



The Road to 400GE

Development Challenges in a Mixed Vendor Network

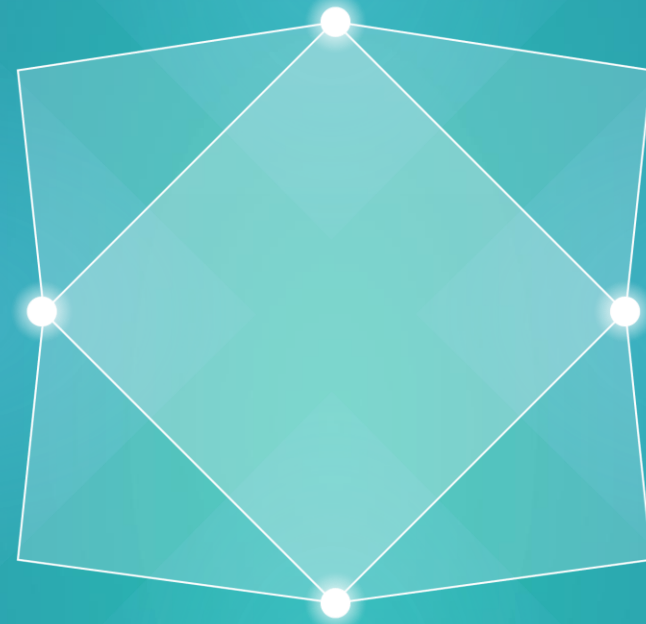


Halil Kama

LINX Senior Peering Advisor

Tuesday, 23 August 2022

AfPIF 2022



LINX recently introduced the option of 400GE ports for members in partnership with its vendor partner, Nokia.

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

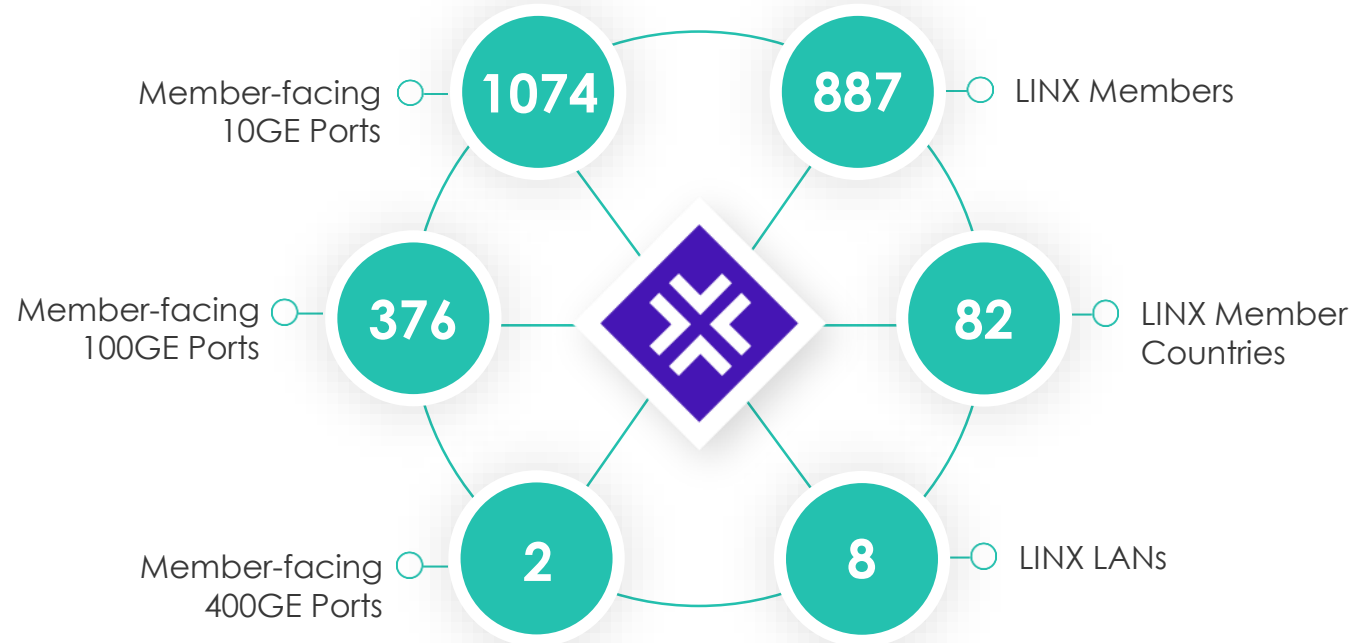
August 2022

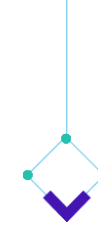
1769
Connected Member Ports

6.271Tbps
Peak Traffic








979
Member ASNs

49.457Tb
Connected Capacity

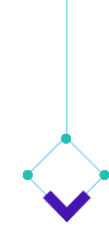












Agenda (1)

-  **Why LINX's 400GE Solution Matters** 
-  **Key Objectives** including Research Phase and 400GE viability for Members 
-  **Pandemic Delays the Testing Process** 
-  **Decision Time** including External Factors that Impacted Choices 





Agenda (2)

-  **New Vendor Options** 
-  **Next Steps:** Testing and Re-Evaluation 
-  **Closing Stages** including Roll Out 
-  **Future Plans:** LON1 and Other LANs 





The Road to 400GE

Why LINX's 400GE Solution Matters



Why LINX's 400GE Solution Matters

- Our most significant exchange is LON1, we converted this from MPLS/VPLS to MPLS/EVPN
- Plus, we have proven out a large scale EVPN network with multi-vendor approach to get to 400GE
- Other IXPs, network designers and datacentre fabric operators will be interested in how we have done this and what to avoid themselves
- We learnt that working with a mixed vendor solution bring:
 - significant challenges in testing, acceptance and in-house ownership
 - highlight problems with how standardized protocol implementation still varies
- How can others benefit?
 - Learn from our challenges





The Road to 400GE

Key Objectives:
Research Phase and 400GE viability
for Members



Key Objectives

- Find a long-term high-density 400GE solution that meets our members needs, has a good price point and allows us to drive a high service availability across all of our networks
- Capable of integrating with LINX's existing LON1 EVPN network
- 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





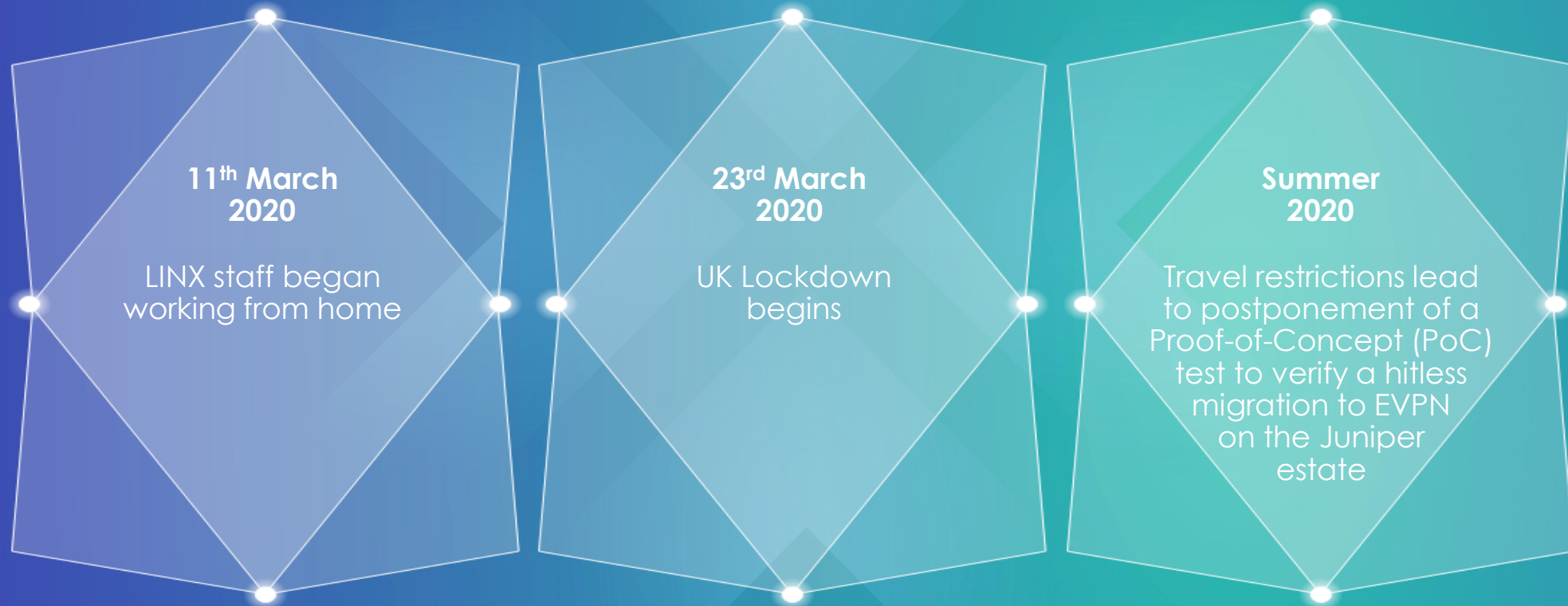
The Road to 400GE

Pandemic Delays the Testing Process:
The Impact of COVID-19 on Progress



Timeline

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

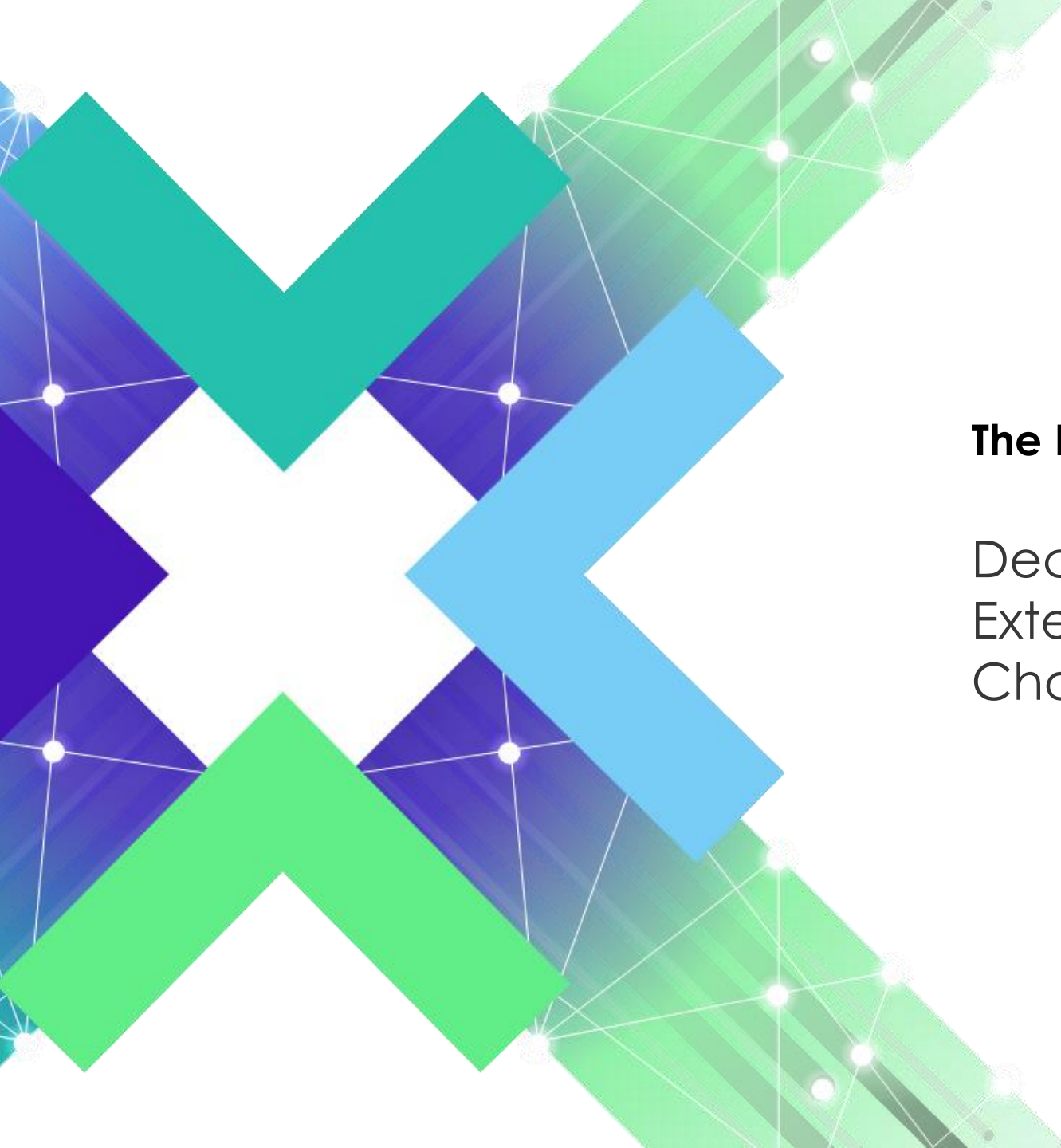




Pandemic Delays the Testing Process

- Visiting Facilities for testing
 - 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





The Road to 400GE

Decision Time:
External Factors that Impacted
Choices

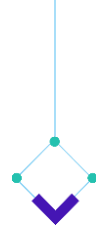


Decision Time - LON1 Vendor Considerations

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





Decision Time - LON2 Vendor Option

Edgecore Networks and IP Infusion

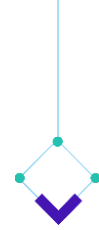
- Using Edgecore and IP Infusion on LON1 would break the long-established design rule of having redundant vendors in the two London LANs
- Edgecore did not have a high-density 400GE platform that supported MPLS natively in the chipset at the same time
- IP Infusion's OcNOS hadn't been ported to any of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





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New Vendor Options:
Nokia and Arista



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 recently integrated in a mixed VPLS environment with Juniper EX
 - DE-CIX: Runs a large 7750 SR deployment





The Road to 400GE

Next Steps:
Testing and Re-Evaluation



Next Steps: Testing and Re-Evaluation

Timeline (Q3 2020 to Q1 2021)

- **Q3 2020:** Decision taken to put 400GE general deployment plans on hold until the start of 2021
 - Commitment to test the capabilities of the Nokia 7750 SR-2s, pre-empting any early orders
- **Q4 2020:** LINX completes own SR-2s testing
 - Hitless migration from VPLS to EVPN with Juniper verified
- **Q1 2021:** Migration of LON1 to EVPN



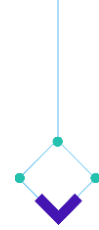


Next Steps: Testing and Re-Evaluation

Re-Evaluating Options for 400GE (Q2 2021)

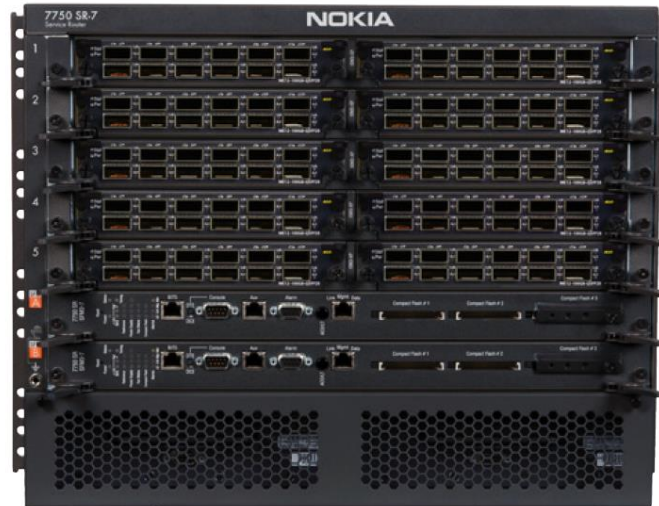
- Supply chain issues
 - Difficulty in acquiring equipment due to the shortages in the silicon market
- Testing of Juniper MPC-10 cards for the MX960 for low-density sites
 - Feature a combination of two or three 400GE ports, and a combination of up to ten or fifteen 100GE ports, that could be repurposed





Next Steps: Testing and Re-Evaluation

By now we were confident that the Nokia 7750 SR-7s could provide better-long term scalability for our use case and decided to do a full integration PoC centred around EVPN



7750 SR-7





The Road to 400GE

Closing Stages:
Including Roll Out



Closing Stages and Roll Out

Timeline (Q3-Q4 2021)

- **August 2021:** Kit from Nokia received
 - 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
 - Six-week deployment of the SR-7s in LON1 to fulfil the first orders





Closing Stages and Roll Out

Timeline (Q3-Q4 2021)

- **October 2021**
 - This PoC was followed by a week of testing the MPC10 in Juniper labs
 - Six-week deployment of the SR-7s in LON1 to fulfil the first orders
- **November 2021**
 - LINX 400GE interconnection service launched in November 2021
 - Nokia will supply their FP silicon powered 7750 Service Router (SR) platforms with 400GE network interfaces





Closing Stages and 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)



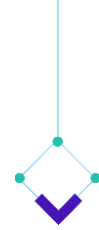


Closing Stages and Roll Out

Potential Future Deployments

- Dependant on member demand
 - Equinix Slough
 - Interxion Brick Lane





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**



The Road to 400GE

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 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?



Want to Know More?



+44 20 7645 3500



sales@linx.net



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