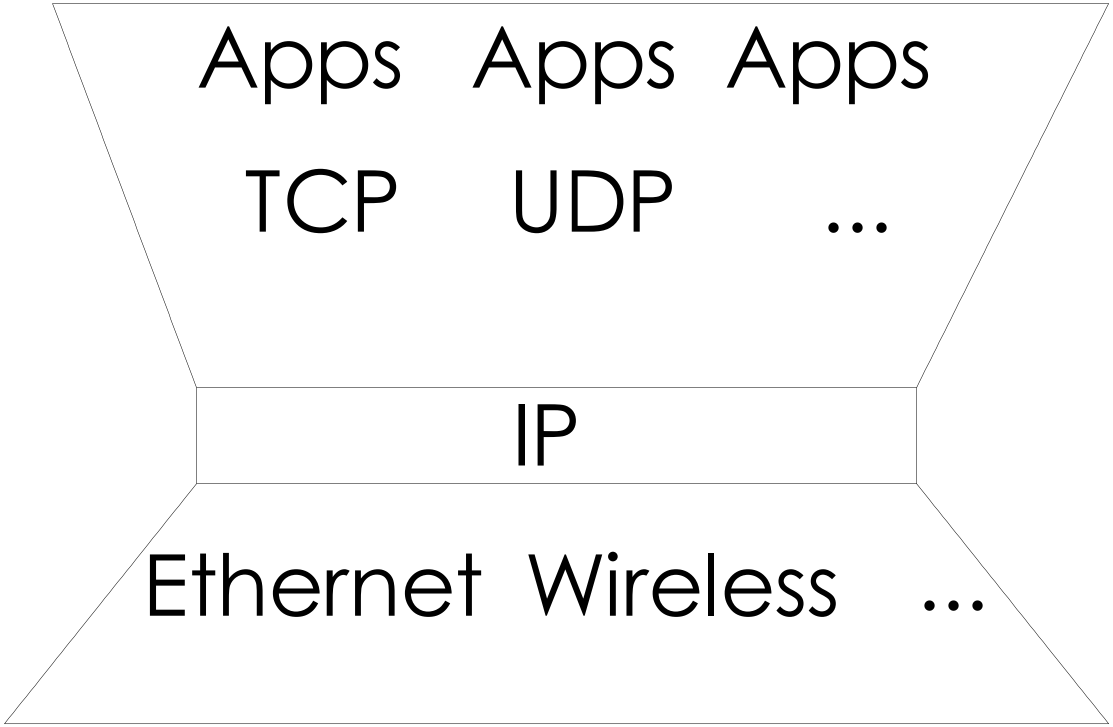
What is the Internet?

- TLD wildcards worked more-or-less adequately for (most) Web work and ordinary email.
  - The IAB noted that wildcards in general are mostly used for email only.
- TLD wildcards do not work well for other protocols.
- What is the minimum common protocol set for the Internet?

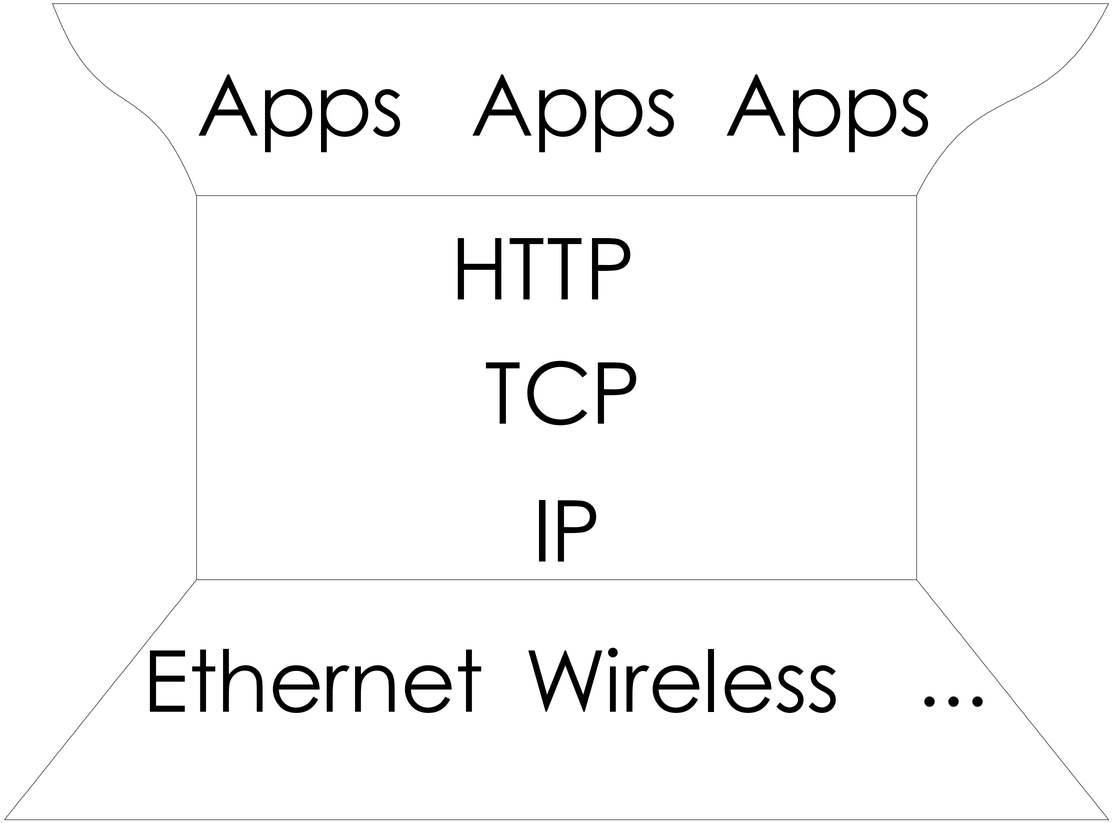
The Hourglass Model

- Historically, the Internet architecture has been modeled as a hourglass: “Everything over IP, and IP over everything.”
- Is the new model “Everything over HTTP”?

Today's Hourglass



Tomorrow's Hourglass?



Where Do Services Originate?

- Most interesting new services come from the edges
  - Often, neither the ISPs nor the IETF are involved, most notably in the early days of the Web.
- One part of the center's job is to stay out of the way of others' innovation – we don't want to lock in the Internet into the mostly-http model

Why Wildcards Can Break Things

- The DNS does not know what application the user wants
  - Is that an ancient mistake?
  - It mirrors the division of responsibility between IP and the upper layers
- A service intended for one or two purposes will often fail for other purposes.
- Even “normal” services can be complex

Conclusions

- The Internet is built on a set of architectural assumptions
- This architecture encouraged innovation
- Breaking the architectural model will cause unforseeable failures, both in less-common existing software and for future ideas