INRG: Network Research at U Auckland

Web Server Performance – as seen by Users

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Introduction

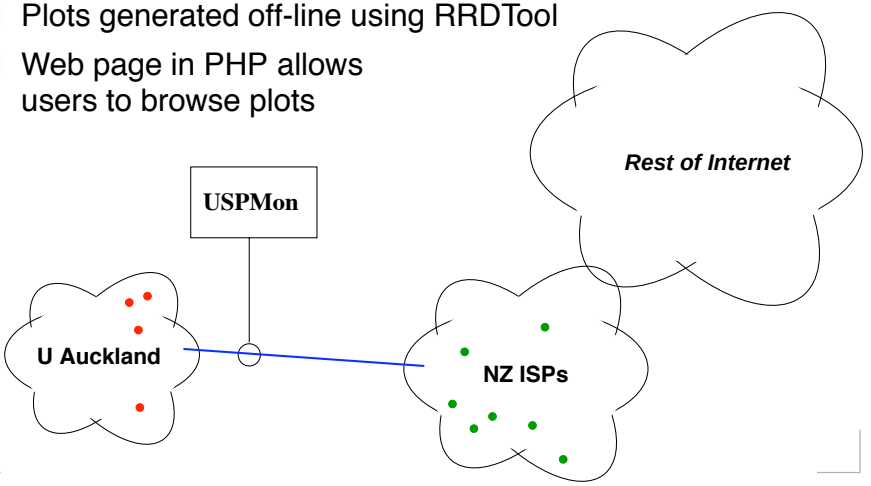
- Networking papers in COMPSCI
  - 215: Introductory network concepts
  - 314: Data Communications Fundamentals
  - 742: Data Communications and Networks
- Information & Network Research Group *(INRG)*
  - Deterministic Information Theory, t-codes, t-entropy
  - Passive Measurements of the Internet
    - Identifying and Measuring Peer-to-Ppeer *(P2P)* activity
    - Object-Oriented network metering using Ruby
    - Detecting 'unusual' behaviour on the network
    - Finding 'significant' hosts on the University
    - Observation of the global Domain Name System *(DNS)*
- INRG people
  - Nevil, Ulrich, (from September '07) Brian Carpenter
  - Also Mano, Radu, Mark . . .

The *USPMon* project

- One ITS-initiated project, in some detail . . .
  - *User-Centric* observation of UoA Web Server performance
    - *Li Li,* M.Sc., 2005
    - *Jonathan Liu,* PGDip Dissertation, 2007
- Passive observation of packets to/from three U Auckland web servers
  - nDeva, Cecil
  - www.auckland.ac.nz
- Users access these servers:
  - From outside New Zealand
  - From inside New Zealand, using various ISPs
- How good is the service they get?
- Does it differ among the NZ ISPs?

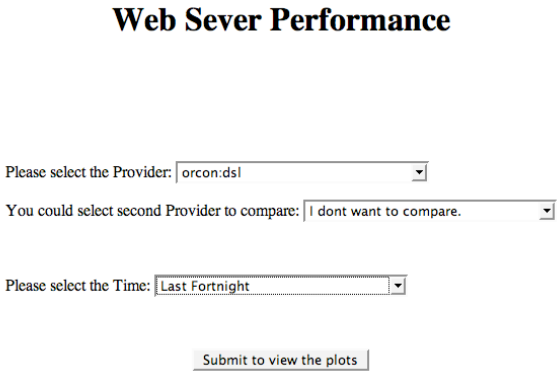
Experimental Setup

- USPMon observes packet headers at edge of our network
- Data saved in RRDTool (Roound Robin) database
- Plots generated off-line using RRDTool
- Web page in PHP allows users to browse plots



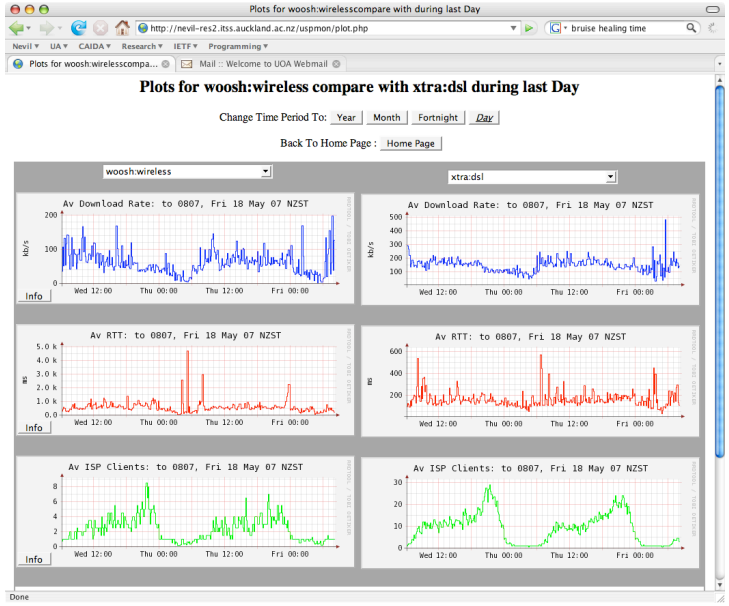
Home Page

- http://nevil-res2.itss.auckland.ac.nz/uspmon/webperformance.php



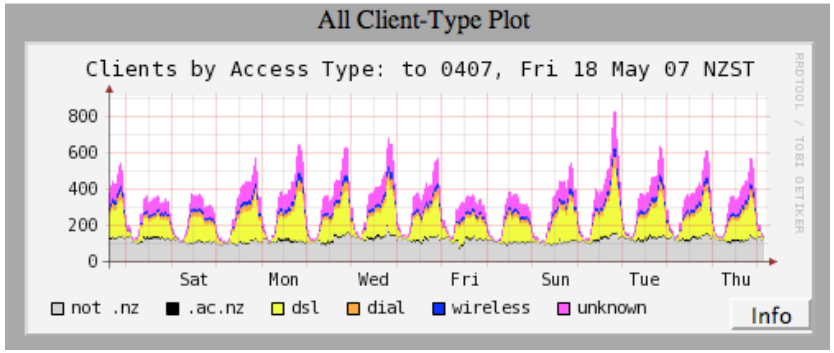
- Each line is a drop-down box. Pick your ISP(s) and Time-span, then click 'Submit'

Day plot



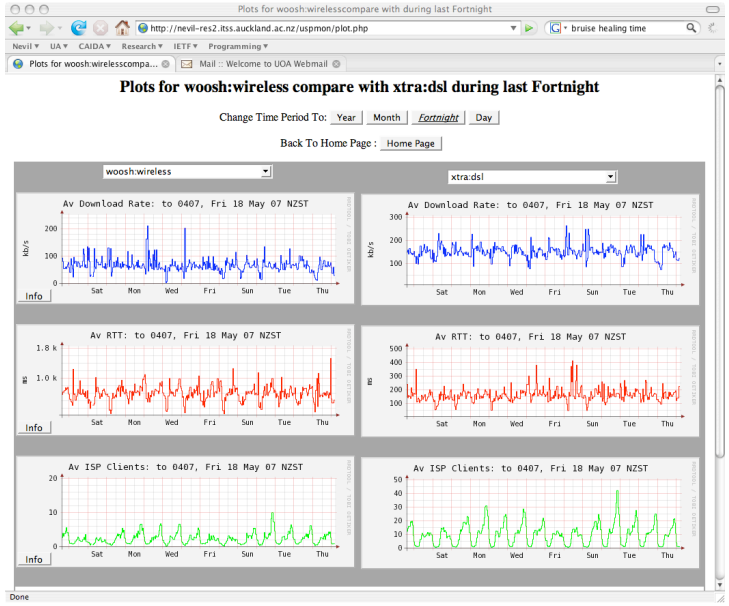
- Three plots for each ISP
- Note different y scales
- Clear diurnal variation, shown by both ISPs

Client-Type plot



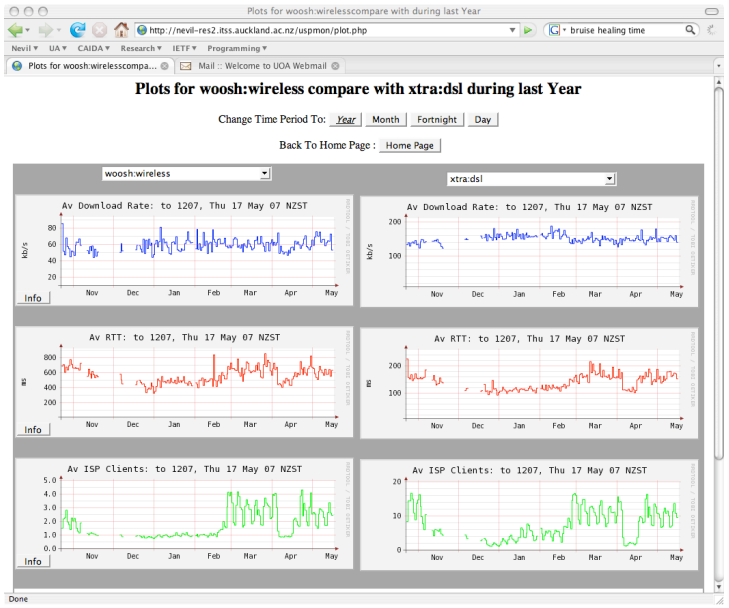
- Grey bottom area shows Internet connections from outside New Zealand
- DSL (yellow areas) is our dominant access method
- Not much DSL or wireless
- 'Unknown' means *"we couldn't tell by looking up domain name"*

Fortnight plot



- Can see weekly variation
- Students work afternons and evenings, Sunday to Thursday
- Download rate goes *down* as load (number of clients) goes up
- RTT goes *up* as load (number of clients) goes up

Year plot



- Gaps show where USPMon monitor was down
- Much more load in Semester 1 than in Summer School
- RTT increases with load, Download Rate doesn't
- Averages decrease with longer agregation period

Conclusion

- UA web site and its users:
  - A majority of our users, ∼70%, have DSL connections
  - There are clear performance differences between dial, wireless and DSL ISPs
  - Users seldom see anything above 200 kb/s download rate
  - Latency *(RTT)* around 200 ms seems surprisingly high
- The Internet now affects all our lives
  - *We to understand it better!*
- Network research . . .
  - Plenty of interesting possibilities