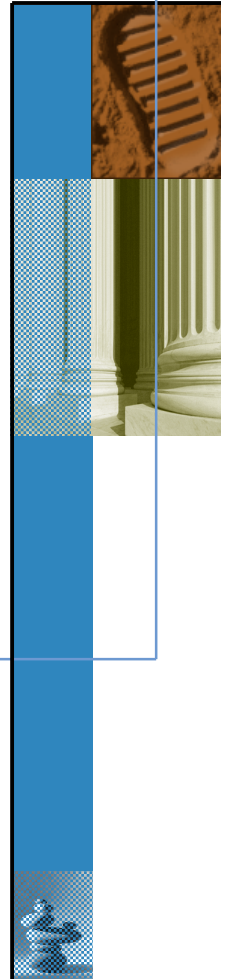

The Good Old Days: Networking in UK Academia ~25 Years Ago

UKNOF7

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It was all so different then....

- "Ghandi" won best picture Oscar
- Michael Jackson's "Thriller" was #1 album
- Aston Villa won the European Cup
- Mobile phones were the size & weight of breeze blocks
- There was no internet
- DEC VAXen were cool
- 400MB Fujitsu Eagle disks were the best
- 4.2 BSD had just been released

Ancient History

- Don Davies at RSRE invented packets
 - > Focus was connection-oriented not connectionless?
- Post Office ran an experimental X.25 network, EPSS
 - > Became BT's PSS service eventually
 - > UK academia had SERCnet
 - Largely dependent on PADs and dumb terminals
- ARPAnet node at UCL
 - > Peter Kirkstein's research group
 - > Link also shared with RSRE in Malvern

The JNT

- Joint Network Team
 - > Now known as UKERNA
- Devised “transitional” protocols on the road towards world domination by OSI
 - > Paid for software development for platforms of the day:
 - VMS, Unix, OS/360, Primos, ICL VME, GEAC, MS-DOS, etc
- Deployed a free X.25 based network, JANET
 - > For academic use, not research
 - > Experiments and other protocols were forbidden
 - > Usually a 64KB link for an entire university
 - > Links provided to commerce: computer companies and research partners mainly

Interconnects & Gateways

- Very limited ARPAnet gateway at UCL
 - > 16kbs for entire UK academic community
 - > Trusted elite could login and do FTP
 - Save file on UCL host, then transfer over JANET
 - Or *vice versa*
- BITNET/EARN gateway at Rutherford Labs
 - > Funded by IBM?
- UUCP via University of Kent Computing Lab (UKC)
 - > Funded by usage - mainly Computer Science and Elect. Engineering departments
 - Paid to send and receive UUCP mail & netnews
 - 1200 baud modems

Coloured Books

- **Yellow Book**
 - > Transport Protocol - essentially about subaddressing
- **Blue Book**
 - > Batch file transfer
- **Grey Book**
 - > Batch email Transfer
- **Red Book**
 - > Remove Job Entry
 - There be mainframes...
- **Pink Book**
 - > X.25 over ethernet
 - > Yes, really....

The Yuckbox

- Truly dire UNIX implementation of Coloured Books by University of York
 - > Front-end processor: the Yorkbox
- Interface protocol was very buggy and more complex than X.25
- Application software and utilities were dreadful
 - > Didn't use sockets or pseudo-terminals
 - > Stand-alone mail system: `hhmail`
 - > Riddled with bugs and security holes
- It was just hopeless...
 - > Even George Michaelson's outstanding efforts over and above the call of duty couldn't make this pig fly

It wasn't all bad

- Free network meant no more phone bills to UKC
 - > Speak Grey Book to UKC instead of UUCP
 - > Still paid for in and out netnews and mail though
 - JNT picked up the bill for that eventually
- Yellow Book and Blue Book to shunt netnews
 - > Listen on <X.25Address>.FTP.NEWS
- Free mail gateways to ARPAnet and BITNET/EARN
 - > Gateways into IBM and DECnet too?
- Very curious mail routing:
 - > Email crossed the street by going to London and then to California to enter Digital's net at their UUCP and ARPAnet gateway

Open Source was invented 20+ years ago

- UNIX Community quickly fixed things for themselves
- `hhmail` discarded in favour of a `sendmail` shim
- `hhcp` was replaced by `niftp` from UCL
- Yorkbox was next to be junked:
 - > UBC X.25 socket code
 - > SunNet X.25
 - > Morning Star Multibus/VME boards
- Device drivers, patches and code widely circulated
 - > Utilities for the NRS database
- Community was self-supporting
 - > Yorkbox disowned by all

The NRS

- Name Registration Service
 - > University of Salford's Prime Computers
 - > Structured text file
- Names and addresses of all X.25 hosts on JANET
 - > Knew nothing about IP or LAN hosts
- Analogous to HOSTS.TXT on the ARPAnet
 - > Get the latest file by Blue Book and munge it into the native format
 - > Hopelessly out of date
- Email involved printers and pigeonholes!

Naming

- Used same syntax as DNS, **BUT.....**
- Ordering was inverted
 - > `uk.ac.strath.cs` JANET
 - > `cs.strath.ac.uk` everywhere else
- Lots of fun when Czechoslovakia (`.cs`) joined the net in the late 80's
 - > Some UK Computer Science departments renamed
 - > Others waited until Czech Republic and Slovakia split
- Middlesex Polytechnic wanted and got `uk.ac.mx`
- Short- and long-form names
 - > `uk.ac.ecmwf`
 - > `uk.ac.european-centre-for-medium-range-weather-forecasting`

Sendmail



- Email addressing was a mess:
 - > Is `a!b@c` supposed to go to `b` at `c` via UUCP to `a`?
 - > Or is it to go to `c` for forwarding by UUCP via `a` to `b`?
 - > Can't rely on inbound delivery channel for clues
- SMTP over department/campus LANs
 - > Needed to hide local host names
 - Monolithic Computer Services mail systems couldn't do that
- NRS madness made this even worse
- Jim Crammond's UK-Sendmail fixed this
 - > Generated working `sendmail.cf` files
- Email couldn't have worked without sendmail or MMDF
 - > UKC and UCL ran MMDF because of billing/policy hooks
 - Some Computer Science departments ran MMDF

What does this do?

$R_{\$*@\$+.\$+}$	$\$1@\$2:\$3$	$u@a.b.c.d \rightarrow u@a:b:c:d$
$R_{\$*@\$-:\$+}$	$\$:\$1@\$3.\2	$u@a:b:c:d \rightarrow u@b:c:d.a$
$R_{\$*@\$-:\$+.\$+}$	$\$1@\$3.\$2.\4	$u@b:c:d.a \rightarrow u@d.c.b.a$

Protocol Wars

- JNT's ambition was to see OSI deployed
 - > Paid for PP (X.400 mailer)
 - > Encouraged X.500 (QUIPU)
- Rise of TCP/IP was unstoppable
 - > Experiments with RFC877 tunnelling
 - > X-windows was becoming significant
 - > The writing was on the wall
 - Threat of no more top-slicing university budgets to pay for the JNT
- JIPS
 - > JANET IP Service
 - > Pilot proved TCP/IP didn't break X.25 and Coloured Book service

JANET joins the Internet

- Backbone upgraded to 2M links
 - > Bandwidth divided 50-50 between X.25 and IP
- Tony Bates brings up 8 Cisco AGS+ in an afternoon
 - > X.25 & OSI weenies stunned
 - “It’s not possible to turn on a national network in 3 hours”
- 4 MB Transatlantic circuit to NSFnet at MAE-East
 - > Known as The Fat Pipe ... until it got clogged
 - Capillary Tube email
- Computer Science departments rejoice and switch off Coloured Books almost overnight
- Links to fledgling IP networks begin: GBnet, PIPEX, EUnet, etc.

NRS Dies

- Futility of the NRS becomes unavoidable
- NRS database flipped into **ac.uk** & **co.uk**
 - > Initially done at UKC/GBnet
 - > **.gb** ISO 3166 code sort of ignored
 - ... and still is!
- Nominet formed and Willie Black leaves JNT
 - > UK name space handed over by GBnet

The Hall of Fame



- Keith Farvis, Edinburgh University
 - > Made the Yorkbox almost usable
- George Michaelson, York University
 - > Superhuman efforts at polishing someone else's turd
- Piete Brooks, Cambridge University
 - > Prodigious output of useful code and utilities
- Steve Kille, UCL
 - > niftp and MMDF
- Tony Bates, ULCC
 - > JANET's first IP and Cisco engineer
- Julian Onions & William Armitage, Nottingham University
 - > niftp, MMDF and NRS processing tools
- Jim Crammond, Heriot-Watt University
 - > UK-Sendmail
- Willie Black, JNT
 - > Led pilot IP service, dragged JNT into the real world
- Bob Day, JNT
 - > Ran and still runs JANET IP service

Questions?

