The Real Cost of Public IXPs

Where is the innovation?

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A tremendous amount of innovation..

- ATM, FDDI, Ethernet - 56 Kbit/s -> 100 Gbit/s
- Decentralized the Internet
- PCH Lists 771 total IXPs, 454 active
- You’re not here for an IXP history lesson

A moment of pity and a disclaimer...

I read a LOT of marketing glossies

Annual reports

Budgets

Price lists

10K’s

And spent hours with archive.org (Thanks, Wayback Machine!)

But not all data could be 100% complete: what is here is accurate.

Data...

- Easiest to hardest to find information (in order):

  AMS-IX

  LINX

  DE-CIX

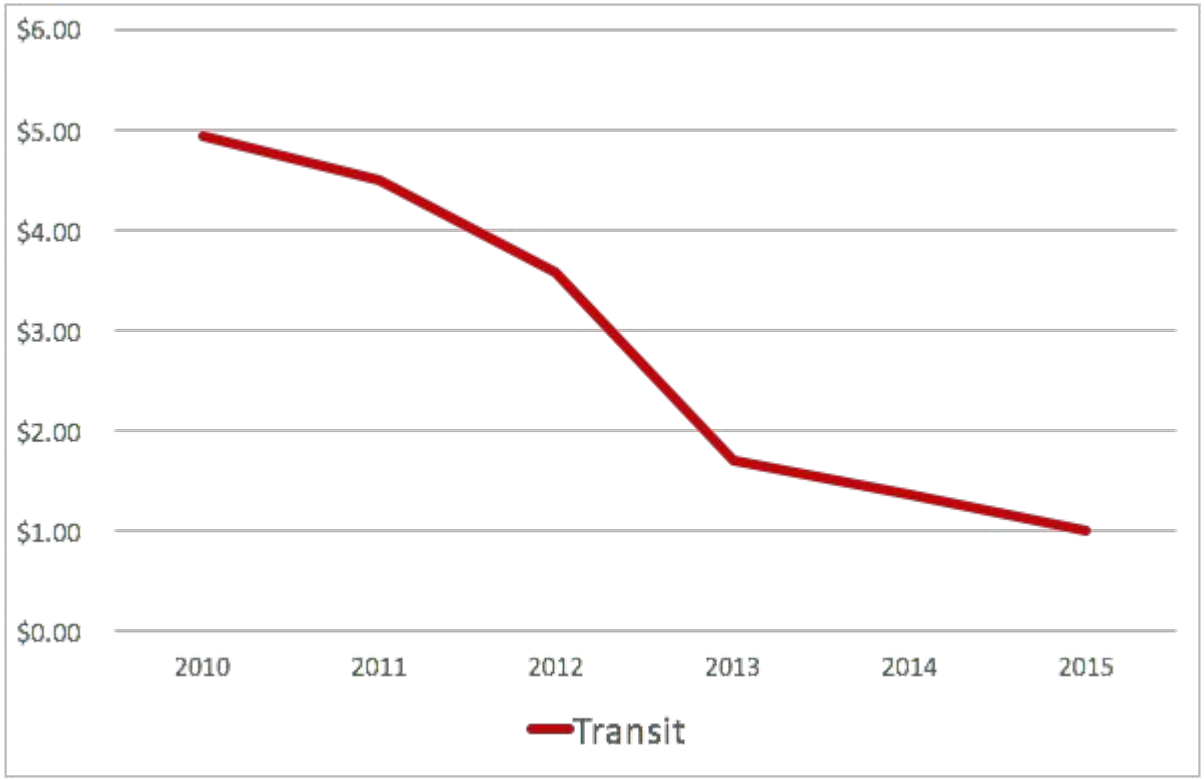
  NetNod

Special thank you to AMS-IX: Your commitment to transparency made your stats easy to find

Currency

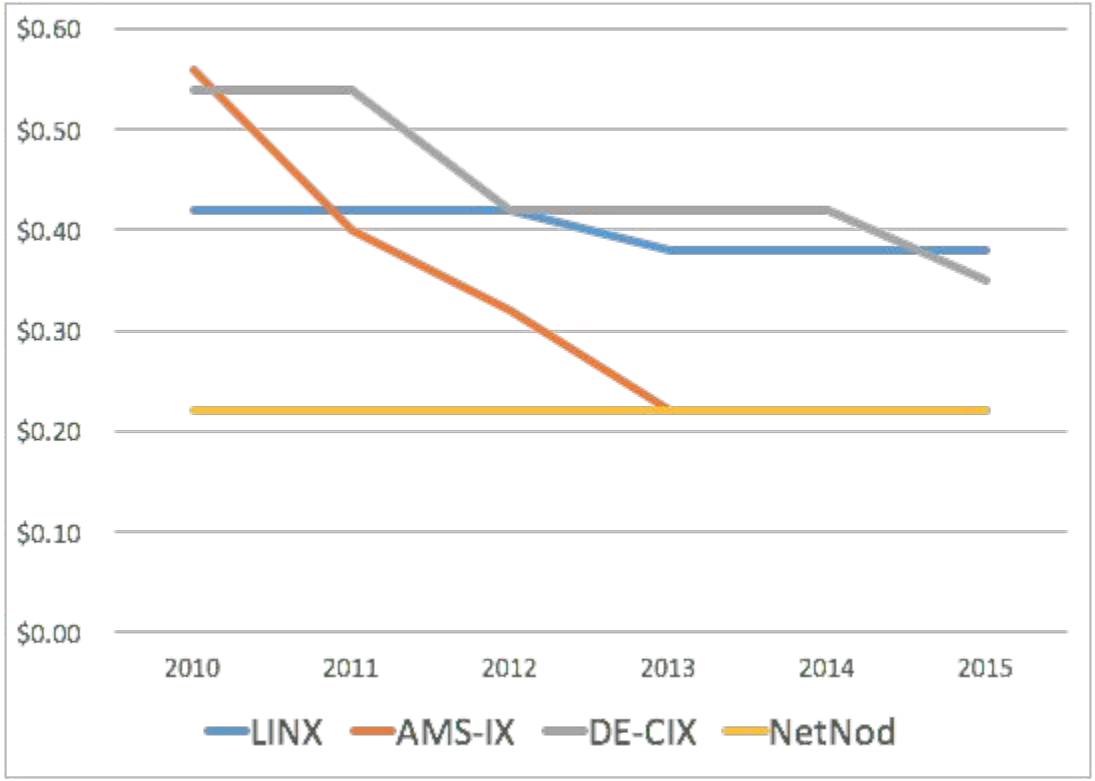
- I’ve chosen to denominate in USD
- All currency conversion rates are current
  - I spent a lot of time thinking about backing into legacy rates using historical data
  - But my benchmark is against a USD-denominated transit purchase
- The trends remain the same; the underlying cost of infrastructure (hardware, fiber, etc.) is generally pegged to the dollar

Transit Pricing (London; source Telegeography)



Transit pricing landed at just under $1.00 at the end of 2015 for a 10Gbit commit

Peering Around Europe



At the end of 2015, the average IXP port price, loaded at industry average (40%), was $0.29/Mbit

IXP Corporation Types

While there may be various holding companies shielding ownership, at the end of the day, the IXPs represented in this presentation are:

- AMS-IX: Not-for-profit
- DE-CIX: Private, For-Profit
- LINX: Not-for-profit, member mutual
- NetNod: Private, For-Profit

Let’s not argue about whether transit is better than peering…

Because, obviously, transit is.

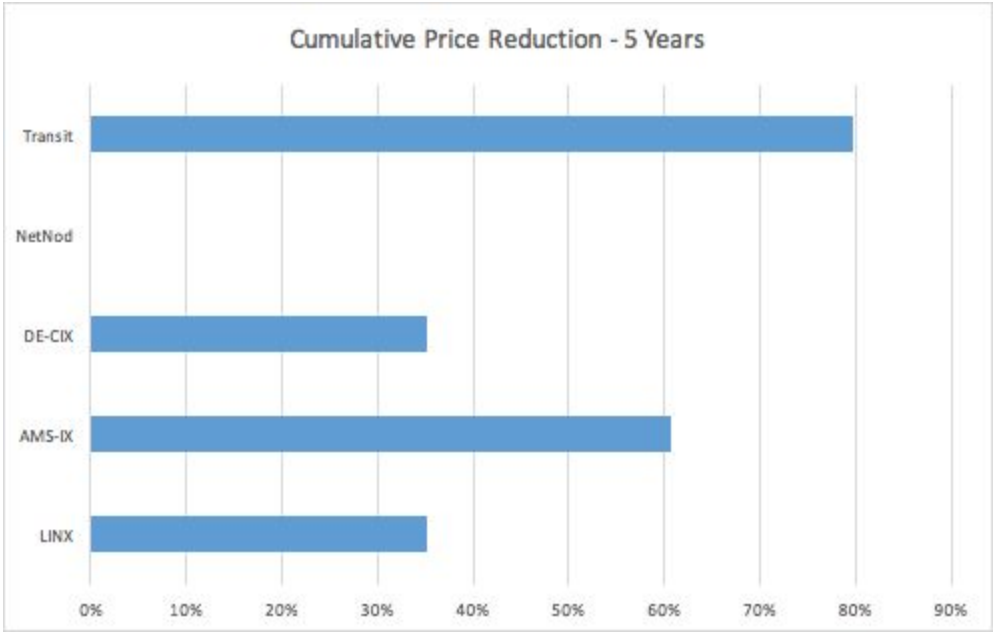
I don’t have to explain it to this crowd

But IXP costs are only a small part of traffic delivery

- We know those transit costs are likely inflated - customers of scale don’t share their pricing openly
- Transit removes the complexity of being present on 4+ exchanges
- Transit covers your non-localized traffic
    - It comes to you

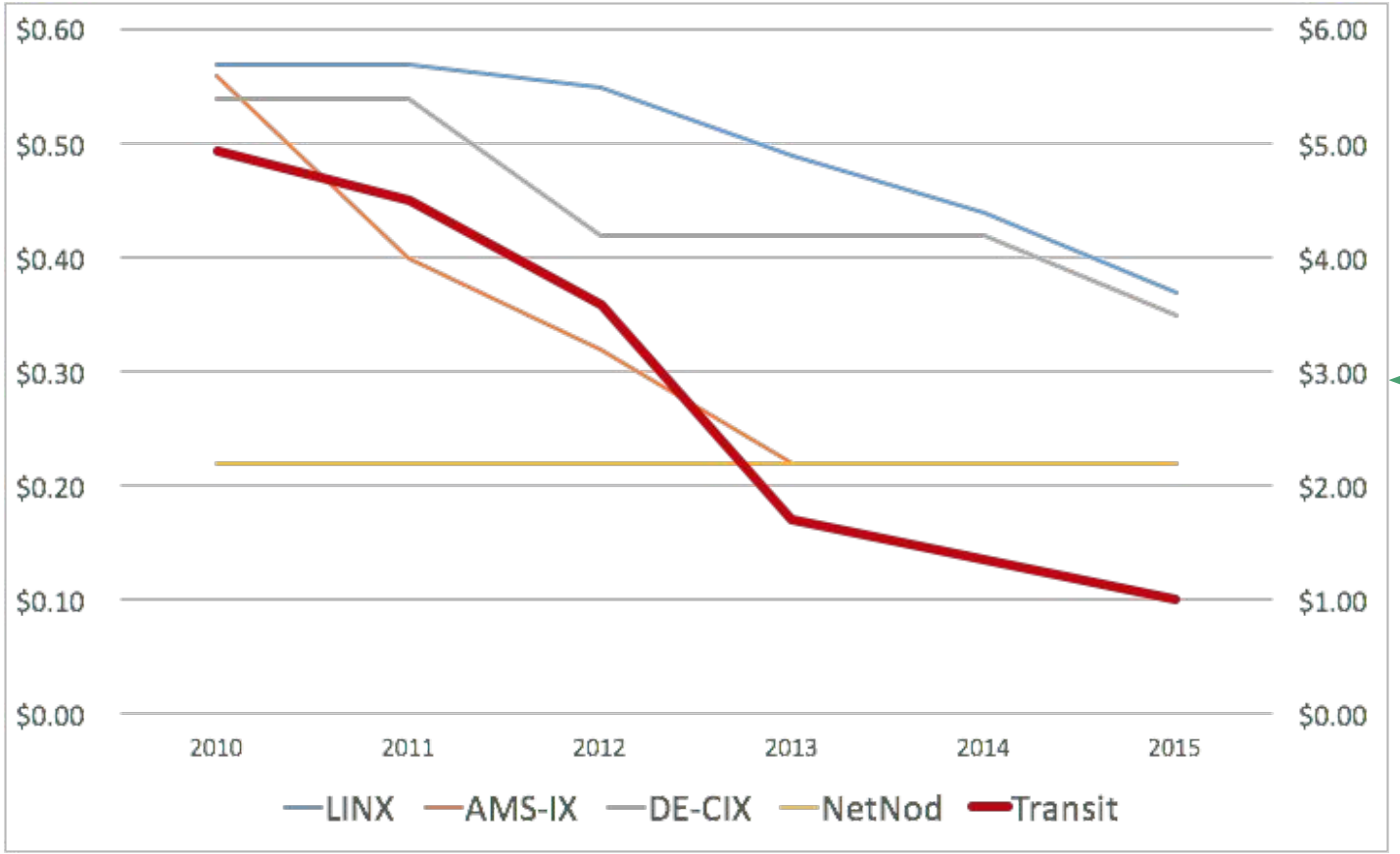
And most importantly: For transit providers who peer, they have already factored the underlying cost of IXPs into their price - and engineered around them.

What’s up with this, NetNod?



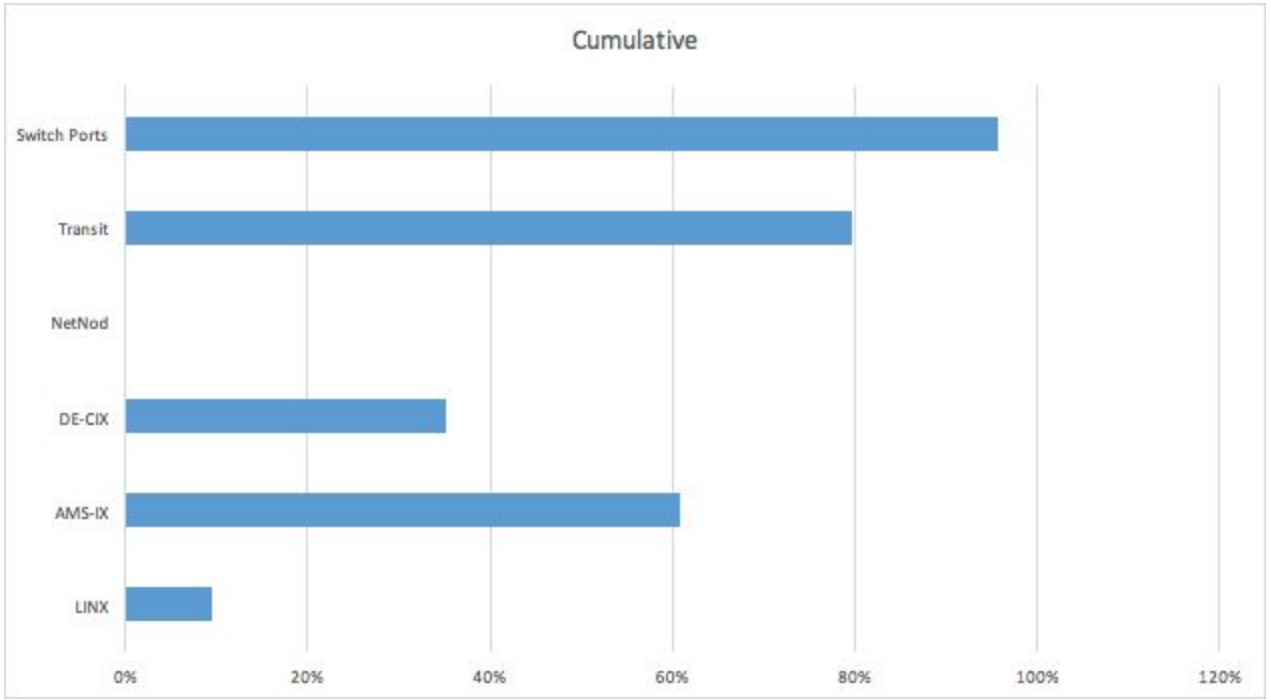
Transit continues to outpace IXP Ports

IXP



Transit

Underlying Costs.. Is it the hardware?



Switch ports are 90+% cheaper in 5 years.
Definitely not

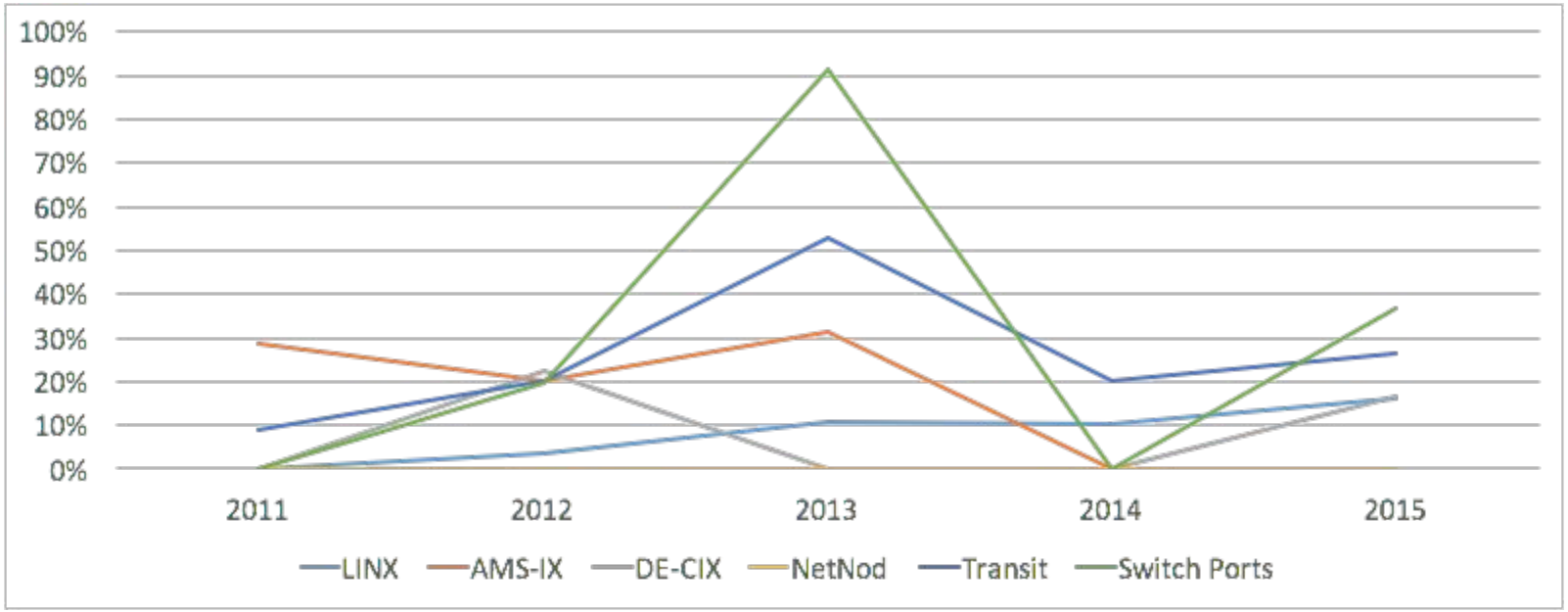
If not, why not...

- Fortune 100 companies are running their networks on whitebox hardware - including carriers
  - Why can’t IXPs?
- Many large, successful IXPs run on inexpensive switching platforms
- BERs no longer needed (Big Expensive Routers)
  - All features needed for modern IXPs present in Arista

I hypothesize that failure to innovate and an over-engineered product suite (Keeping up with the Joneses) is to blame.

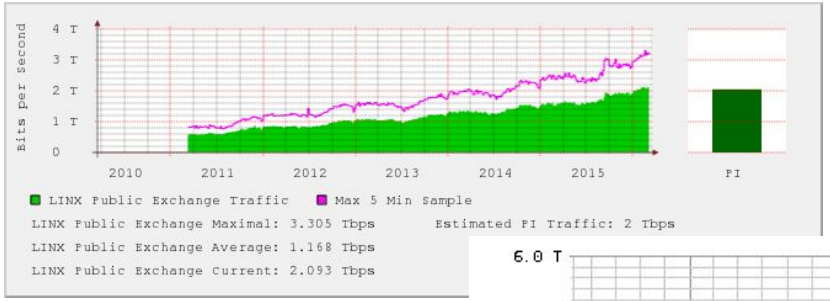
Would you take a 50% MRC cut to not get PVLAN service? I would!

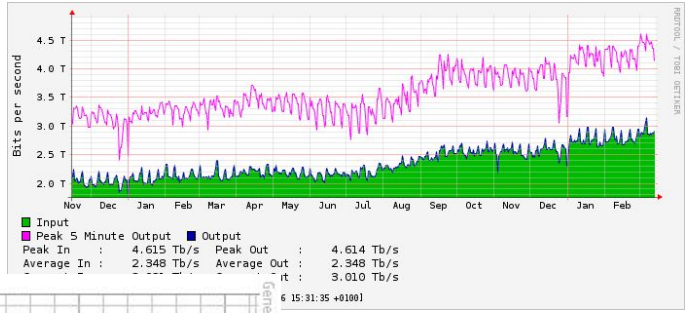
2013 was the only year of significant correlation...

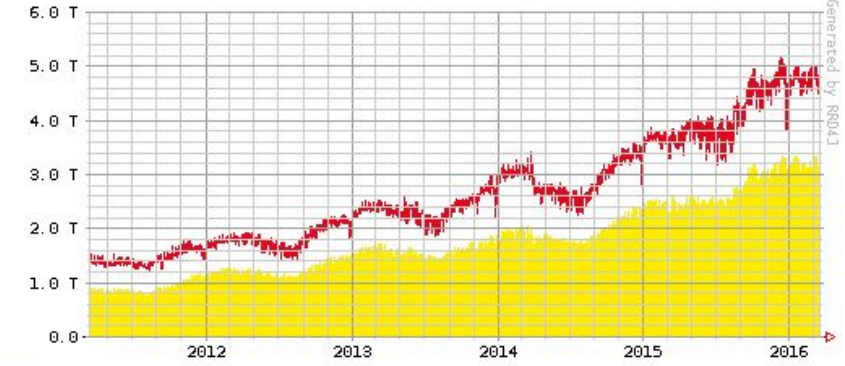


Year over year cost reduction for ethernet ports capable of standard IXP feature sets

Traffic continues to grow, as does scale…







So why are our costs, as members, not steadily decreasing with scale*?

* Customers without scale have seen promotions such as free 1G ports, etc.

Let’s talk about a few reasons...

1. Technology Innovation
2. With extended scale, comes extended staff
3. Extended marketing
4. International expansion

This...

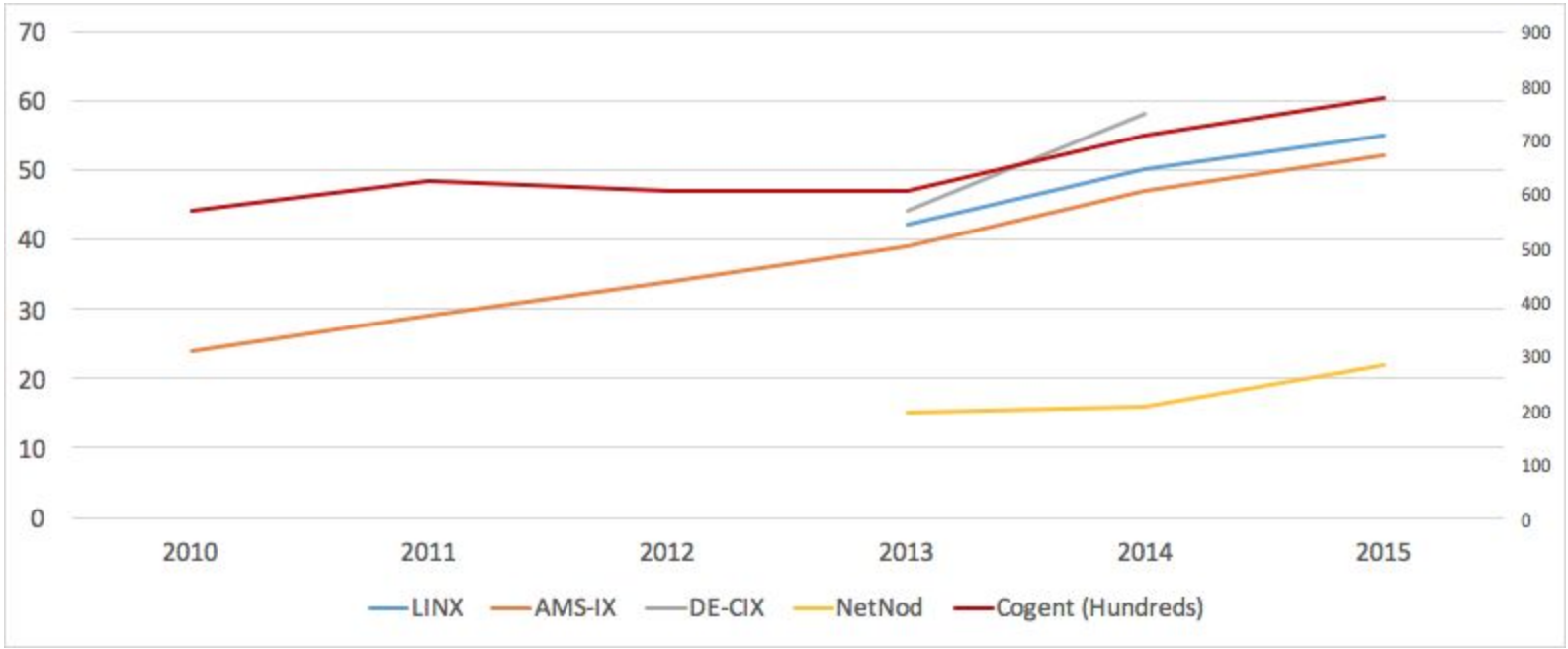
Now fits in less than this...

1/4 the power consumption
1/4 the space
Most importantly: 1/4 the price - for better density

Legacy IXP functions can be implemented in software, if truly necessary.

Headcount

It’s tracking the industry (but skipped the correction)…



Look around you…

- You paid $300 to sit here and watch me speak
  - I consider that a bargain
  - I didn't even show you any cat pictures
- There's approximately 200 people here = $60,000
- The total event budget is approximately $300,000

The fine sponsors of this program spent at least $240,000 of their marketing budgets to get here.

These events are valuable, but they come at an operational price.

All of the other events…

(Not an exhaustive list, just an exhausting list)

NANOG

CEE Peering Days

capacity

Middle East, Balkans, LatAm, North America, Europe, Asia

APRICOT
Asia Pacific Regional Internet Conference on Operational Technologies

GlobalPeering FORUM

CARRIERS WORLD ASIA 2016

itw 2016

PLNOG
where people meet

CHI-NOG
CHICAGO NETWORK OPERATORS GROUP

RIPE

dknog

IETF

UKNOF

lacnic

PACIFIC TELECOMMUNICATIONS COUNCIL

menog
MIDDLE EAST NETWORK OPERATORS GROUP

streaming media east

AIS_Africa

hostingcon THE GLOBAL EVENT

gamescom

The cost of marketing

It’s non-trivial to break out marketing costs from some of the budgets. We will assume it’s an average of ~$1MM based on the publicly available information from some IXPs. In that case, you would have, for example:

- 62 10G ports on LINX (blended LANs) for 1 year
  - out of 844, or ~7.3% of applicable revenue
- 76 10G ports on AMS-IX for 1 year
  - out of 921, or ~8.3% of applicable revenue

How much marketing is too much marketing?

- Many of us look at an IXP as a (necessary) utility
- Utilities who don’t have competition (due to regulations) generally don’t spend a lot on sales or marketing
  - Think of your power company
    - Co-Ops create value for their members by working with, not against, other Co-Ops
- Competition in the IXP space has been mostly created by the IXPs themselves
  - Moving into already-occupied markets
- Members should have visibility into the return on investment on such activities

International expansion…

LINX NoVA

IXSCOTLAND

DE-CIX New York

DE-CIX Dallas

UAE-IX powered by DE-CIX

DE-CIX Palermo DE-CIX Marseille

DE-CIX Istanbul

It takes investment (hardware and associated build CapEx), people (technical, marketing), and most importantly, distraction from your core business.

Do we need this?

- Is the expectation of a domestic member of an IXP that their membership fees are used to further international expansion?
  - Shouldn’t an IXP be happy being successful in their home market?
  - Localization is increasing, not decreasing
  - For the member-mutual IXPs (not all of them are, like NetNod or DE-CIX), should excess be returned directly to members (similar to profit sharing)?
- When an IXP fails to gain traction, who is held accountable?
  - When do you pull the plug?

Do we need this? ...continued

- Subsidized cross connects
  - Aren't we encouraging people to leave the fabric, thereby reducing the value of scale?
- Lobbying
  - There are lots of public interest entities that spend billions of dollars a year on lobbying
    - They represent both sides of most given arguments with much bigger budgets
  - Do IXPs lose or gain credibility in markets outside of their home?

Conclusions

Let’s discuss in the panel, but…

- IXPs have not followed industry trends for consolidation
  - Instead they have grown further horizontally
- It’s time for cost innovation in the IXP infrastructure space
- There’s an open question as to how much say members should have in the re-investment (or return) of their money

and

- IXPs are hugely valuable
- Peering is hugely valueable
- Moving to PNI is inevitable unless IXPs fix this