

The Real Cost of Public IXPs

Where is the innovation?

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NANOG 67
Chicago

This talk

Is...

- Designed to be interactive
 - I will probably let you interrupt to ask your question

Is not...

- an exhaustive comparison of every IXP on the planet
 - Job Snidjers has done a breakdown of European pricing at <https://goo.gl/1DyKFk>
- an invitation for ad hominem attacks
 - I will cut you off if you rant and/or attack me or another person

Let's keep this light.

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

I also gleaned from various confidential sources, some of which chose to stop communicating with me once they learned what the data would be used for.

An example...

As a LINX member, I asked for the detailed LINX budget.

The answer was:

“For various reasons such as not allowing our CAPEX budget to get exposed to vendors and weaken our negotiating position, this is not a line item summary.”

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

I don't often quote Martin Levy

“We need to figure out how to regulate ourselves before a much more unsavory group of people comes in and does it for us”

GPF11, April 2016

Or Richard Steenbergen...

If IX's want to funnel their profits into drinking and social events rather than reducing pricing, that's certainly their option. In fact one might even call it a smart use of the funds given a rational assessment of their primary customer base, a bunch of small networks who don't and will probably never realize that the economics of peering have long since passed them by.

But in the face of lack of competition and demand to do better they're just doing what any rational business would do, make their costs more efficient over time and pocket (or drink) the profits. And there will probably always be a couple of hundred networks out there who are willing to keep funding the drinking and social events, so it's not even a failing business model.

IXP Corporation Types

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

- Non-profit (the minority)
- For-profit
- Non-profit owned by a for-profit (prevalent)

Non-Profit?

LINX made \$2.32MM in profit last year

- Board members are compensated \$22,000 per year (pretty good hourly rate if you ask me!)
- Board chair is compensated \$44,000 per year

AMS-IX, without depreciation, turned a \$4.1MM cash profit in 2015

The “Member” Model - what is it?

- Votes are non-binding
 - They are simply an advisory to the board
- In some cases the board itself is non-binding
 - They simply function as an advisor to the corporation

Is Membership Better?



Or when we think member, are we really thinking...

Co-Ops, or 501(c)(12)'s

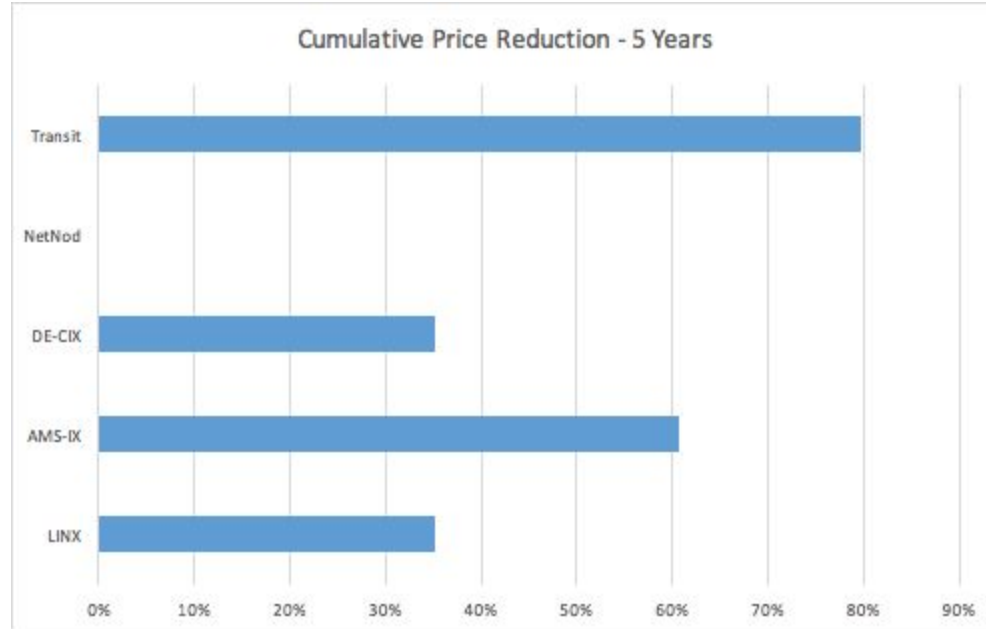
These organizations must use their income solely to cover losses and expenses, with any excess being returned to members or retained to cover future losses and expenses. They must collect at least 85% of their income from members for the sole purpose of meeting losses and expenses.

Membership of a mutual organization consists of those who join the organization to obtain its services, and have a voice in its management.

Let's not argue about whether transit is better than
peering...

Because, obviously, transit is.

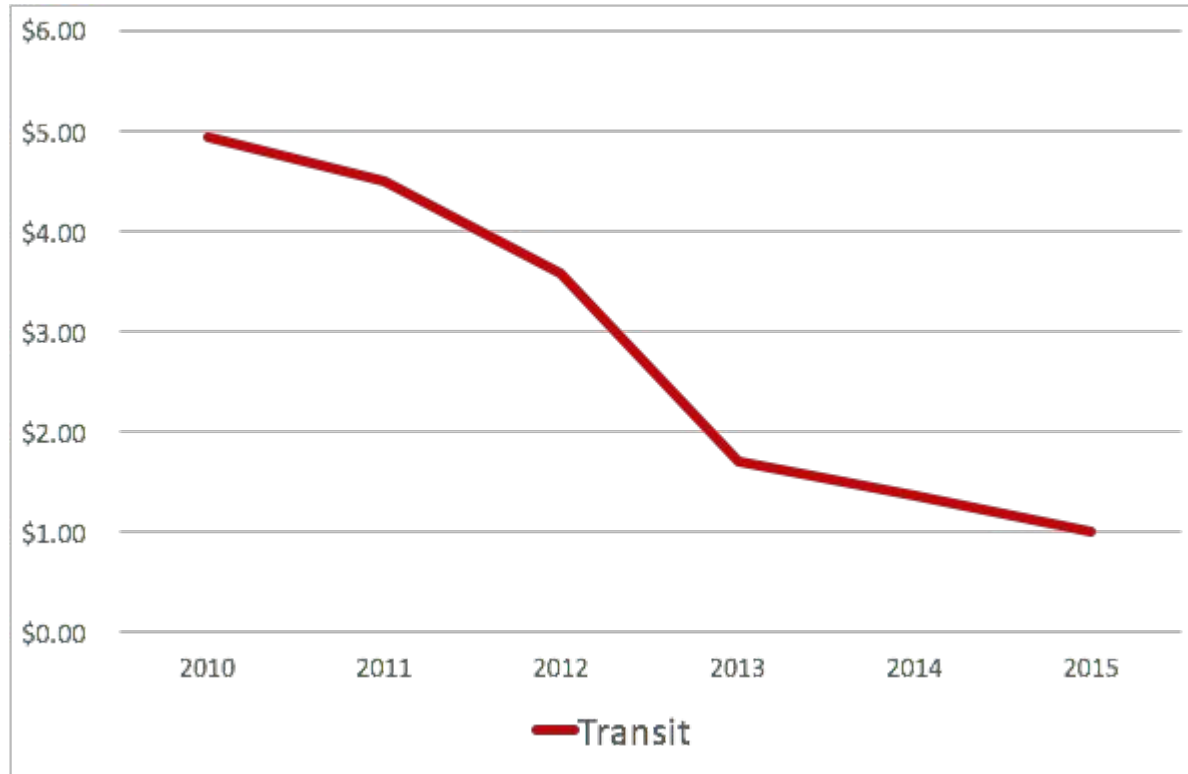
What's up with this, NetNod?



Interestingly, NetNod used to be “cheap”. Now it’s very expensive.

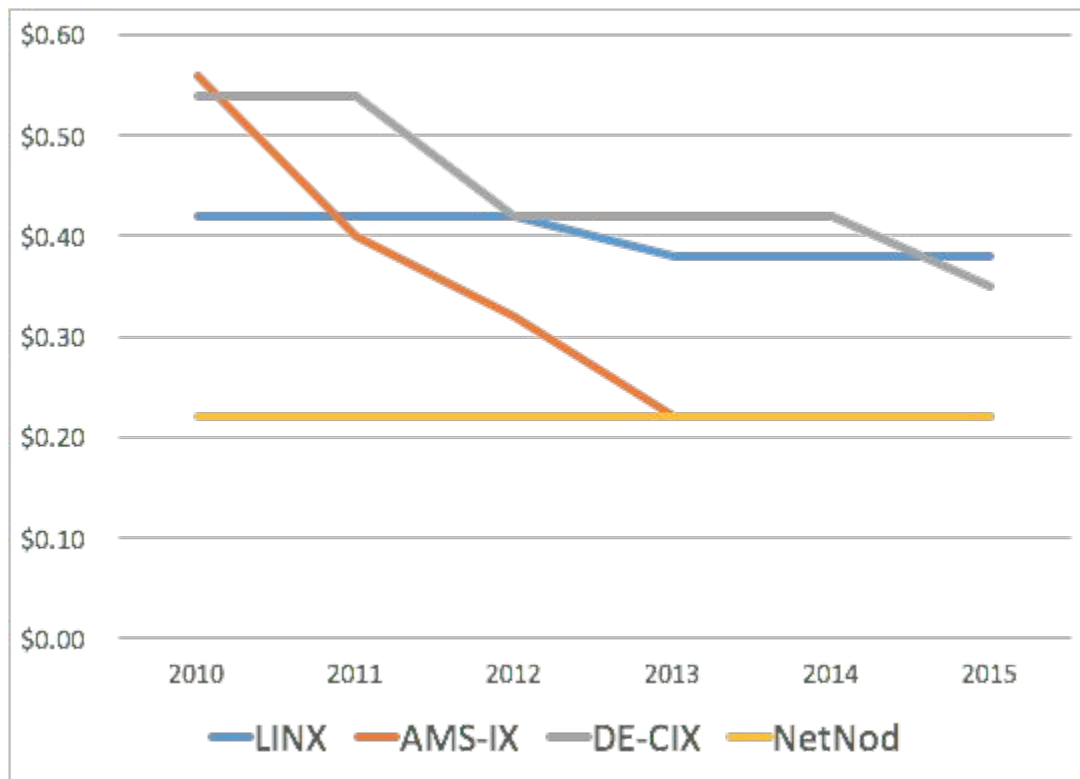
*Footnote: NetNod reduced port fees by ~5% for late 2016

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

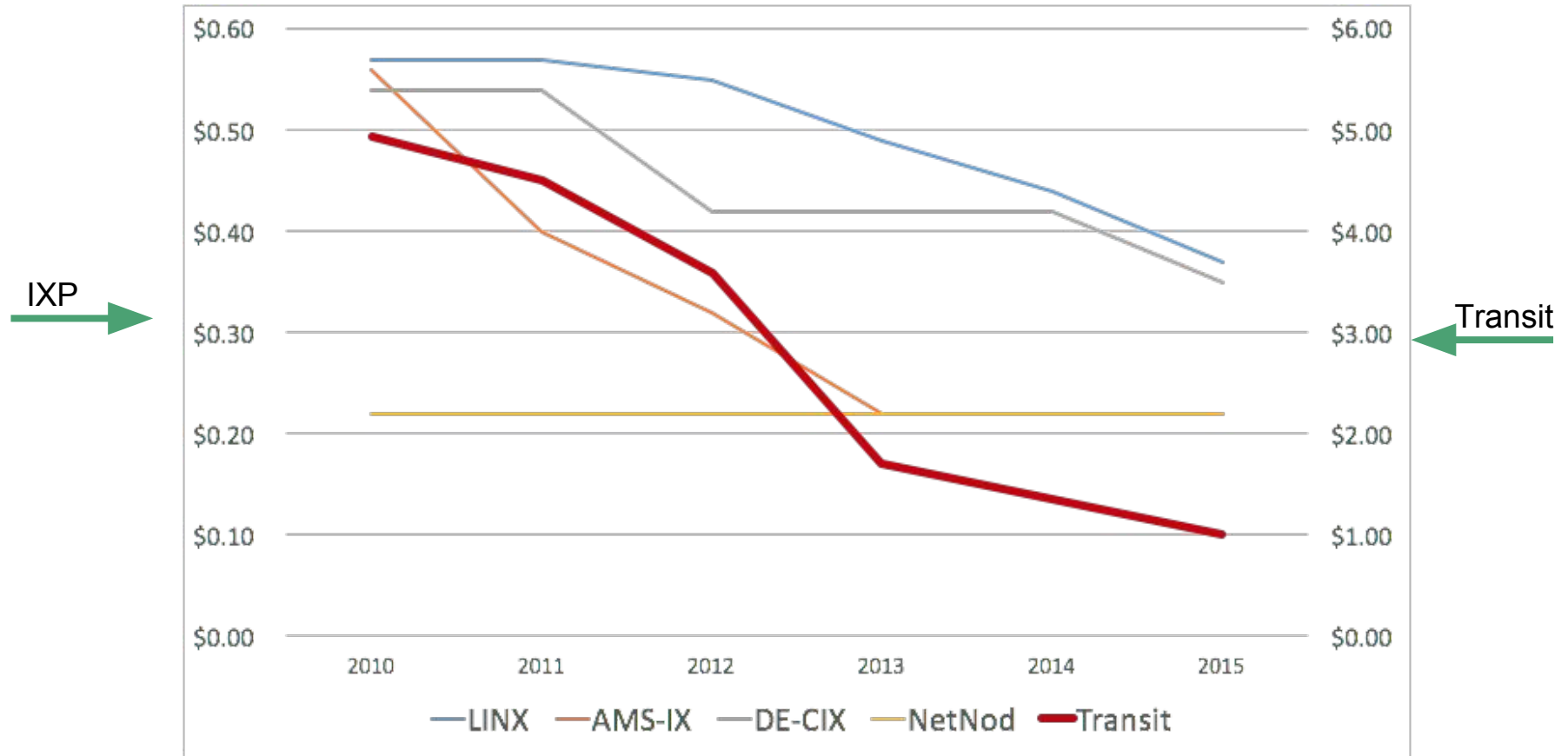
I don't have to explain it to this crowd

But IXP costs are only a small part of traffic delivery

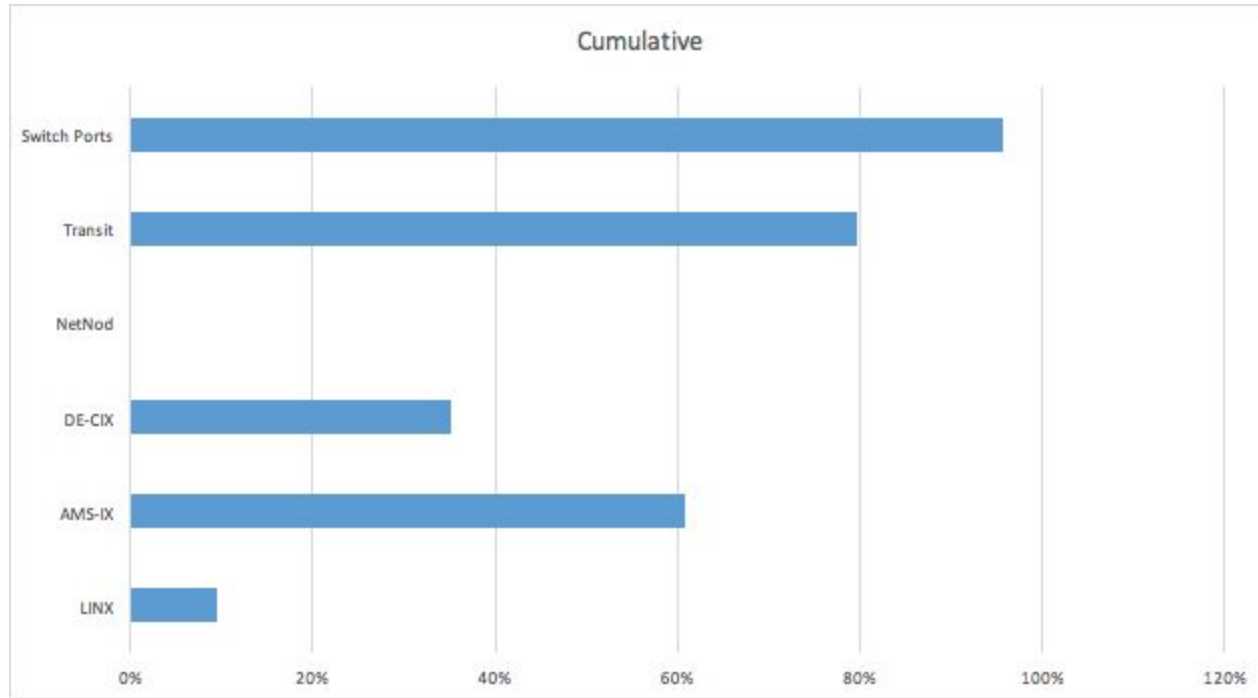
- We know those transit costs are likely inflated - customers of scale don't share their pricing openly
- Transit removes the complexity of being present on 4+ exchanges
- Transit covers your non-localized traffic
 - It comes to you

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

Transit continues to outpace IXP Ports



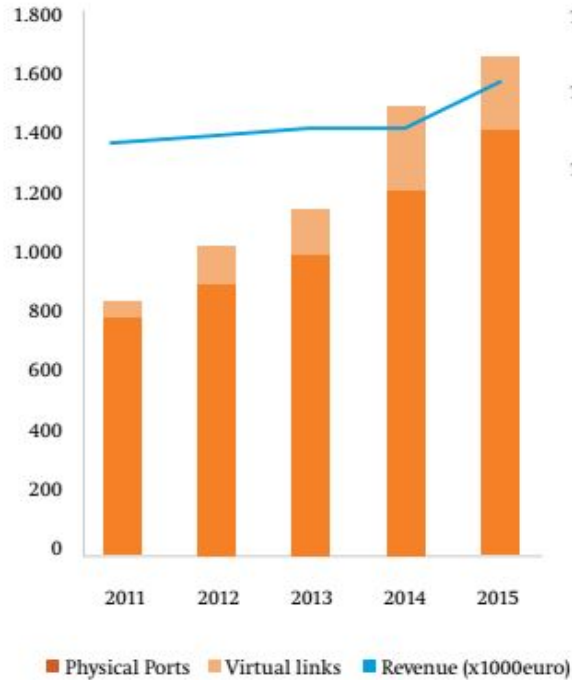
Underlying Costs.. Is it the hardware?



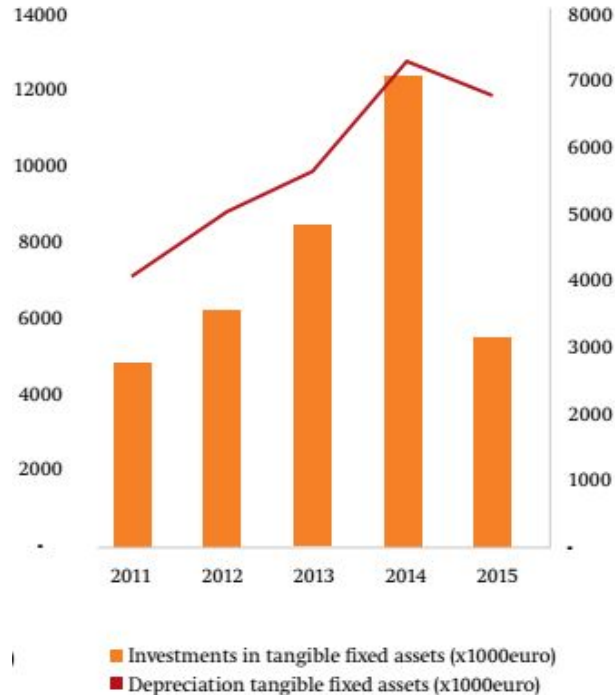
Switch ports are 90+% cheaper in 5 years.
Definitely not

Revenue continues to outpace investment...

Consolidated revenue vs ports and virtual links
(31/12/2015)



Investments vs Depreciation
(31/12/2015)



- AMS-IX announced a 5% price reduction for 2017

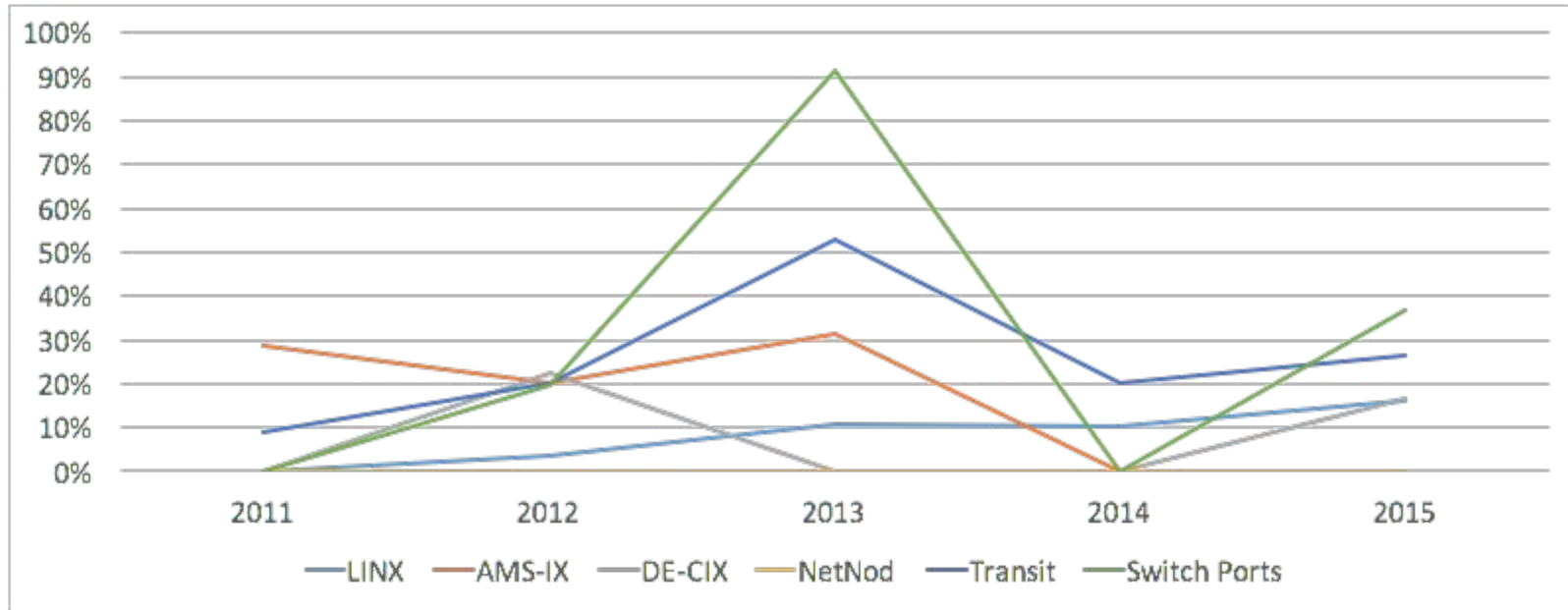
If not, why not...

- 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 Cisco, Juniper, and Arista switching

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

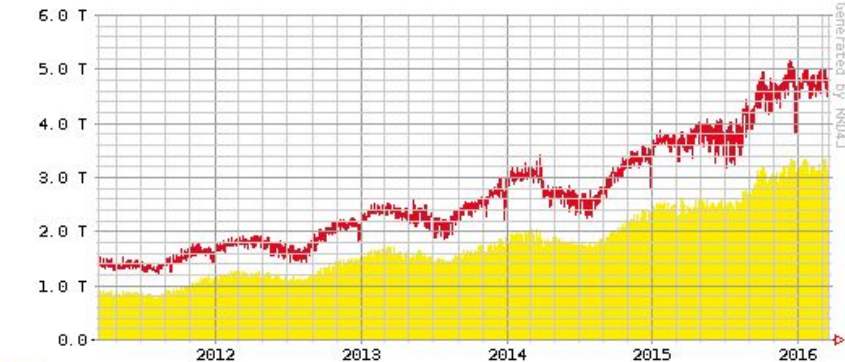
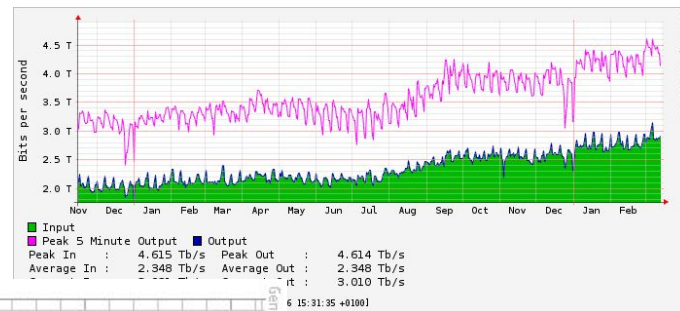
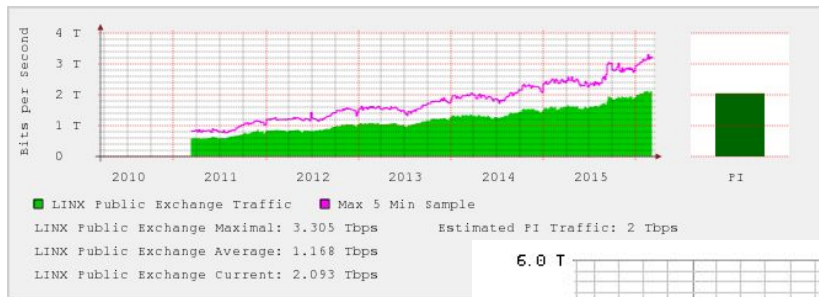
Would you take a 50% MRC cut to not get PVLAN service? I would!

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.

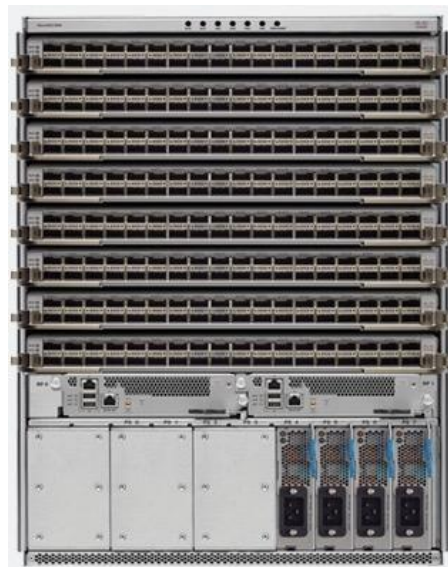
Let's talk about a few reasons...

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

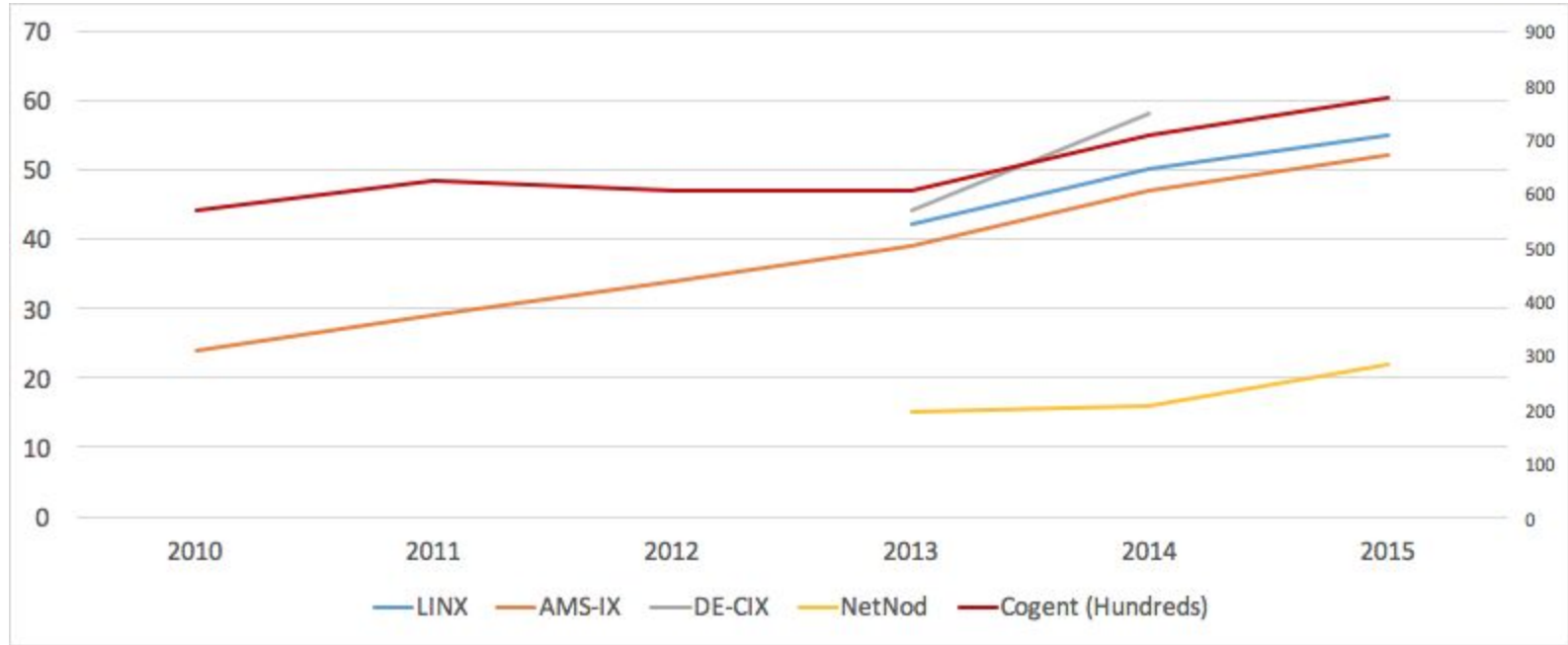
1/4 the space

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 \$450 to sit here and watch me speak
 - I consider that a bargain (I need to speak to my agent)
 - I didn't even show you any cat pictures
- There's approximately 1000 people here = \$450,000
- The total event budget is approximately \$400,000

The remainder of income from the event goes back to NANOG members in many forms:

- Education
- Outreach (NCI, Fellowships, NOTR)
- Staff salaries and travel
- Reserve for the inevitable downturn

All of the other events...
(Not an exhaustive list, just an exhausting list)



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









A very different focus..

Some of those events are just like NANOG-

Money comes in, money goes out in the form of education

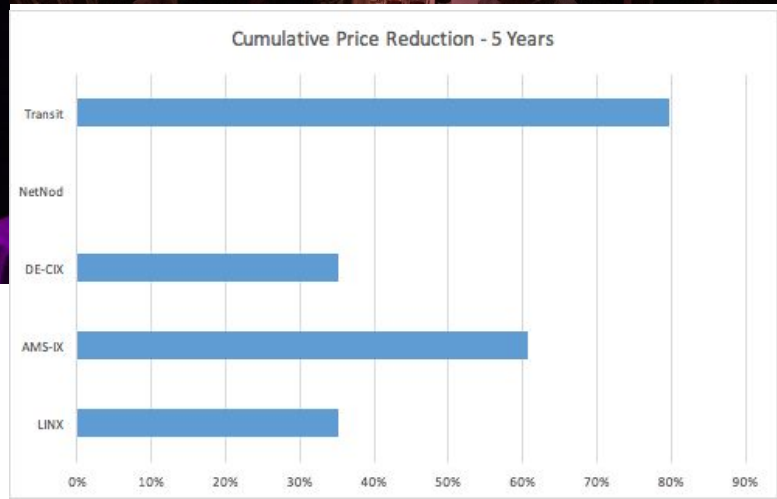
But many are there for less altruistic reasons-

Money comes in, money goes out in the form of

- Payments to commercial meeting operators
- Extensive marketing (**paid awards ceremonies**)
 - Galas and social events



Spring RIPE Dinner, Sponsored by NetNod



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

NANOG 67 Sponsors

Espresso Bar



This sponsorship cost the fees from 27x10G ports this month - roughly 3% of 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

Expansion outside of home territories...

LINX NoVA

IXSCOTLAND



DE-CIX Dallas



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

- 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
- Should IXPs be Co-Ops?

and

- IXPs are hugely valuable
- Peering is hugely valuable
- The IXP-to-PNI cycle continues to churn

Questions?



"We'd now like to open the floor to shorter speeches disguised as questions."