



# Deploying a Disaggregated Model for LINX's LON2 Network

How LINX reimagined its LON2 network architecture using EVPN routing technology

**The first IXP in the World to do so.**



Connecting over

**825** members from

**80+** countries around  
the globe.



**Members** consist of access networks, ISPs and content providers who **exchange Internet traffic between each other** over their secure peering LANs.



Through LINX members are able to reach **80% of the total global Internet** making it one of the single biggest connection points in the world with **traffic peaks of over 4Tb/sec** on their public peering platform alone.

An aerial photograph of a coastline, likely in the UK, showing a dark sea meeting a sandy beach and rocky shore. The image is overlaid with several geometric shapes: a large purple triangle in the top-left, a teal triangle in the top-right, and a large purple triangle in the bottom-right. In the bottom-left, there are two overlapping chevron shapes, one white and one green. The text is positioned within the purple triangle in the bottom-right.

LINX operates a dual-LAN  
infrastructure in London  
along with UK regional  
exchanges in **Manchester,**  
**Wales** and **Scotland**



LINX also operates an Internet exchange in the Ashburn metro area in the **US** just outside **Washington DC**.

# Dual LAN Platform in London

LINX's two London  
networks span in  
excess of

**65Km**

**12** different  
locations, operated  
by four different data  
centre partners.

**Digital Realty  
Equinix  
Interxion  
Telehouse**



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# LON2 Infrastructure Review

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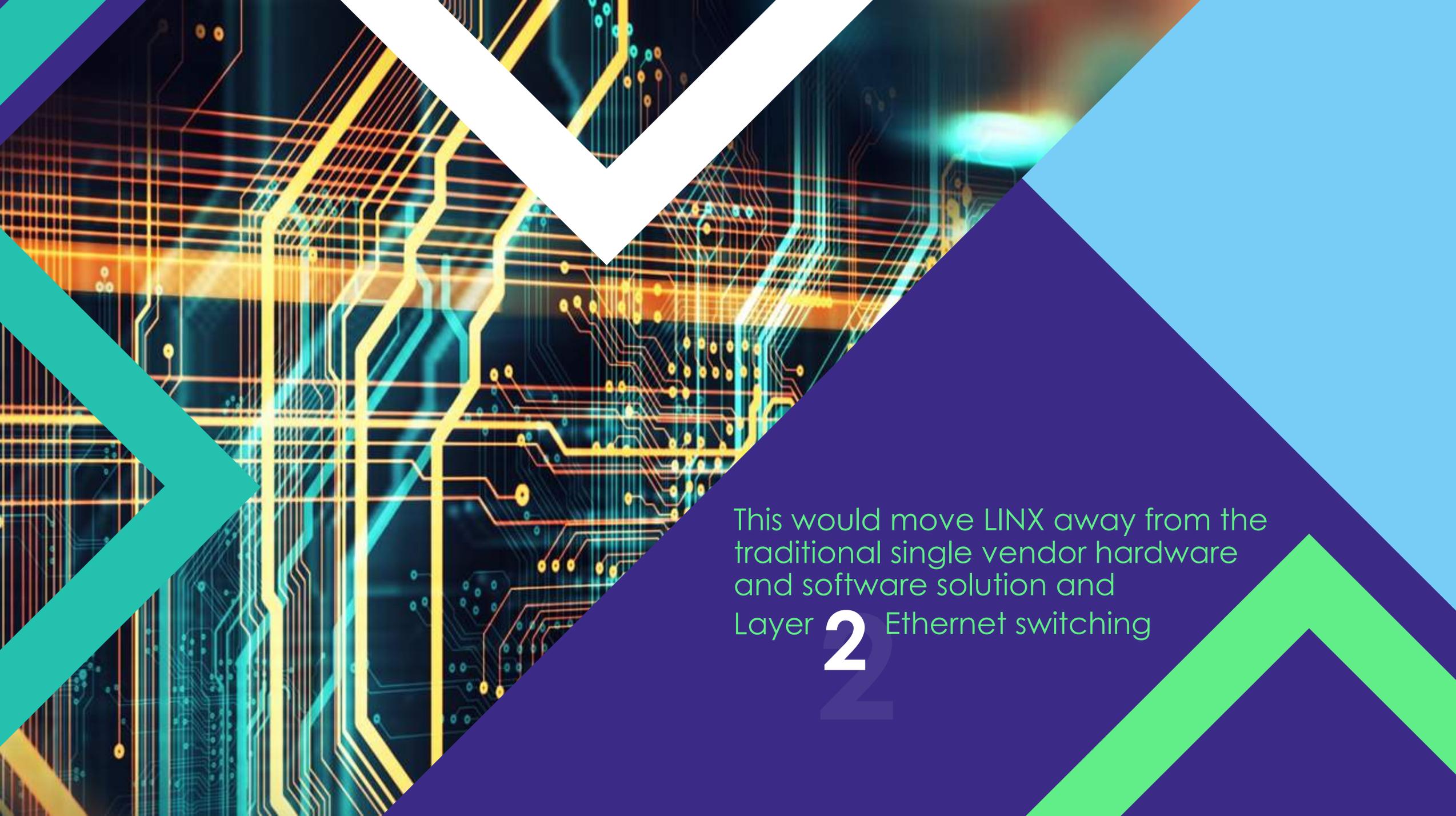
# The Background

LINX wanted a new architecture that offered choice, resilience and robustness for its

**700+** membership  
(now 825+)

An extensive review of LINX's LON2 infrastructure began in **November 2015** in preparation for a major network upgrade

After a vendor testing process an **improved technical solution** was found at a **significantly lower cost**



This would move LINX away from the traditional single vendor hardware and software solution and Layer **2** Ethernet switching



This decision enabled LINX to  
confidently reduce its prices by

**40%** on LON2 in July 2016

# Collaborative Process

LINX decided to adopt hardware from **Edgecore Networks**, owned by Accton Technology Group, as well as software from **IP Infusion**

**ip**infusion™

**E**dge-**c**ore**E**  
NETWORKS



LINX would be the first IXP in the world to adopt all of the new technology concepts and features on a single network

The new solution employs EVPN (Ethernet VPN) over IP, leaf-spine topology, full automation and is

**100G** ready



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# The New Technologies

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An aerial night view of a city, likely New York City, showing a grid of streets and illuminated buildings. The image is overlaid with large, stylized geometric shapes: a light blue downward-pointing chevron in the top right, a white upward-pointing chevron in the bottom left, and a teal upward-pointing chevron in the bottom center. The background is a dark purple gradient.

# Leaf-Spine Approach

**Leaf Spine design scales to very large capacities**

by adding more fixed configuration switches instead of needing to replace the switches with faster, more expensive switches

**It is a low complexity design, making it less error and failure prone**

# Disaggregation Explained

Disaggregated in the router/switch context is a model where a operator selects a **generic switch** from one source, then **selects independently software** to run on that switch.



# Disaggregation Explained

The traditional model involved buying fully both the switch/router hardware and software from a single supplier, the two tightly bound.

But the **server space has long demonstrated that need not be the case**, where you purchase the hardware from one supplier, and the software from a different source - allowing individual companies to focus on their strengths.



# Disaggregation Explained

The approach allows an operator to **independently select suppliers to best meet their needs**. They might prefer the form factor or density from one hardware manufacturer, but the features from a different software vendor. And can **review independently** the choices as their requirements evolve.



# A Disaggregated Approach

By introducing a disaggregated platform, LINX members will benefit from **increased flexibility** plus continued value from their investment.



## What is EVPN and what are the benefits?



Switches communicate about the MAC addresses, they are synchronised and ultimately more predictable and stable

## What is EVPN and what are the benefits?



**Offers flexibility** for more features to be added



## What are multi-homing ports and how do they work?

It already is possible to have multiple ports treated as a single connection, but without multi-homing, they must be connected to a single switch or router.



A **Multi-homed** set of ports allows the same set of ports to be distributed **across multiple switches** (or routers), where the switches appear as a single logical switch to the remote end.

Under normal circumstances,  
the **traffic is load shared**  
**equivalently to a set of ports**  
**connected to a single router,**  
load-sharing across them to make  
use of full capacity

```
object to ...  
mod.mirror_obj  
... == "MIRROR_X"  
..._mod.use_x = True  
..._mod.use_y = Fals  
..._mod.use_z = Fals  
... == "MIRROR_  
..._mod.use_x = Fals  
..._mod.use_y = True  
..._mod.use_z = Fals  
... == "MIRROR_  
..._mod.use_x = Fals  
..._mod.use_y = Fals  
..._mod.use_z = True  
... at the end -  
..._obj.select= 1  
..._obj.select=1  
..._obj.scene.objects.a  
..._selected" + str(modi
```

**In case of failure, or maintenance, ports are removed from the link-aggregation, but state learned from those ports is maintained.**

The load-sharing across the network is adjusted to the surviving topology.

At worse that would represent a drop to half the total capacity.

This protects against issues such as maintenance work, software upgrades, or unplanned failures





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# The Process

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# The Process

The LON2 migration process has taken two years but was broken down into phases



## Demonstrator Phase (2016)

This was at the end of the vendor selection, where they demonstrated they could achieve our goals



# The Process

The LON2 migration process has taken two years but was broken down into phases



## Prototyping Phase

(late 2016 through 2017)

Iterative development where we incrementally test new features, and fine tune the requirements



# The Process

The LON2 deployment and migration phases



## Hardening Phase

(late 2017 through early 2018)

Finding and fixing the last remaining bugs



# The Process

The LON2 deployment and migration phases



## Deployment Phase

(early 2018) [Parallel to hardening]

Where we deployed the new network ready for migration



# The Process

The LON2 deployment and migration phases



## Migration Phase

(April-May 2018)

Made network live, and moved members across



# The Process

The LON2 deployment and migration phases



Fully operational in June 2018



# The Process

The LON2 deployment and migration phases



**Enhancement Phase  
including new software  
releases**

(late 2018 and beyond)





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**What does this mean in  
the Market Place?**

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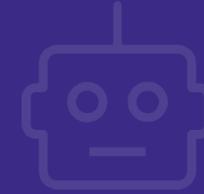


While **LON2** is smaller than the LINX LON1 network, it is still **larger and more complex** than many other European IXPs

The background is a night cityscape with light trails from cars in shades of red, orange, and white. A tall building with lit windows is visible in the center. The image is overlaid with large, stylized geometric shapes: a teal chevron pointing down, a white chevron pointing down, and a light blue chevron pointing up. The bottom left and bottom right corners are filled with dark purple and light blue geometric shapes respectively.

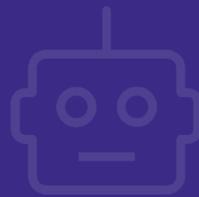
Having dual LANs in London  
enabled LINX to be bold in  
trying something new

All networks will benefit from the new infrastructure



Smaller networks will see **background traffic reduced** on their ports and thus offering more value

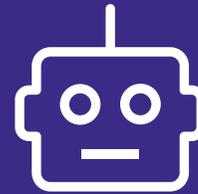
All networks will benefit from the new infrastructure



Larger networks will see **more flexibility and scalability** and be able to deliver higher capacity at lower prices



All networks will  
benefit from the  
new infrastructure



Solution designed with  
**Automation in mind**





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Questions

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**Thank you**

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