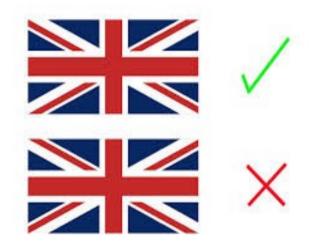# Great British IXP Failures

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Sheffield
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SMOTI Enterprises Inc.

Speaker's Background

- Internet operations and development since 1986, co-founder of:
    - UK's first commercial ISP, *PIPEX* (CTO)
    - London Internet Exchange, *LINX* (CEO)
    - *.uk* TLD registry, *Nominet UK*
    - *RIPE NCC* Executive Board (Chair)
    - *UK Network Operators' Forum* (Chair)
  - Moved to US 2006:
    - Internet Systems Consortium (VP Engineering until 2012)
    - DNS-OARC (President)
    - UKIF/UKNOF (Managing Director)
    - Open-IX (Board)
    - IIX (Advisory Board)
    - SMOTI Enterprises (Principal)

UKNOF Internet History Project

- A series of occasional talks, capturing for posterity the recollections of those who were there when the early days of the UK Internet happened

- http://www.uknof.org.uk/history.html

- *"It is clear that the Internet has changed society fundamentally, perhaps as much as any of the Telephone, Television, Aviation and the Automobile. It is also clear that the key changes which caused the Internet to emerge into widespread use happened during the 1990s. On this basis it seems that records of these events may be of interest to future historical researchers."*
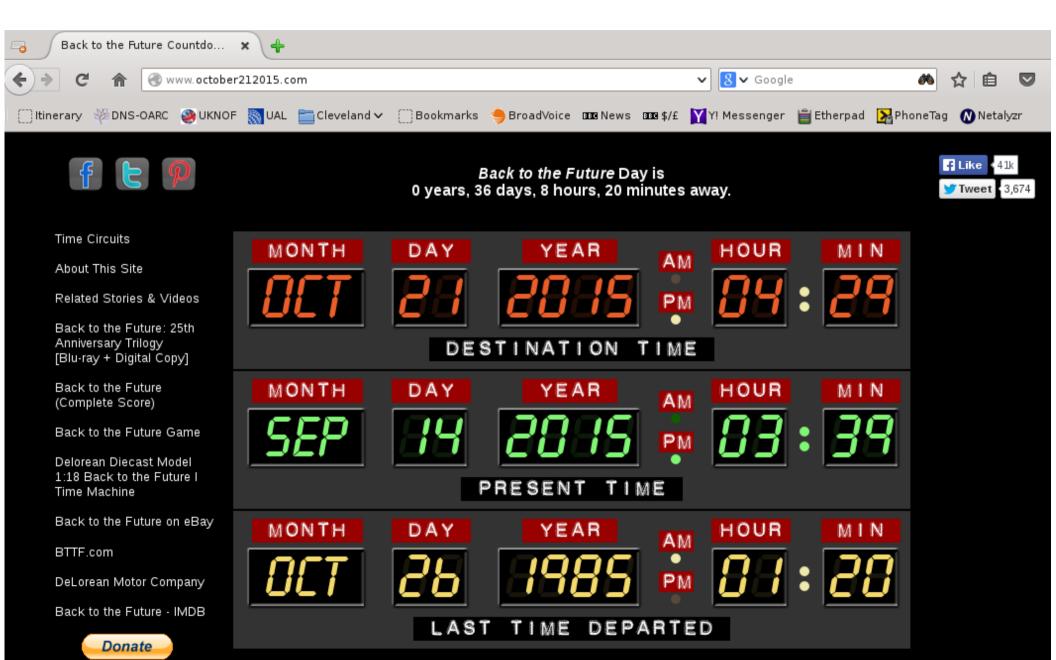
Disclaimers

- The observations in this presentation are my personal ones, and **not** those of UKNOF, Open-IX, IIX, or any other organisation with which I am affiliated

- Any errors or omissions are down solely to my ageing brain

- Some of the events related were quite emotionally charged, I've never taken any of it personally, and suggest you don't either..

- *Successful* UK IXPs are explicitly out of scope for this talk

I've been doing/watching this IXP stuff for a while....

- i.e. it's a decade past time I gave a history talk, where to start ?

- The UK has for 2+ decades been world-leading in Internet Exchange innovation, operations and governance, home to some of the largest and best run IXPs globally

- I am proud of my contribution to this, especially LINX

- This has not been without a few bumps along the way however, and the count of failed exchanges to date is higher than the successful ones.

- This talk reviews the history and some experiences of the various more or less well-conceived and resourced failed British IXPs, and attempts to arrive at some lessons about how **not** to do it

Watch for a Flying DeLorean..

Before the Wayback Machine: 1997, London

- i-Exchange was a non-neutral entry-level IXP set up in Telehouse North to cater to ISPs for whom the barrier to LINX membership was too high

- Run and hosted by Bactel, sharing a rack with their ISP business

- Unfortunately, Bactel got some or all of its international transit by stealth tunnelling over other ISPs' backbones between LINX and MAE-East

- In terms of IXP abuse, quite leading edge for its time...

i-Exchange

- 3 LINX member ISPs detected the abuse via NetFlow

- LINX and Telehouse took collective action to avoid risk of criminal liability, and shut Bactel's rack and peering down

- Unfortunately this also inadvertantly closed down IXP and hosting service for various innocent parties peering on i-Exchange ☹

- Largely this same community of ISPs went on to set up LONAP, doing an entry-level IXP the *right* way...

- The whole incident was valuable input for the much-copied LINX MoU

1998 onwards: Manchester

- Many IXPs have risen and fallen in Manchester
- I don't claim to know all the intimate local details, but the one I was most closely initially involved with was MaNAP
- Pre-MaNAP, there was something called MINX, but that seemed to be more of a London/Manchester backhaul/transit-buying consortium than a true IXP, per se
- MaNAP emerged out of U of Manchester Computing Centre, Mike Kelly instrumental in this

MaNAP

- This was a well-founded attempt to set up the UK's first autonomous regional IXP, following the LINX model very closely

- Migrated from U of MCC to first TeleCity facility

- Had issues gaining critical mass, in particular did not gain peering from major UK backbone operators such as BT and JANET

- Eventually subsumed into NWIX

MaNAP Successors

- NWIX, don't know exactly how this failed, but it still owes £1000 sponsorship from UKNOF7 !

- MCIX, set up at MCC/IFL data centres competitive with NWIX

- EdgeIX subsumed MaNAP, injecting some public money

- ENLIX and GB-IX set up in mid-2000s as response to dissatisfaction with MaNAP/NWIX/EdgeIX

- NWIX acquired by Ask4 by Allegro by IIX

To Scotland..

- In theory the longer backhaul distances should make a stronger sustainability case for a Scottish National IXP
- In practice Scotland has very little telecomms infrastructure autonomy from the rest of the UK
- But in 1998, we were still in the first round of attempting UK regional IXPs, so it seemed worth a try
- Initial discussions spurred by RIPE31 in Edinburgh
- Various initial stakeholders including Scottish Development Agency, Scottish Telecom

Scot-IX

- My vision was of another autonomous, ISP and co-lo neutral, membership-based IXP following the LINX model closely

- In practice there were no suitable data centres in the country

- An RFP was issued by the various stakeholders to encourage bids, investment and construction from interested DC operators to host the IXP

We Scots love Schisms !

- Two serious bids, from TeleCity and ScoLocate
- Some bidding conflicts of interest made things complicated
- Scot-IX nonetheless launched on time, ribbon cut by Deputy First Minister, initially in bank data centre with plan to migrate to TeleCity Edinburgh
- Two data centres built within a mile, each funded by the two biggest then-Scottish banks (BoS, RBoS)
- Scot-IX RFP losers (ScoLocate) went ahead and built their own IXP (World-IX) anyway

Great Scottish IXP Failures

- IMHO, a single neutral IXP spanning the 2 data centres would have been a better solution than the "Old Firm match" we finished up with

- A market probably not large enough to support a single IXP was split, and worse, both lost all the advantages of critical mass

- Union-IX (http://www.uknof.org.uk/uknof1/McKay-UIXP.pdf) was an attempt in the mid-2000s to build a consolidated Edinburgh/Glasgow inter-metro IXP

- So as well as founding the UK's most successful IXP, I also got caught up in the largest British IXP failure

- Biggest mistake of my career !

- Like many things Internet in the run-up to the 2000 dot-com bubble, it seemed like a good idea at the time....

Dotcom Boom vs Mutual Membership

- Mid-2000, huge amounts of money were pouring into the data centre business

- Investors saw it as a "foolproof" real estate as well as tech opportunity

- Pressure was being put on LINX and other neutral European IXPs to grow and change faster than their mutual membership, non-profit funding models, and communities would allow, threatening their relevance

- Was there some way to bring commerical funding and flexibility into the IXP space ?

XchangePoint Vision

- Commercially-funded, but neutral
  (like commercial data centre operators)
- Operate multiple IXPs in major European cities:
  - each standalone, not interconnected
  - same service offering at all, one-stop shop
- Simple, non-member apolitical customer relationship
- Commercial support and service levels
- Meet demand from US ISPs

How not to do a commercial spin-off start-up

- £6M was raised from 2nd-stage VCs by a subset of LINX Directors

- Derisory offer made to de-mutualise/acquire LINX, badly communicated

- Enough funding to go pan-European was conditional on LINX acquistion (except nobody actually told the executive team that)

- Major traumatic split of LINX Board and Staff

- So we finished up trying to build a start-up head-to-head with our biggest best competitor in the aftermath of the dot-com bust

Doing it the Hard Way

- Despite all this, by 2004 XchangePoint had:
  - Achieved comparable market penetration (200 customers) and total traffic to LINX in London
  - Opened in Amsterdam, Frankfurt, Hamburg
  - Raised second £6M funding round
  - Pioneered inter-IXP interconnection with LONAP
  - EBITDA positive
- Then came "Extreme-rot", major shared memory issues on our entire switch platform just as we were trying to upgrade to 10Gb/s ☹
- XchangePoint sold to PacketExchange thence to GTT

Vision vs Hindsight

- Some XchangePoint things regarded as heretical for IXPs in 2000:

  - Operating multiple non-connected IXPs in multiple cities/countries

  - Pan-European one-stop-shopping

  - Layer 1 private interconnect

  - Point-to-Point VLAN services over switch fabric

  - Customers who are not members

  - SLAs

- All of these now on offer from many major mutual IXPs

- Neutral but commercial IXP model seems to have most traction in Japan (JPIX, JPNAP)

Elsewhere in London

- LIPEX:
  - entry-level IXP across many data centres, using enterprise-grade switches
  - seemed to have a lot of stability issues
  - http://www.uknof.org.uk/uknof1/Malialis-LIPEX.ppt
- Single-DC IXPs:
  - http://www.uknof.org.uk/uknof3/Golding-RBIEX.ppt
  - http://www.uknof.org.uk/uknof3/Farmer-SovEx.pdf
- Experimental:
  - UK6X (BT)

Observations, Lessons Learned

- Building IXPs is all about *community* building
  - this takes years, not weeks
- No amount of investor capital or public sector support will help you if you don't get that right
- Don't piss off or split your entire stakeholder base on day one !
- IXPs do not magically create the base level of infrastructure needed to support them
- The technology component is the easy part
- Being an ahead-of-your time visionary does not always equal success...

Observations, Lessons Learned

- Even in the non-profit world of IXPs, there's a balance between competition, co-operation and innovation
- There is an overhead that goes with building a pure non-profit, neutral membership association
  - This may set the sustainability bar too high for smaller IXP capture areas
  - But where they succeed, seem to be more stable in the long term
  - Data center neutrality is hard when the local market base is small
- Euro-IX has been a great community based-answer to many issues of IXP viability and co-ordination
- The case for UK regional IXPs remains open,
  I wish the current generation well

Questions ?

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