

History of Neutral Commercial Internet Exchange: The PAIX Story

Paul Vixie

November 2011

Prehistory: 1980's

- 4.2 BSD UNIX ships
 - Adds TCP/IP stack including Sendmail
- 4.3 BSD UNIX ships
 - Adds DNS stub resolver, BIND 4
- .COM, .NET, .ORG go live
- Fast growth of UUCP network and UseNet
 - UUCP Project (Mark Horton)
 - UUNET

Digital Equipment Corporation

- BSD UNIX ran first on DEC PDP-11 and VAX
- First 10+ MIPS RISC computer: DECWRL Titan
 - Sun, Pyramid, others, then at ~3 MIPS
- DECWRL was DEC's Internet gateway
 - At first, ARPAnet connection (9.6KBit to NASA)
 - Added CS-net connection (56KBit)
 - Added AlterNet connection (1.5Mbit)
 - Added NSFnet (BARRnet) connection (10Mbit)

Early 1990's

- Internet privatization/commercialization
- Modem users replace UUCP/shell with SLIP
- NSF backbone “replaced” by ANS (w/ AUP)
- NAPs offer interconnect service (w/ AUP)
- AlterNet, PSInet offer commercial IP service
- Telcos get into the IP business
- CIX offers interconnect service (w/o AUP)

Mid 1990's

- Because AlterNet, CS-net, BARRnet, and DECWRL shared a 10Mbit LAN, we invited them to peer with each other via EGP
- In 1994, work begins commercializing “DIX”
- In 1995, UUNET expands its POP
- In 1996, DEC PAIX opens for business

Context of DEC PAIX Creation

- MAE's had moved from Ethernet to FDDI
- ATM was expected to become primary fabric
- CIX had moved to SMDS (802.11 over ATM)
- NSP interconnect usually meant leased lines
- Informal deals were made in "wire centers"
- Universities ran non-commercial IX centers
- Telcos ran non-neutral IX centers

Midnight Economics

- DEC did not believe in the IX model
 - So we told them there would be servers
 - They thought they could sell “field service”
 - In reality there were very few servers – ever
- Some early customers also misunderstood
 - So they pointed “default” at other customers
 - Thus we added access control lists
 - And they wired our LAN port to their LANs
 - Thus we moved to static MAC addressing and asked Extreme to implement “one learned MAC per port”

1998-1999

- DEC acquired by Compaq, who sells off IP assets:
 - AltaVista, the first “search engine”
 - PAIX, the first neutral commercial IX
- The building they shared went with AltaVista
 - ...who later fails, sells assets to Yahoo
- AboveNet acquires PAIX for USD 70Mil
- Equinix founded by some ex-PAIX people
- MFN acquires AboveNet for USD 2Bil

2000's and Beyond

- Dot-com bubble explodes, MFN goes bankrupt
 - PAIX was MFN's only profitable business unit
 - So it was sold for USD 44Mil to Switch & Data
- Switch & Data later acquired by Equinix
 - Thus completing the great circle
- All IXPs are carrier-neutral now
- Some still operate at ISO L3, this will change