LINX History

ISP Workshops

Background

- Slide set based on experiences of one founding participant of LINX
- Covers history of LINX during the 90s
  - More recent history covered well on the LINX website

LINX History

- Commenced operations in late 1994
- Located in Telehouse London
- Initial participants:
  - PIPEX
  - Uknet
  - BTnet
  - Demon Internet
  - JIPS (JANET IP Service)
- Initial Hardware:
  - 8 port ethernet hub
  - Each Operator brought a router

Why LINX?

- 4 commercial ISPs in UK
- Plus the academic and research network
- A variety of private interconnects
- But not every operator was connected to the other
- Quite often UK domestic traffic would go via D-GIX (Sweden), Vienna-NAP (Virginia) or even CIX-West!
- UK interconnection made technical sense
  - International links very expensive
  - Latency via US West Coast was 300ms+

How LINX?

- Often discussed during 1993/4
- From PIPEX perspective:
  - We had 85% of the UK market
  - Made little commercial sense for us – sales organisation strongly against peering and giving away commercial advantage
  - Uknet only partially commercial and struggling
  - BTnet still more research activity than providing commercial service – but shaping up as formidable competitor
  - Demon Internet was ex-reseller and difficult relationship
  - Private peering with JIPS

Where LINX?

- Variety of high level meetings between the network operators (mostly at CTO level)
- Some providers wanted the Exchange to be in their premises:
  - Uknet in Canterbury
  - Btnet in BT Telecom datacentre (London Telecom Tower)
- Efforts at compromise:
  - JANET suggested ULCC in London
  - PIPEX suggested Telehouse in East London
  - Discussion about “sharing the exchange”

Where LINX?

- ULCC
  - University of London Computing Centre
  - Certainly was neutral for the commercial providers
  - But unclear commercial level of service and access, not really acceptable to the ISPs
- Telehouse
  - Japanese disaster recovery company
  - East London datacentre was backup trading floor and disaster recovery for City of London financial institutions
  - “Super” redundant – power, security, connectivity
  - Not convinced about this “Internet thing”
  - But eventually the location chosen for the Exchange

The First LINX

- Equipment rack in Telehouse Datacentre
  - Contributed and installed by PIPEX
- 8 port 10Mbps ethernet hub
  - Contributed by PIPEX
- Operators brought routers:
  - PIPEX – Cisco 4000M
  - BTnet – AGS+
  - Uknet – Cisco IGS (?)
  - Demon – PC (Zebra?)
  - JIPS – AGS+ (?)
- BGP peering setup between all operators

Early LINX

- 8 port ethernet hub replaced by Catalyst 1208 switch
  - Very early 8 port 10Mbps ethernet switch, contributed by PIPEX
  - Now in London Science Museum!!
- More ISPs started joining
  - Second Catalyst 1208 joined the first one, 10Mbps link to the original switch
  - Initial group of 5 operators gave way to management board, member meetings, and restricted membership rules
  - PIPEX still did most of the technical hands-on (but each new ISP literally had to plug in an ethernet cable)

Early LINX

- PIPEX was first UK ISP to use Telehouse
  - Was very hard job to persuade them to let us in
  - But it became a very large PoP, supplementing the PIPEX West London PoP
- BT Internet moved into commercial service
  - Also set up a datacentre in Telehouse
- Demon Internet expanded out of small north London office
  - Also set up consumer access PoP in Telehouse
- Telehouse was becoming a major Internet presence in the UK
  - And were gradually realising that there might be some future in this “Internet thing”

Early LINX

- Restrictive membership rules:
  - Membership fee of £10k per year
    - Designed to exclude smallest ISPs
  - Own independent international bandwidth
    - i.e. circuit out of UK to US
    - Transit was not enough
    - Designed to exclude small ISPs and resellers
  - Members had to be Internet Service Providers who provided UK Internet access
    - Designed to exclude content providers (eg BBC, Microsoft)
    - Designed to exclude international operators with no UK presence

UK Internet impact

- Telehouse became less of financial markets disaster recovery, and more of Internet datacentre
  - Impact on Telehouse's wider business (New York, Japan)
- LINX membership rules simplified once UK Telecoms regulator took note after complaints from the excluded
- After that:
  - LINX grew faster
  - Bigger variety of operators joined
  - Transit providers (eg UUNET, Sprint, PSInet etc) turned up to sell transit in the UK

Today's LINX

- One of the world's biggest IXPs
- Multiple sites across London
- Industry leading Ethernet Switches
  - Double ring topology
  - Two vendors (Juniper and Extreme)
  - Connections from 100Mbps to over 10GE
- Over 300 network operators present
  - One of the "go to" peering points in Europe
- LINX organisation
  - Not-for-profit
  - Technical and operational staff

Conclusion

- LINX was major enabler of Internet growth in the UK
- At least three of original founders believed they'd lose commercially
- In reality all three grew rapidly as local peering unleashed the market
  - Local content
  - More smaller providers
  - Richer interconnections
  - More datacentres
  - More opportunity