

Internet Exchanges in Denmark

And how to get started with peering.

Lasse Jarlskov – lasse@jarlskov.dk

About me

- Internet industry since 1999. – Various operators.



Main interest:

- "What is keeping the Internet together?"
- The invisible glue of the Internet? - Peering!

- Currently Chairman of the board at DKNOG



Overview of IX'es in Copenhagen



DIX

The logo for DIX (Danish Internet eXchange) features the letters 'DIX' in a bold, black, sans-serif font. A small red circle is positioned at the center of the letter 'X'.

NLix
The Interconnect Exchange

The logo for NLix (The Interconnect Exchange) consists of the letters 'NLix' in a stylized font. 'NL' is in red, and 'ix' is in blue with a white outline. Below the letters, the text 'The Interconnect Exchange' is written in a smaller, blue, sans-serif font.

**NET
NOD**

The logo for NET NOD features the words 'NET' and 'NOD' stacked vertically in a bold, grey, sans-serif font. A horizontal grey bar is positioned above 'NET', and another horizontal grey bar is positioned below 'NOD', with a small yellow-green rectangle at the bottom right corner of the lower bar.

SIX
STOCKHOLM INTERNET EXCHANGE

The logo for SIX (Stockholm Internet Exchange) features the letters 'SIX' in a bold, white, sans-serif font, set against a red rectangular background. Below the red box, the text 'STOCKHOLM INTERNET EXCHANGE' is written in a smaller, red, sans-serif font.

DIX



- Established in 1994
- Located at the Technical University of Denmark (originally)
- Currently operated by DeIC (Danish e-Infrastructure Cooperation).
- Government owned.
- The only (relevant) IX in Denmark for 20 years.

- Not particularly active in community building or attracting new customers.
- 2008-2012: Major community push for additional activities or privatization. With very little result.

Netnod Copenhagen

- Established February 2014
 - As an extension of the existing IX in Malmö
 - Originally branded COMIX
 - COpenhagen Malmö Internet eXchange
 - Benefits from Netnods extensive community outreach.
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- <https://www.netnod.se/news/netnod-launches-comix-ixp-in-copenhagen%21>



NL-ix



- Entering Copenhagen in November 2015
 - Originally established in The Netherlands in 2002
 - Not really a local exchange – rather an exchange with local presence.
 - Provides remote peering capabilities.
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- <https://www.nl-ix.net/feed/news/neutral-internet-exchange-nl-ix-expands-european-reach/>

STHIX



- Originally the alternative IX in Stockholm
- Positioned as the less-expensive option.
- Entering Copenhagen in September 2017
- Still only few and small players connected in Copenhagen.
- <http://www.sthix.net/index.php/2017/09/15/sthix-launches-an-ixp-in-copenhagen/>

Peering!

An overview.

0. Get caches! (if you are an eyeball network)
 - Where is my traffic coming from?
1. Peer locally
 - IX'es in Copenhagen
2. Peer internationally
 - Where to go next
3. Peer globally
 - Are you really that big? – Not covered here.

0. Get caches

Contact directly:

- Netflix
- Google (Youtube)
- Akamai (DR)
- Facebook

Will cover about 70% of an eyeball-networks traffic.

Some volume-restriction may apply. (i.e. you're not big enough!)

0.b Peer with content

Check PeeringDB (www.peeringdb.com):

- Netflix: Stk, Ams, Fra, Lon
- Google: NL-ix, Stk, Ham, Ams, Fra, Lon
- Akamai: DIX, NL-ix, Netnod CPH
- Facebook: NL-ix, Stk, Ams, Fra, Lon

1. Peering locally

Choosing an Internet Exchange

- Location
 - Which datacentres are you already in?
- Price
 - Comparison at <https://peering.exposed>
- Community
 - Who do you need to peer with?

1. Peering locally

- Connect to an IX available in your datacentre.

Datacenter	Location	NL-IX	NETNOD CPH	DIX	STHIX CPH
GlobalConnect	Hørskættten 3-5, Taastrup	YES	YES		YES
InterXion	Industriparken 20A, Ballerup	YES	YES	YES	YES
Telia Telehouse	Sydvestvej 100, Glostrup		YES		
UNI-C	DTU bldg. 304, Lyngby			YES	
Additional locations		Throughout Europe	Malmö	Skanderborg	

1. Peering locally

- Choosing an IX in Copenhagen – some pointers

IX	Estab.	Data-centres	Price pr 10G port	Noteworthy peers	Comment
DIX	1994	IX + DTU	€ 671	Akamai, Microsoft	Legacy peering-platform – not many new peers arriving.
Netnod CPH	2014	GC + IX + SVV	€ 763	Apple, Akamai, Microsoft	First challenger in Copenhagen.
NL-ix	2015	GC + IX	€ 828	Google, Apple, Akamai, Amazon, Facebook, Twitch, Microsoft	Offers international peering
STHIX CPH	2017	GC + IX	€ 469	-	New entrant to the market. Still not many peers in Copenhagen.

2. Peering internationally

Peering location	The usual suspects	Challenger
Stockholm	Netnod	STH-IX
Amsterdam	AMS-IX	NL-ix, Asteriod
Frankfurt	DE-CIX	ECIX
London	LINX	Lonap

- A. Look for partnership programs (remote peering)
 - Combines transport-service with IX-port in one subscription.
 - For low-volume peering (< ~5Gbps)
- B. Establish a PoP
 - Acquire co-location, wavelengths, IX-ports seperately.
 - Allows you to engage in private peering and get your own customers.

Check out DKNOG

- Danish Network Operators Group
 - A lot more like this presentation
- DKNOG 8
 - March 8th – 9th 2018
- Please join us
 - <https://dknog8.dknog.dk>

