Life in a ’90s ISP

Internet Services at Victoria University of Wellington / NetLink

1992 - 1997

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A bit of history

1985 VUW Computer Science exchanges UUCP mail / Usenet news

1989 PACCOM link from University of Waikato to University of Hawaii
Co-funded by NASA
Analogue, 9600 bps via ANZCAN cable.
Upgraded to 14.4k
VUW Comp Sci link to UoW via DSIR network

1990 Kawaihiko network, DDS (48k / 9k6) lines between Universities

1991 PACCOM link upgraded to 64k via satellite to NASA Ames.

A little about me

Miscellaneous 8 bit micros, 1982-1986

Programmer at Datacom Systems Auckland, 1986-1988
- VAX/VMS, PDP-11/RSTS/E applications
- Early data communications exposure

Systems Programmer, Goverment Printing Office 1988-1991
(GP Print Ltd from 1990).
- VAX/VMS systems and admin
- First email address, don@gp.govt.nz in 1988

VUW CSC advertises for "Network Systems Manager", late 1991

DEC PDP-11/70


Ethernet with H-4000 transceiver and tap

January, 1992

Started 6 Jan, 1992, as "Network Manager".

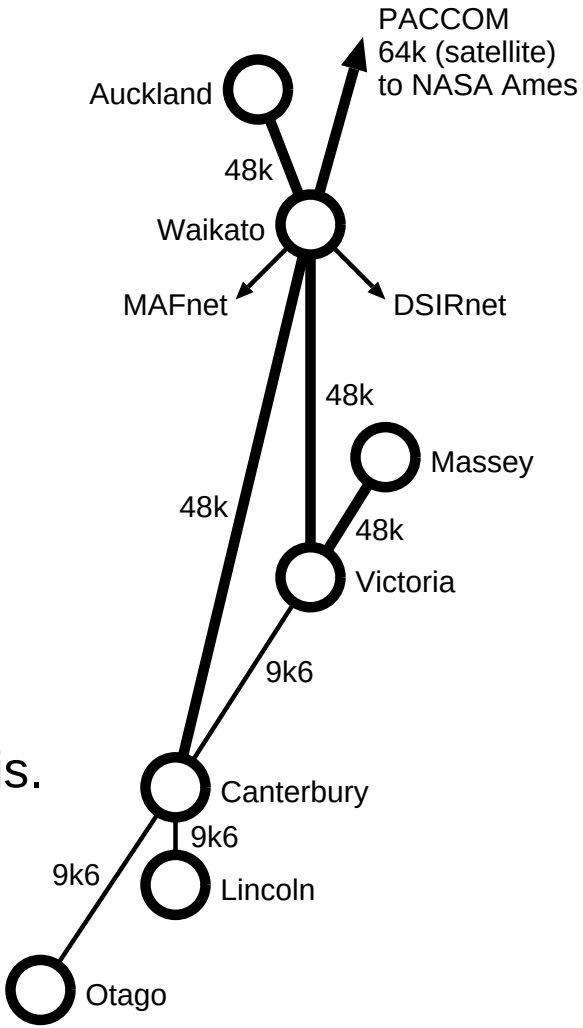
VUW had 48k Kawaihiko links to Massey & Waikato

PACCOM link, U of Waikato - NASA Ames via 64k satellite.
- Sun outages a thing.
- 700+ms RTT to US West Coast

DNS mil.nz, govt.nz hosted at VUW, other nz at Waikato.

VUW has six external IP links, mainly ~9.6k SLIP, on no fee basis.

VUW largest NZ institution by Internet usage



Kawaihiko Network,1991

1992

1992 research sector reforms prompts Tuia Net (frame relay) deployment.
- VUW connected at 128kbps

The dial-up (and PC router) problem
- 2x 9600bps (V.32) dial-in modems on TRW terminal server
- Terminal access only
- Leased line SLIP connections on cheap (but large) PC routers

Garage sale to purchase Cisco 516CS router to service:
- dial-ins, with SLIP access
- leased SLIP connections

International traffic around a gigbyte per month

VUW Internetworking Group - Late 1992-1993

Cost apportionment on PACCOM via volume tiers established

WCC City Net volumes explode, greater than VUW in November

VUW Internetworking Group established, charging from 1 Jan 1993.
- Asynchronous SLIP connections
- Synchronous "multiprotocol" connections

Charging model:
- Install costs around incremental cost per port
- Quarterly cost ~$500 per connection, excludes Telecom circuit.
- Traffic ~$2.50/MB international (with discounts), 20c/MB national

PACCOM to 128 kbps in early 1993

The University notices - 1994

CSC becomes ITS, Frank March remains Director, but reporting lines altered

Internetworking equipment purchases and revenue become part of budget cycle

40-ish leased-line customers, 1994 turnover ~ $250k.

Internet Administrator (Sid Jones) hired to start Jan 1995

Discussions on commercialisation started with Victoria Link Ltd

In other news

- PACCOM NASA subsidy ends January 1994
- PacRim East, 2 x 560 Mbps Auckland-Hawaii commissioned 1993
- PACCOM link upgraded to 256k via PacRim East, March 1994

NetLink - 1995

NetLink launched April 1995 as division of Victoria Link Ltd

Initial offerings:

- Leased lines (sync / async)
- Dial-up, 24-line modem pool
- Email hosting (POP3)
- Basic web page hosting

Stuart Wilson on commercials, Don Stokes on technical

Joint ITS / VicLink management advisory committee

NetLink expansion - 1995

Computer Science uucp / Usenet operations merged with NetLink

Expanded WWW expertise with Nat Torkington (ITS) & Jules Anderson (CS)

Integrated University of Auckland operations
- CyberNet DoS incident
- Existing UoA leased connections
- New dial-ins

Christchurch, Network Dynamics
- New dial-ins and lead connections

VolcanoCam, October 1995

1996

NZGate (ex PACCOM) moved to NetWay Communications
    $4,500 / 64 kbps / month

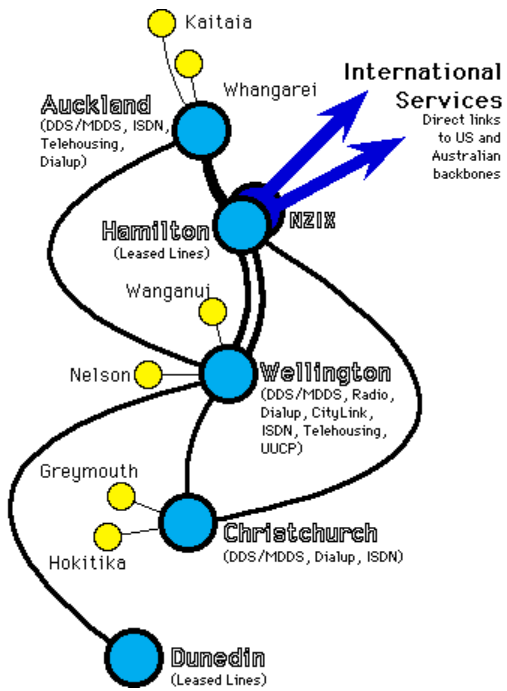
Dunedin and Hamilton POPs deployed

NetRadio - 2.4 GHz spread-spectrum wireless

First CityLink customers, September 1996

DIA to Parliamentary complex link
    Hardware encrypted IP VPN over E1 connections

1996 general election web coverage



1997 - 1999

(and beyond)

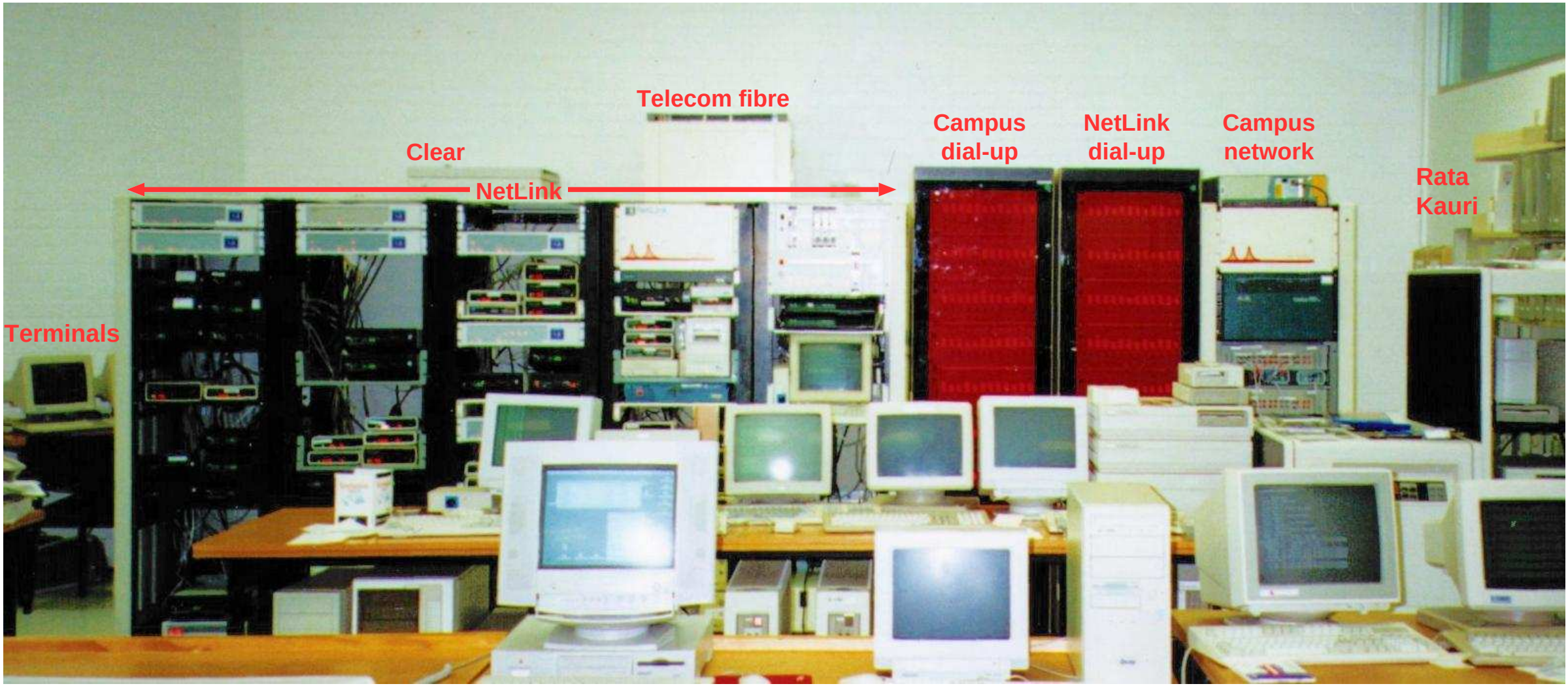
NetLink incorporated as NetLink Limited, January 1997

New CEO appointed, Don Stokes and Stu Wilson depart
- Andy Linton as new technical lead

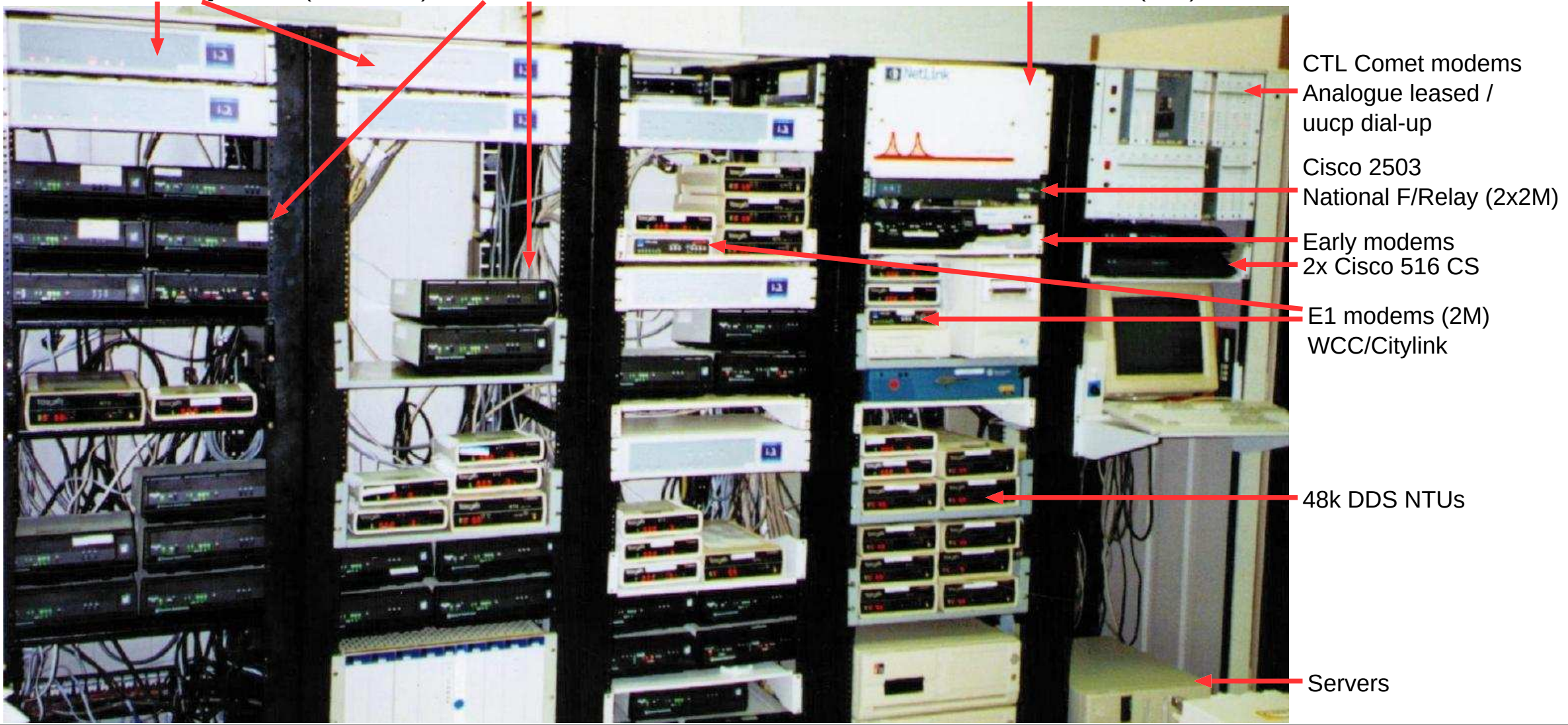
New CEO, David Plummer, 1998

Sold to Telstra, October 1999
- Telstra & Saturn (ex Kiwi Cable) merge, February 2000
- TelstraSaturn purchases Paradise Net, April 2000
- TelstraSaturn merges with Clear Communications, 2001
- TelstraClear acquired by Vodafone New Zealand, 2012

VUW machine room circa 1997



NetLink racks circa 1997



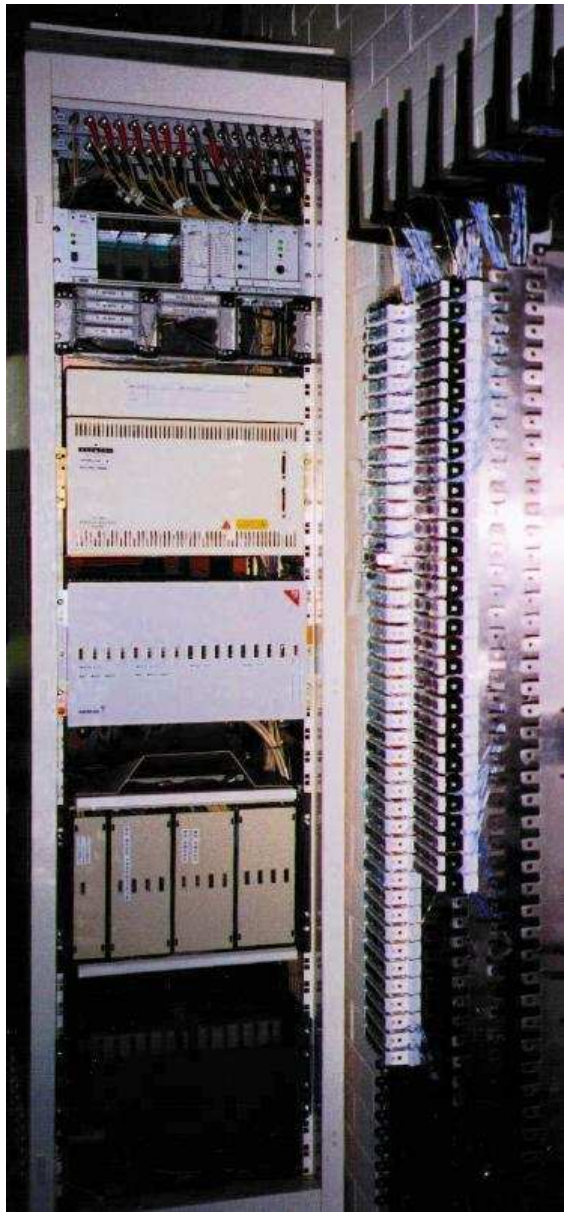
Telecommunications in the 1990s

Telecom owned ... everything
- Clear was ... trying

Everything built on:
- Analogue pairs, ~$80/month
- DDS / MDDS @ 48k, ~$450/month ... or *n* x 64k
- "High speed" was 2 Mbps channelised E1 / PRI
- Layers of TDM (PDH)

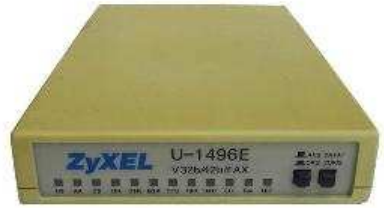
Also deployed (1996):
- NetRadio, 2.4 GHz FHSS
- CityLink Sep 1996
- Others: microwave, UHF

Internal entirely 10Mbps Ethernet, mainly ThinWire (10Base-2)



Modems

Original campus dial-ups: 2x Compuspec M9600s, 9600bps (V.32)



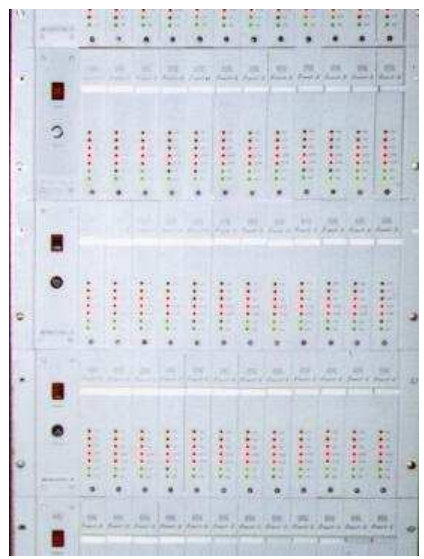
ZyXEL U-1496E

Standardised on ZyXEL U1496-E, 14k4 (V32bis) / 16k8
- Still standalone modems with external power supplies
- Not V.FAST (developed into V.34), 28k8


CTL Comet-X MD1290

University proposes large scale dial-in pool for 1994 budget cycle

U. Waikato using CTL Comet-X MD1290 modems (standalone).
- Purchased two for a leased line
- Suggested to CTL to make rack-mount version


Part of NetLink dial-in pool

Deployed for campus and NetLink dial-ups, plus leased lines
- V.34 and V.34bis (33k6) versions produced.
- 18 shelves, over 200 modems purchased.

The Ace Router

Based on DSIR network nodes
- Started with CSIRO PDP-11 based NODECODE
- Re-implemented by DSIR to MC68000 architecture

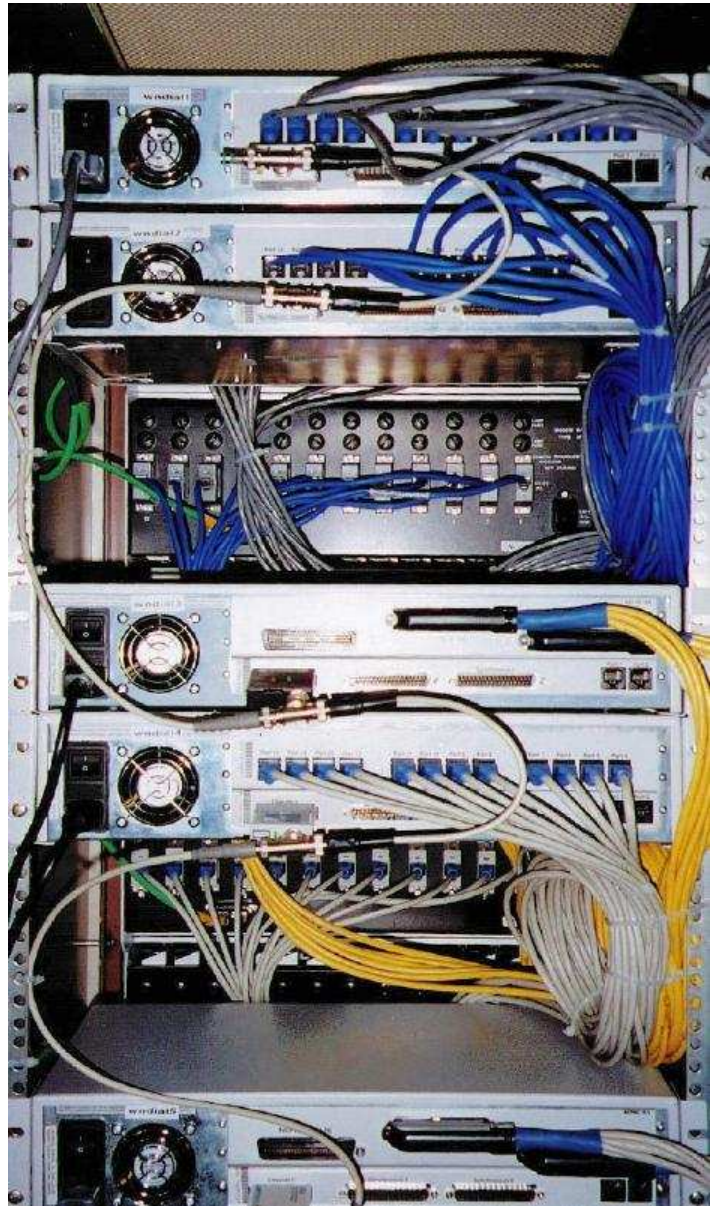
Marketed by Network Dynamics Ltd as "Ace Router"
- Ex DSIR (IRL) network team moved to NDL in Christchurch.

Basic chassis: 1x Ethernet, 2x sync ports, Expansion slot
- Options: 4x sync ports, 2x channelised E1/PRI, 12/16x async

End routers (e.g 1x Ethernet, 1x Sync or ISDN BRI)

Sold to Securicor 3net, then Teltrend
- Branded "Network iQ"
- Now Allied Telesis Labs

Reliability ... uh ...



NetRadio - 2.4 GHz

Proxim RangeLAN2, 2.4 GHz Frequency Hopping Spread Spectrum

1.6 Mbps radio data rate

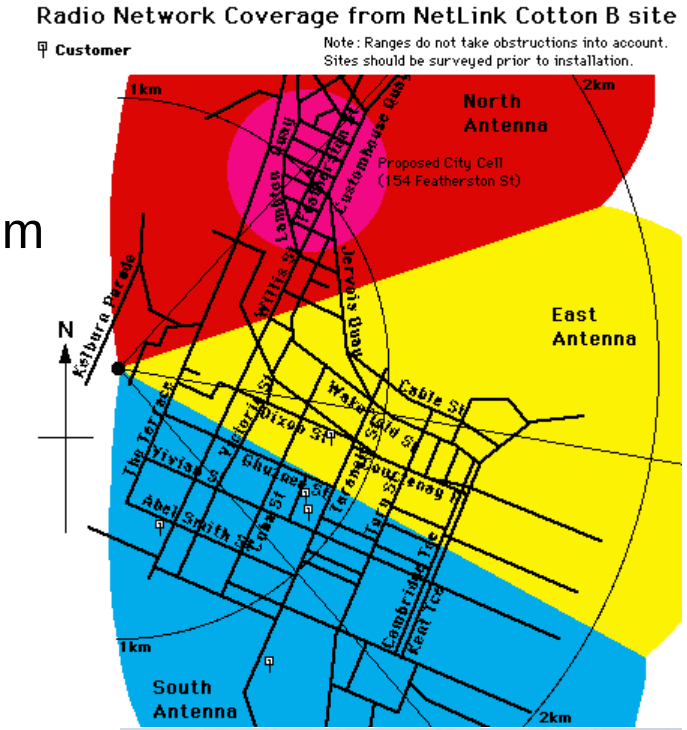
Half megabit or so real-world performance

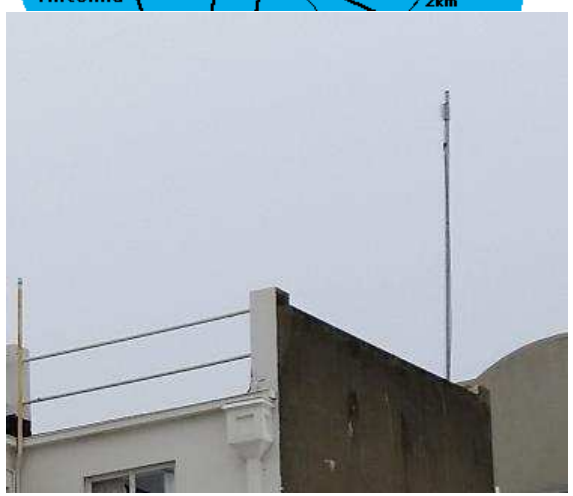
3-antenna node on Cotton Building roof September 1996
plus node on Hotel Grand Chancellor, mid-1997

Over 1 km range with directional antennas

11 connections in Wellington

Connections via Accton mini-PC with ISA RangeLAN2 card installed





The Web

Hypertext around since the 1960s.

WWW first proposed in 1989, actual implementations circa 1990-1991
- NCSA Mosaic released early 1993
- Netscape Navigator released December 1994

Victoria University appoints Nathan Torkington as CWIS admin, 1994

February 1995 IP-based virtual hosting proof-of-concept
- (Host: header not a thing)

"Internet Presence" accounts from July 1995, $100/month, includes:
- dial-up account,
- POP mailbox and domain email handling
- Domain name and web host

"Internet Presences", 1995

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budfin.co.nz
compkarori.co.nz
countrywide.co.nz
cyberbridge.co.nz
enduser.co.nz
fireserv.org.nz
first.co.nz
helios.co.nz
caduceus.co.nz
kiwihome.co.nz
orac.co.nz
racing-new-zealand.co.nz
trustbank.co.nz
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1990s ISP environment

Telecom monopoly on last mile not really dealt with until UFB

Telcos slow to embrace Internet

Internet a "nice to have", therefore
- Problems generally tolerated, outages expected
- Resiliance not a priority - no backup power, redundancy, seismic bracing
- Security and software resiliance marginal

"Exponential" growth - a trickle of connections in 1992, sizeable numbers by 1994, rapid growth in 1995 onwards

Telecomms and equipment costs extremely high throughout 1990s (and beyond).
- Volume charging allowed affordable connections (if expensive to use)

Technology Environment

A little too much bleeding on the bleeding edge....
- New services on new products are ... problematic
- Software immature and often non-existent
- No-one who's done it before to ask for help ...

Local vendors often more responsive to needs than larger players
- Commoditisation increased supply, decreased prices and engagement
- But many dead-ends and problems

Telco communications facilities complicated, inefficient and expensive
- ... especially compared to Ethernet
- ... and analogue modems Should Not Exist

Security .... marginal. Firewalls and NAT become things in the later '90s
- Encryption uncommon
- Early software not hardened against attack (e.g. open SMTP, buffer overflows)
- Many security lessons learned the hard way

Reflections

Initial developments around cost recovery and sustainability, rather than profit
- Charges aligned with costs
- Communications costs borne by customer

Volume charged model allowed cost effective connection despite high infrastructure cost

University environment provided a good incubator to try things
- People
- Facilities
- Money - budgets in which to hide things early on ...

NetLink always focused on organisational rather than individual customers
- Larger average spend per customer than contemporary ISPs
- Competitve even after telcos entered market

Questions?