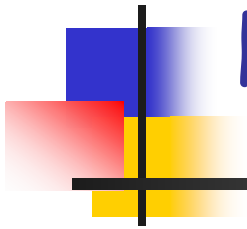
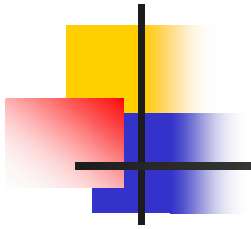


How the Internet Goes Wrong

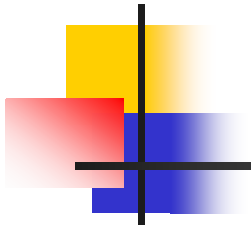
Jon Crowcroft,
http://www.cl.cam.ac.uk/~jac22



Let's look at what can go wrong

- We take the Internet for granted
- Until something doesn't work!

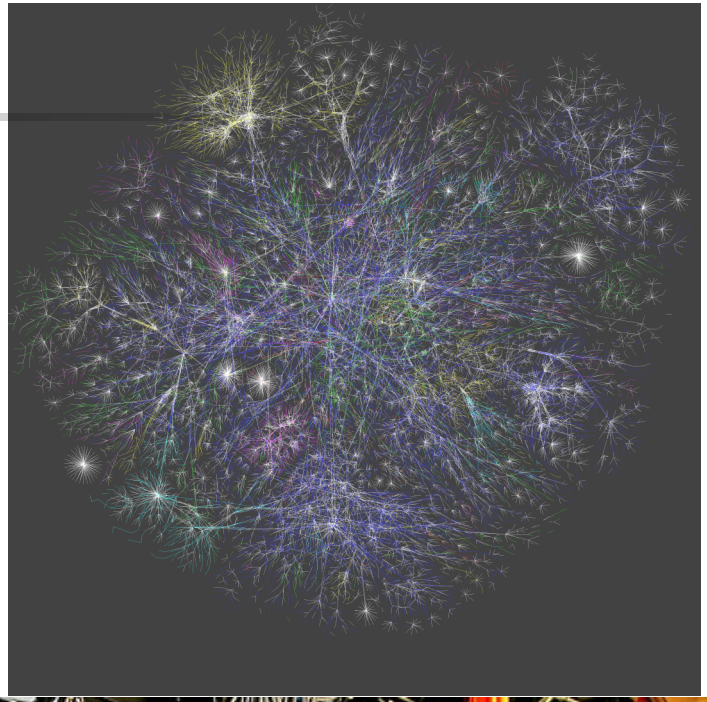
- Let's look at three common problems
  1. Why can't I get to a web site?
  2. Why's my download suddenly go slow?
  3. Why's my computer just got virused?

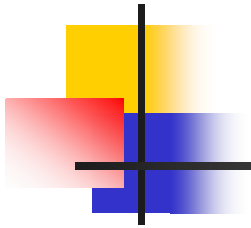


Outage!

- Aside from wires coming unplugged, or computers crashing (yours or theirs) there are several reasons you might not be able to get to a website :-
  1. Names
  2. Addresses
  3. Routes

The Wires…



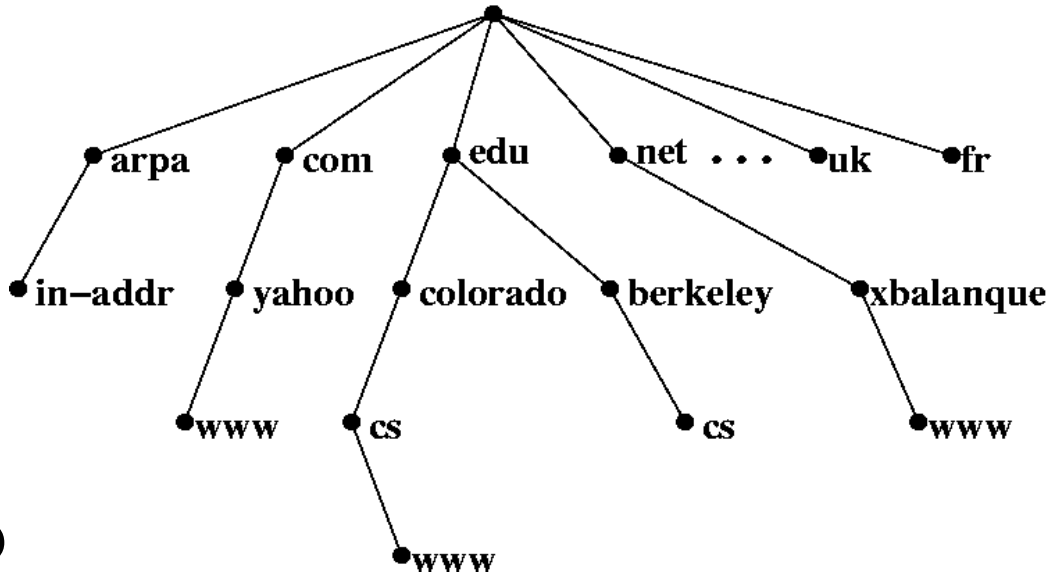


Flakey hardware improved by Smart Software

- Wires get broken
  - People kick cables out
  - Turn computers off
  - Power fails
- Can we make up for this by making the whole
  - Smarter than the sum of the parts?
- Yes - control software!!

The Domain Name System

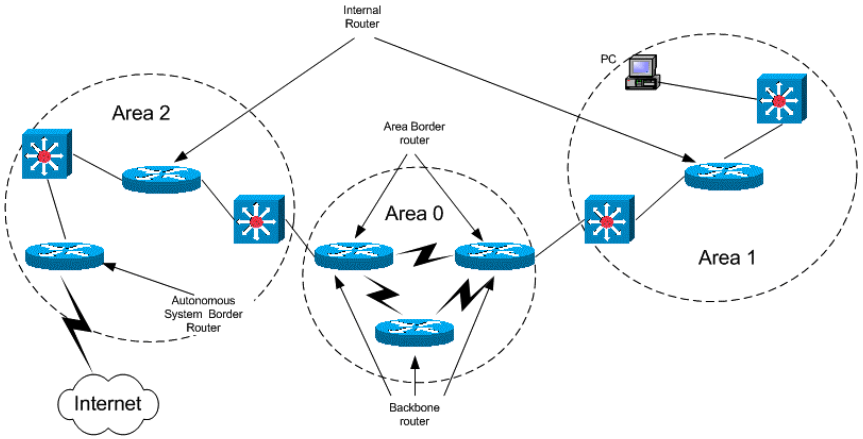
- When you type (or cut&paste) www.facebook.com, **what** you want…
- a "lookup" is done to
- Find the
- IP Address
- Which is
- **Where** it is



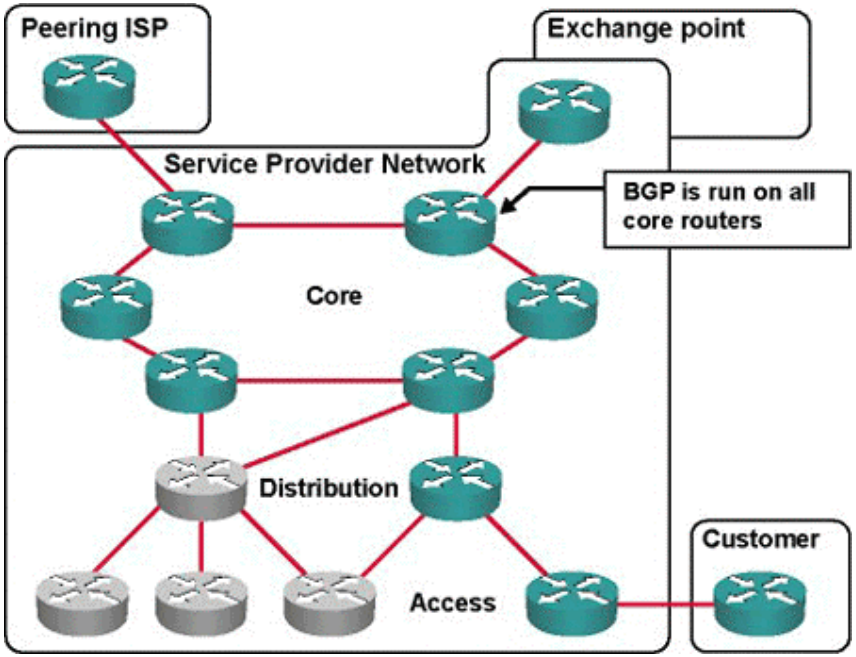
- The DNS may b
- Or you might just type something slightly wrong

Routing

- An address is where, but then you need a map and a compass to find the route

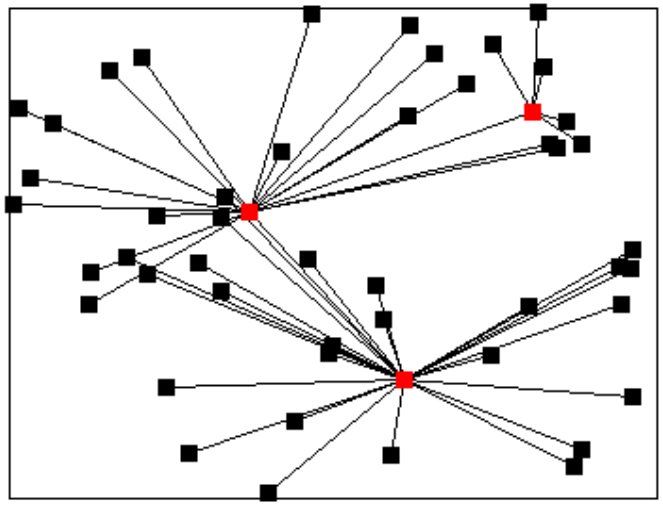


- The net does this
- For you in a
- Distributed way
- Which can go wrong!



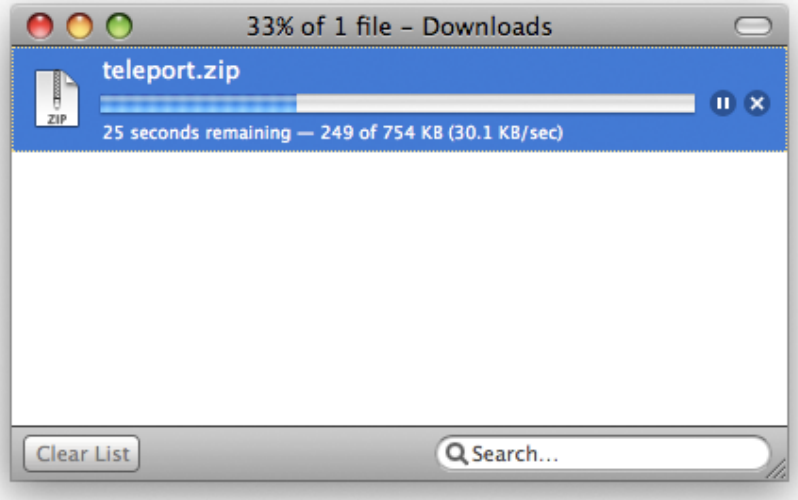
Dynamics

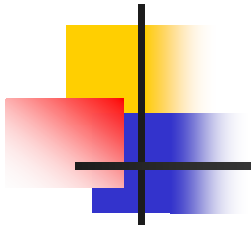
- Even as things change, software can keep track



Congestion

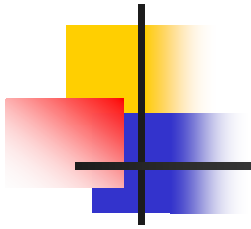
- Traffic jams can happen anywhere…on the internet too…





The Internet is shared, like roads

- Not so much like railways or flight paths
- So you have to wait your turn
- If there's a lot of users, the wait gets longer
- This is "implemented" by software in your computer which runs a *protocol*
- Called *TCP* - which cooperates with other computers implicitly to give a fair share…think about card games or anything where there are rounds…but where you can pass if you like
- It isn't exactly like that as it would take to long in a network, so instead it uses statistics

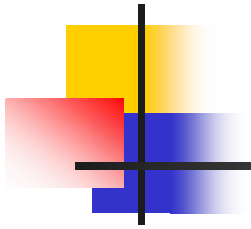


Insecurity!

- You may program your computer,
- But most the programmes you use were written by someone else (Microsoft, Apple, open source contributers)
- When you download a programme, how do you know who really wrote it, and what they really want to do with it?
- This is as true on your cell phone as it is on a notebook.
- This is true for Facebook Apps (and photo tagging) that invade your privacy.

Why do people write "malware"

- Sometimes they want to steal your ideas or your money
- But other times they want to use your computer to do things like
  - Spam
  - Botnets/ddos attacks
- Really bad guys pretend
- To be trying to help:



The Internet is quite complicated

- It isn't complex -
  - it's just made of a lot of pieces, each of which is really very simple.
  - For an "end to end" path to work
    - Properly, as expected, and to perform well
    - All the pieces have to function correctly
  - Amazingly, it does work most the time
  - Largely because we have got a lot better at designing and building computer software and hardware in the last 10-20 years
  - But there's a lot more to do still!