



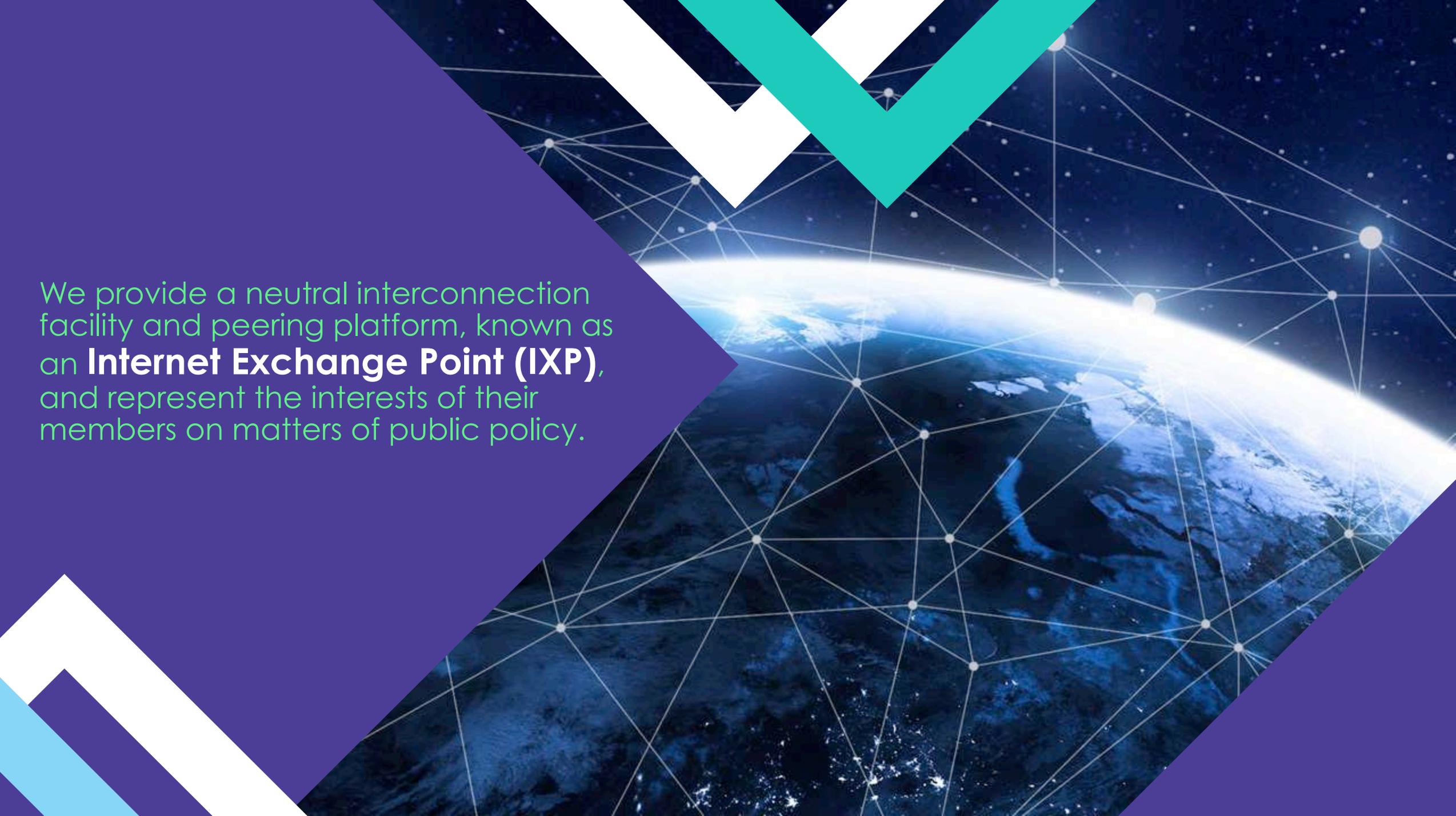
Deploying a Disaggregated Model for LINX's LON2 Network

How LINX reimagined its LON2 network architecture using EVPN routing technology

The first IXP in the World to do so.

About LINX

LINX is one of the largest
Internet exchanges
in the world



We provide a neutral interconnection facility and peering platform, known as an **Internet Exchange Point (IXP)**, and represent the interests of their members on matters of public policy.



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



Connecting over

825

members from

80+

countries around
the globe.



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. The image is overlaid with several geometric shapes: a large purple triangle on the right, a white chevron shape on the left, and a green chevron shape at the bottom. The text is positioned within the purple triangle.

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

16 different
locations, operated by
different data centre
partners including:

Digital Realty
Equinix
Interxion
Telehouse



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



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



LON2 Infrastructure Review

The Background

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

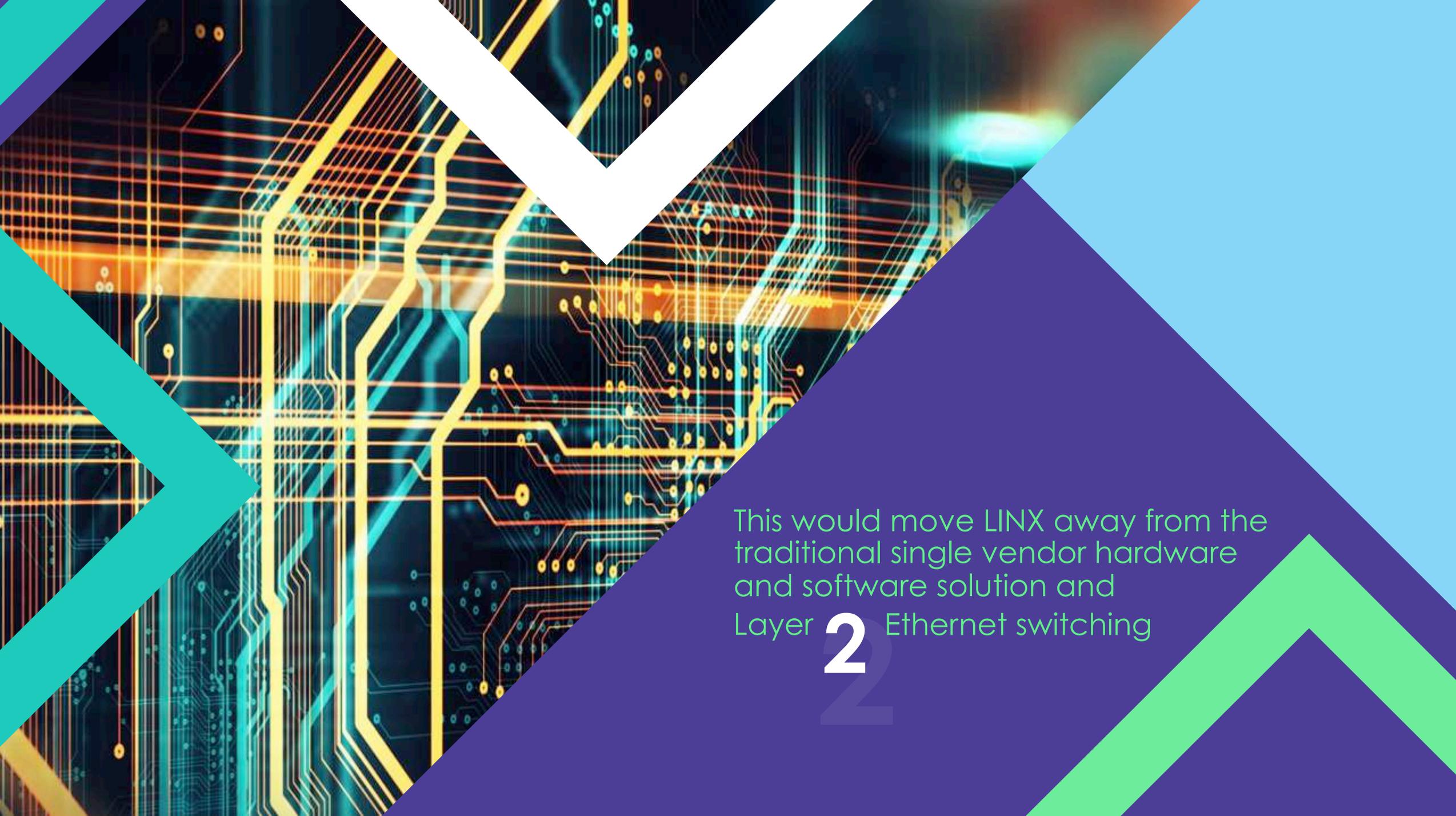
700+ Membership
(now 825+)

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

The project was triggered by as a reaction to the dramatic increase in the number of **100G port orders** from early 2015

We saw that we could only scale the existing LON2 design so far. Long term we needed a **new design** that **scaled further**.

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

The background features a complex digital circuit pattern with glowing orange and yellow lines on a dark blue background. Overlaid on this are several large, semi-transparent geometric shapes: a white downward-pointing chevron at the top, a teal downward-pointing chevron on the left, a purple downward-pointing chevron on the right, and a green upward-pointing chevron at the bottom right. The text is positioned in the lower right quadrant, overlaid on the purple and green shapes.

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

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



The New Technologies

Collaborative Process

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

ipinfusion™

Edge-**c**ore**E**
NETWORKS

Project Partners

Edgecore Networks delivers wired and wireless networking products and solutions through channel partners and system integrators worldwide for data centre, service provider, enterprise, and SMB customers.



Project Partners

IP Infusion was founded in 1999 by Kunihiro Ishiguro and Yoshinari Yoshikawa as commercial-grade, hardware-independent network software for IPv4 and IPv6

The logo for IP Infusion, featuring the lowercase letters 'ip' in orange and 'infusion' in dark blue, followed by a trademark symbol (TM).

ipinfusion™

Leaf-Spine Approach

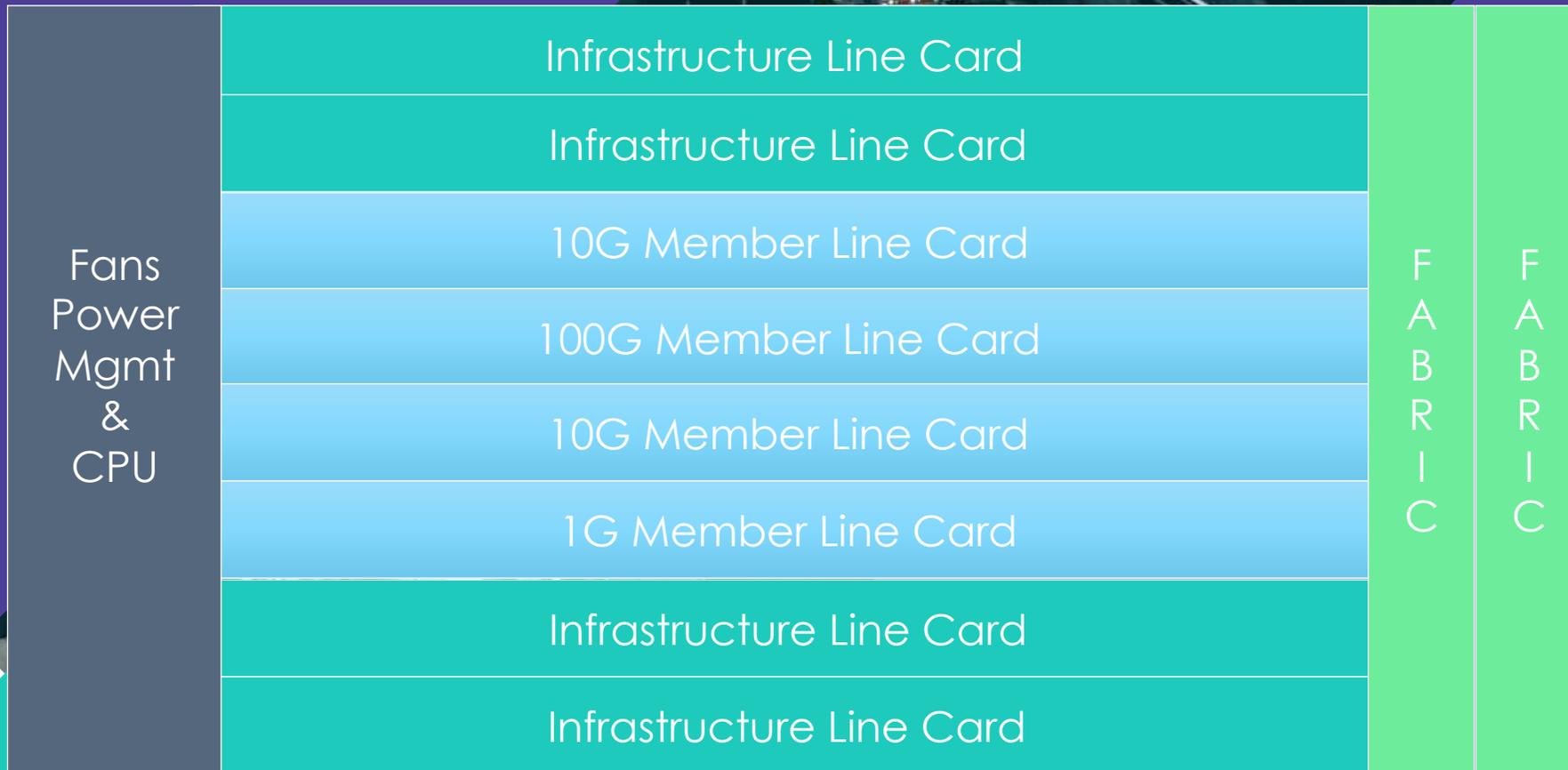
An aerial night view of a city, likely New York City, showing a dense grid of skyscrapers and streets. The image is overlaid with large, stylized geometric shapes in shades of purple and teal. A large teal arrow points downwards from the top right, and a large purple arrow points upwards from the bottom left. The text is placed on these purple and teal background areas.

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

Chassis Based Design



Individual Switch Design

Infrastructure Switch

Infrastructure Switch

10G Member Switch

100G Member Switch

10G Member Switch

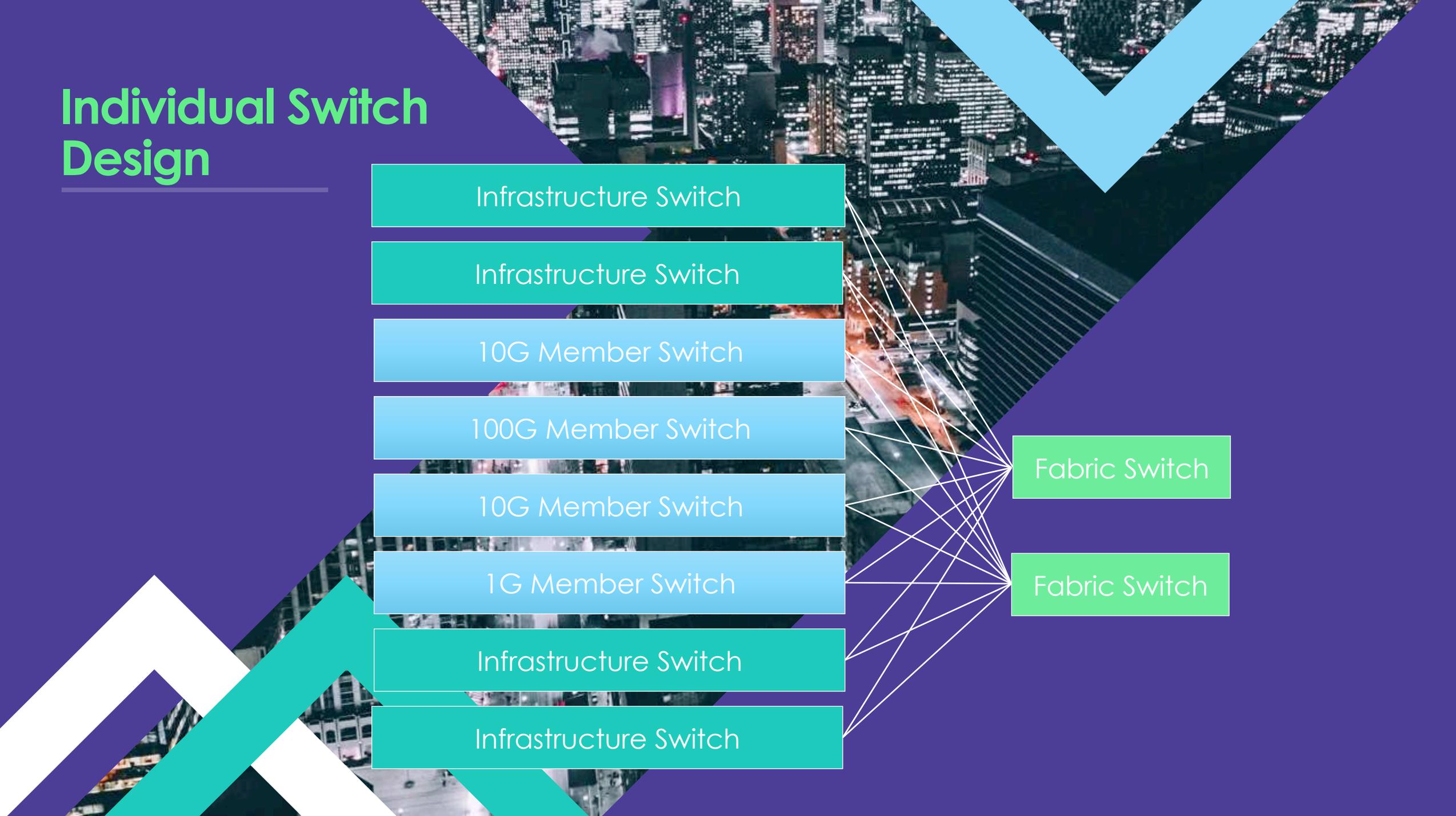
1G Member Switch

Infrastructure Switch

Infrastructure Switch

Fabric Switch

Fabric Switch



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.



A Disaggregated Approach

The disaggregated platform with Ethernet EVPN **allows LINX to play the long game** with the aim of delivering long-term innovative technology to members.



A Disaggregated Approach

It also means they can commit to targeting **ever-greater levels of service quality** and cost effectiveness.



What is EVPN and what are the benefits?



Everything is effectively programmed

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

```
tempString.replace("czData",  
format))) tempString =  
s = value dataCal =  
fieldID",str(key)) tempStr:  
II_STRING"): s = value dataC  
tempString.replace("czData",  
value=" in line and flagCheckRinam  
message>" in line: myEvent = "RT_OHA  
yfilename+"\n" if typeOfFile == "RT": b  
os.path.exists(path): os.makedirs(path)  
TARTAVTEST/"): shut:
```



The Process

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)





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

What does this mean
in the Market Place?

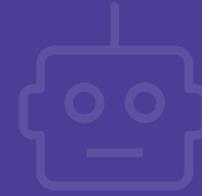
LINX is one of the **Top 3**
exchanges in Europe/world

All networks will benefit from the new infrastructure



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

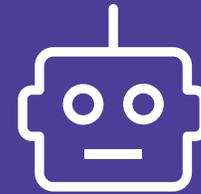
All networks will benefit from the new infrastructure



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





Questions



Thank you



Marketing@linx.net



01733 207705



[Facebook.com/LondonInternetExchange](https://www.facebook.com/LondonInternetExchange)



[Twitter.com/linx_network](https://twitter.com/linx_network)



[Linkedin.com/company/linx](https://www.linkedin.com/company/linx)