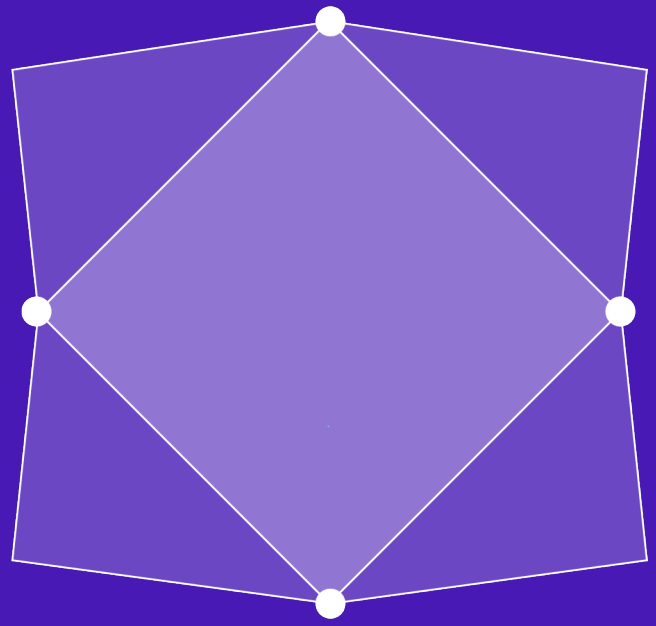
linx

The Road to 400GE



Development Challenges in a Mixed Vendor Network

Author: Mariano Juliá

Date: 9/04/2022

Version: 3

LINX recently introduced the option of 400GE ports for members in partnership using Nokia equipment.

This presentation covers why this is important, the complexity of a mixed vendor network and the development process to get to where we are today.

London Internet Exchange (LINX)

- Established 1994
- 950+ strong non-profit membership community
- Members from all major cloud, data communications, telecoms, financial, and enterprise networks
- Members located in more than 80 countries worldwide.

LINX Statistics

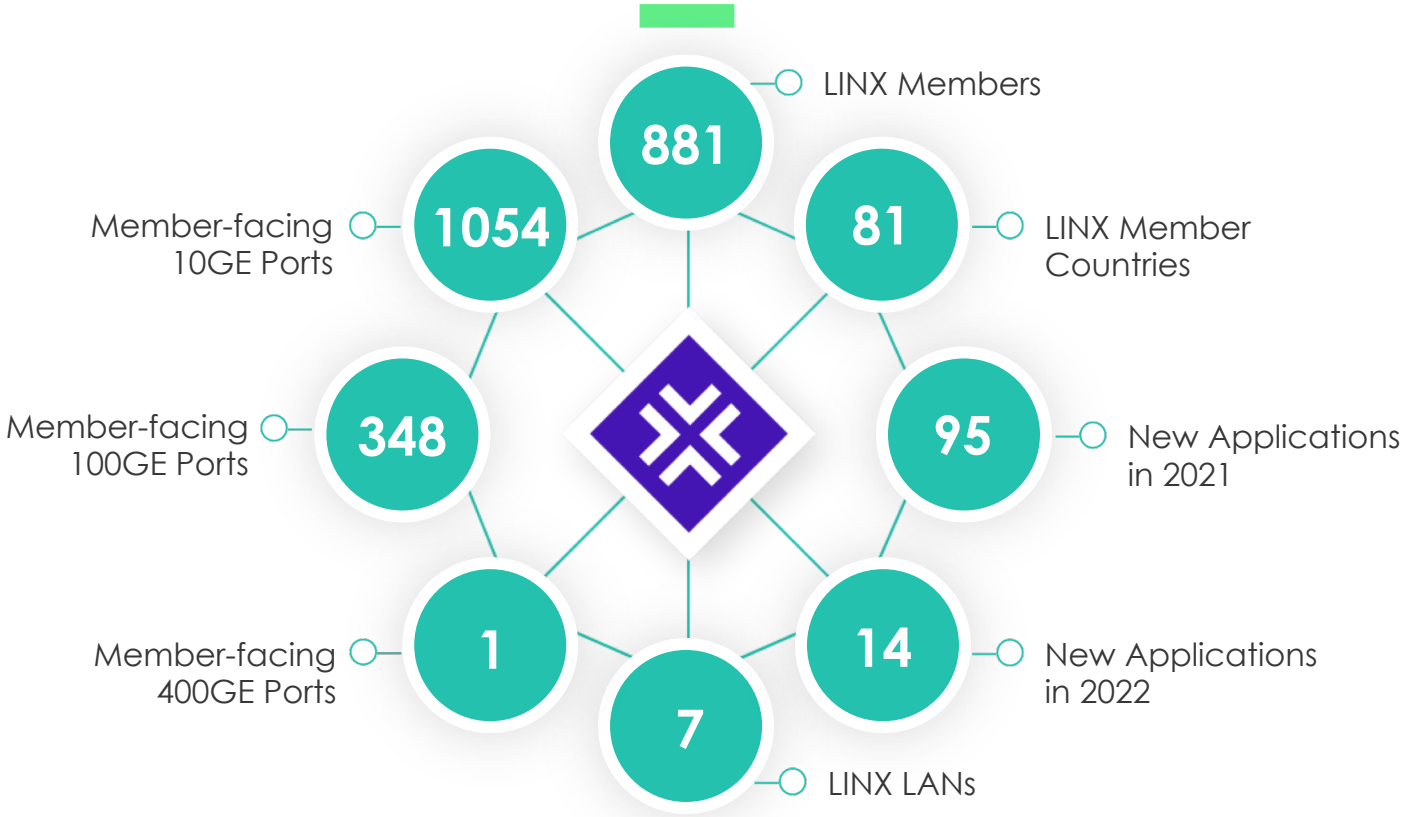
5th April 2022

1783
Connected Member Ports

997
Member ASNs

6.89Tbps
Peak Traffic

46.12Tb
Connected Capacity



Agenda

- Research Phase
- Testing
- Roll out
- Future Plans

Why LINX's 400GE Solution Matters to you

- We proved a multi-vendor EVPN network approach to get to 400GE
- Other IXPs, network designers and datacentre operators will be interested in how we have done this and what to avoid themselves.
- We learnt that working with a mixed vendor environment bring:
  - Significant challenges in testing, acceptance criteria and in-house ownership
  - Highlight problems with how standardized protocol implementation still varies
- How can others benefit?
  - Learn from our challenges

Research Phase

Key Objectives

Our most significant exchange is LON1 and we were looking to migrate from VPLS to MPLS/EVPN

In March 2020 we set out to:

- Find a long-term high-density 400GE solution that met our members needs, had a good price point and allowed us to drive a high service availability across all of our networks
- Capable of supporting LINX's LON1 (then) VPLS network and (future) MPLS-EVPN
- Capable of Integrating with LINX's Automation and management tools
- Able to offer services that can enable the full portfolio of interconnection products LINX provide

Timeline

The situation outside of LINX at this time was uncertain due to the Coronavirus pandemic

11th March 2020

LINX staff began working from home

13th March 2020

Postponement of a PoC to verify a hitless migration to EVPN on our Juniper estate

23rd March 2020

UK Lockdown begins

Pandemic Delays the Testing Process

- Difficulty testing and doing demos
  - No firm dates as to when we could visit vendor facilities, or our own, for a full-blown proof of concept
  - The world slowed down for a while
- After two months of video calls and remote presentations, we had, at least on paper, a clearer picture of the landscape

LON1 Vendor Considerations

Juniper Networks

- Juniper Networks did not, and would not, have a high-density 400GE card for the main MX960 platform.
  - The alternatives were to use the PTX or QFX switches
  - LINX was in the finishing stages of replacing the PTXs with the MX10k
  - QFX was not seen as a long-term strategic solution
  - The high-density 400GE card (12 or 24 ports) for the MX10k was still two years away

LON2 Vendor Option

Edgecore Networks and IP Infusion

- Using Edgecore and IP Infusion on LON1 would break the long-established design rule of having redundant vendors in the two London LANs
- Edgecore did not have a high-density 400GE platform that supported MPLS natively in the chipset at the same time
- IP Infusion's OcNOS hadn't been ported to any of the 400GE platforms
  - Their software integration cycles are at least six months for existing platforms and 12 to 18 months for the new ones

New Vendor Options

Arista

- Offered the highest port density
- Offered the best automation and telemetry capabilities.
- Did not support Ethernet OAM or VPLS, and both were required for LON1
  - Note: The migration to EVPN was not a certainty at this time

New Vendor Options

Nokia

- Nokia supported Ethernet OAM and VPLS, all the required features at the outset
- Good port density and most competitive
- In use at other IXPs
  - FranceIX: Nokia integrated in a mixed VPLS environment with Juniper EX
  - DE-CIX: Runs a large 7750 SR deployment

Testing

Testing and Re-Alignment

Re-Alignment to world landscape

Timeline 2020

- **Q3 2020:**
  - Decision taken to put 400GE general deployment plans on hold until the start of 2021, but
  - Committed to test the capabilities of the Nokia 7750 SR-2s, pre-empting any early orders
- **Q4 2020:**
  - LINX completes own SR-2s testing
  - Verified Hitless migration from VPLS to EVPN with Juniper

Re-evaluation and Testing

Timeline 2021

- **Q1 2021:**
  - Migrated LON1 to EVPN
- **Q2 2021:**
  - Supply chain issues
    - Difficulty in acquiring equipment due to the shortages in the silicon market
  - Testing of Juniper MPC-10 cards for the MX960 for low-density sites
    - Feature a combination of two or three 400GE ports, and ten or fifteen 100GE ports, that could be repurposed
  - Decided to test the Nokia 7750 SR-7s will provide better-long term scalability for our use case doing a full integration PoC centred around EVPN

Closing Stages

Timeline (Q3-Q4 2021)

- **August 2021:**
  - Kit from Nokia received and installed in the LINX lab
  - Configuration and building the topology
- **September 2021**
  - PoC Testing completed
- **October 2021**
  - This PoC was followed by a week of testing the MPC10 in Juniper labs

Roll-out

Roll Out

Timeline (Q3-Q4 2021)

- **October 2021**
  - Six-week to deploy the first SR-7s in LON1 to fulfil the first orders
- **November 2021**
  - LINX 400GE interconnection service launched in November 2021

Roll Out

400GE Deployment (LON1)

- **Telehouse Europe**
  - Available for ordering in Telehouse North (THN)
  - Ability to serve the entire Telehouse campus
- **Equinix**
  - Equinix Harbour Exchange (LD8)

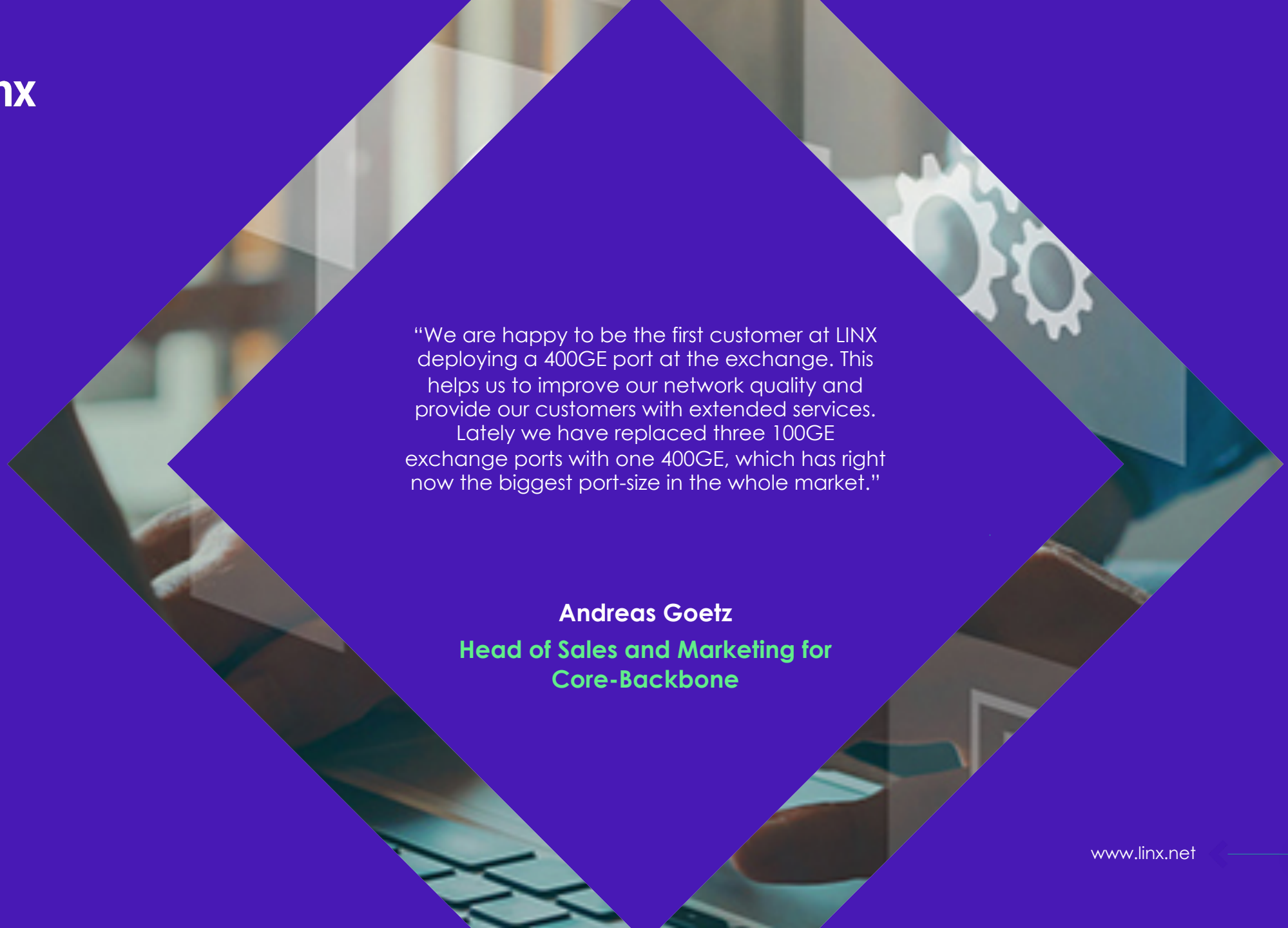
Supported Optical Interfaces

LINX will add other interfaces as vendor support increases and new 400GE kit is deployed

Interface	Reach	Protocol	Modulation
400G-LR8	10km	IEEE 802.3bs	8 x 50G PAM4
400G-FR4	2km	100G lambda MSA	4 x 100G PAM4

First 400GE Connection

- **25th November 2021:** Core-Backbone announced as having placed the first order for the new LINX 400GE service
  - Based in Germany, Core-Backbone operates an international, secure, and high-availability network around the world and have been fast to adopt 400GE services at IXPs across Europe



"We are happy to be the first customer at LINX deploying a 400GE port at the exchange. This helps us to improve our network quality and provide our customers with extended services. Lately we have replaced three 100GE exchange ports with one 400GE, which has right now the biggest port-size in the whole market."

Andreas Goetz

Head of Sales and Marketing for Core-Backbone

Future Plans

LON1 and Other LANs

Future Plans (LON1)

400GE in the Core and the Edge

- LON1
  - Testing and deploying 400GE in the Juniper MX10k platform
  - 400G transport with Ciena and Smartoptics to support traffic growth in our core, especially growth in West London

Future Deployments

- Dependant on member demand
  - Equinix Slough (LD6)
  - Interxion Brick Lane

Future Plans (Other LANs)

400GE in the Core and the Edge

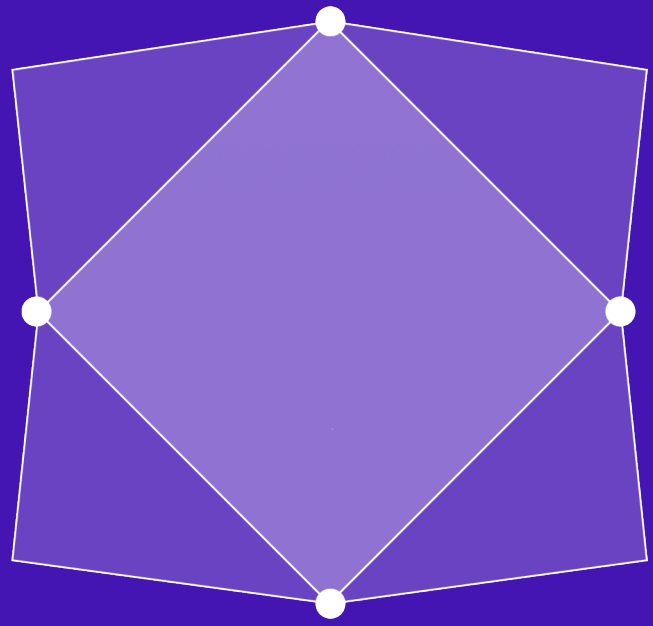
- LON2 / LINX Manchester / LINX NoVA
  - 400GE Edgecore
  - 400GE IP Infusion
  - 400G transport with Ciena and Smartoptics

If you would like to learn more about the integration of 400GE at LINX, and how networks can benefit, please contact our sales@linx.net team.

Any Questions?

linx

Want to Know More?



mariano@linx.net