



# Deploying a Disaggregated Model for LINX's LON2 Network

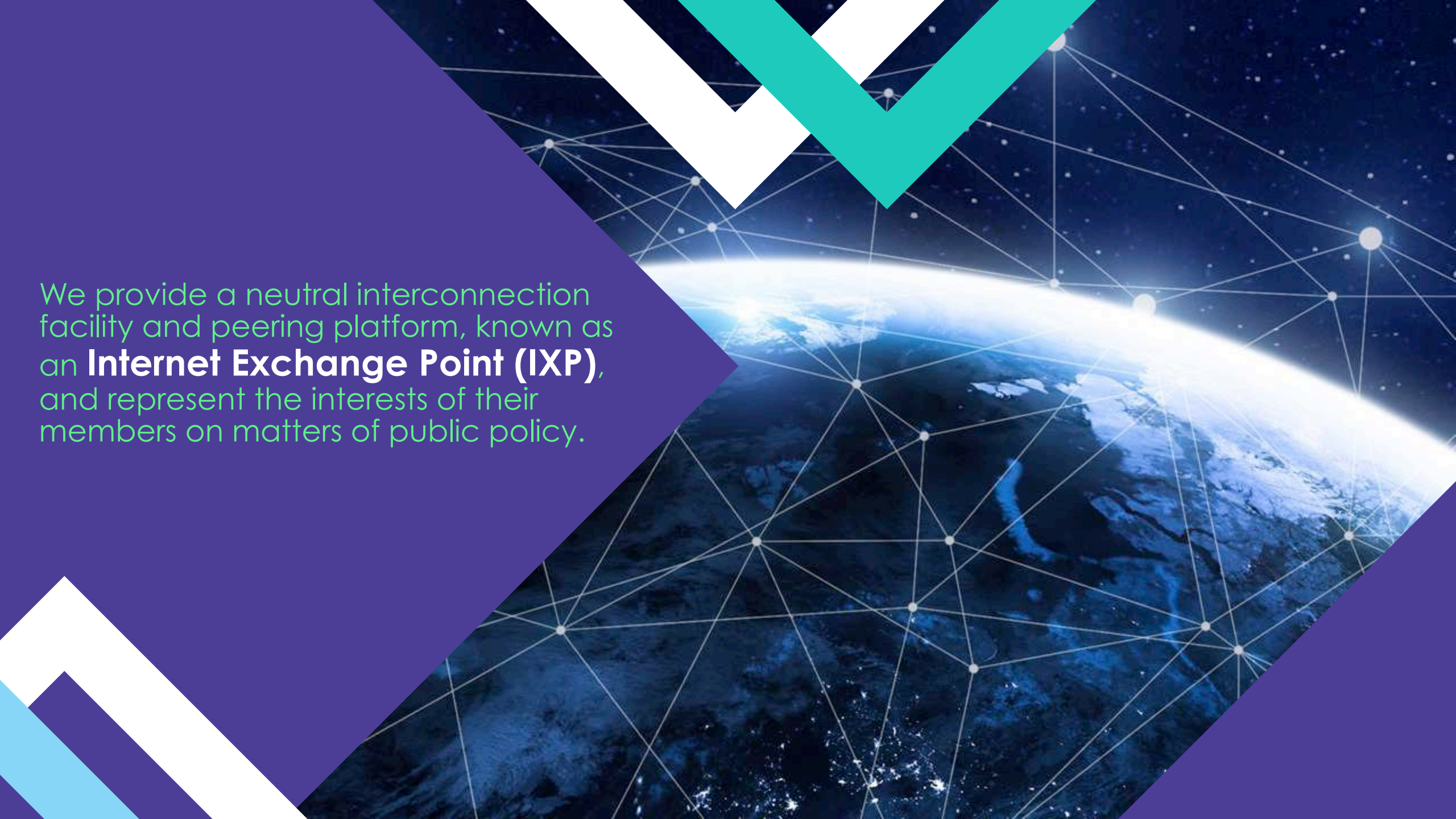
How LINX reimagined its LON2 network architecture using EVPN routing technology

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

# About LINX

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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 and a 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. A white chevron shape is in the bottom-left, and a green chevron shape is in the bottom-center. The text is located within the bottom-right 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



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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

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 field. Large, semi-transparent geometric shapes in teal, purple, and light blue are overlaid on the scene. A large white number '2' is positioned in the lower right, partially overlapping the purple and teal 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



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# The New Technologies

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# 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

# 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

**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

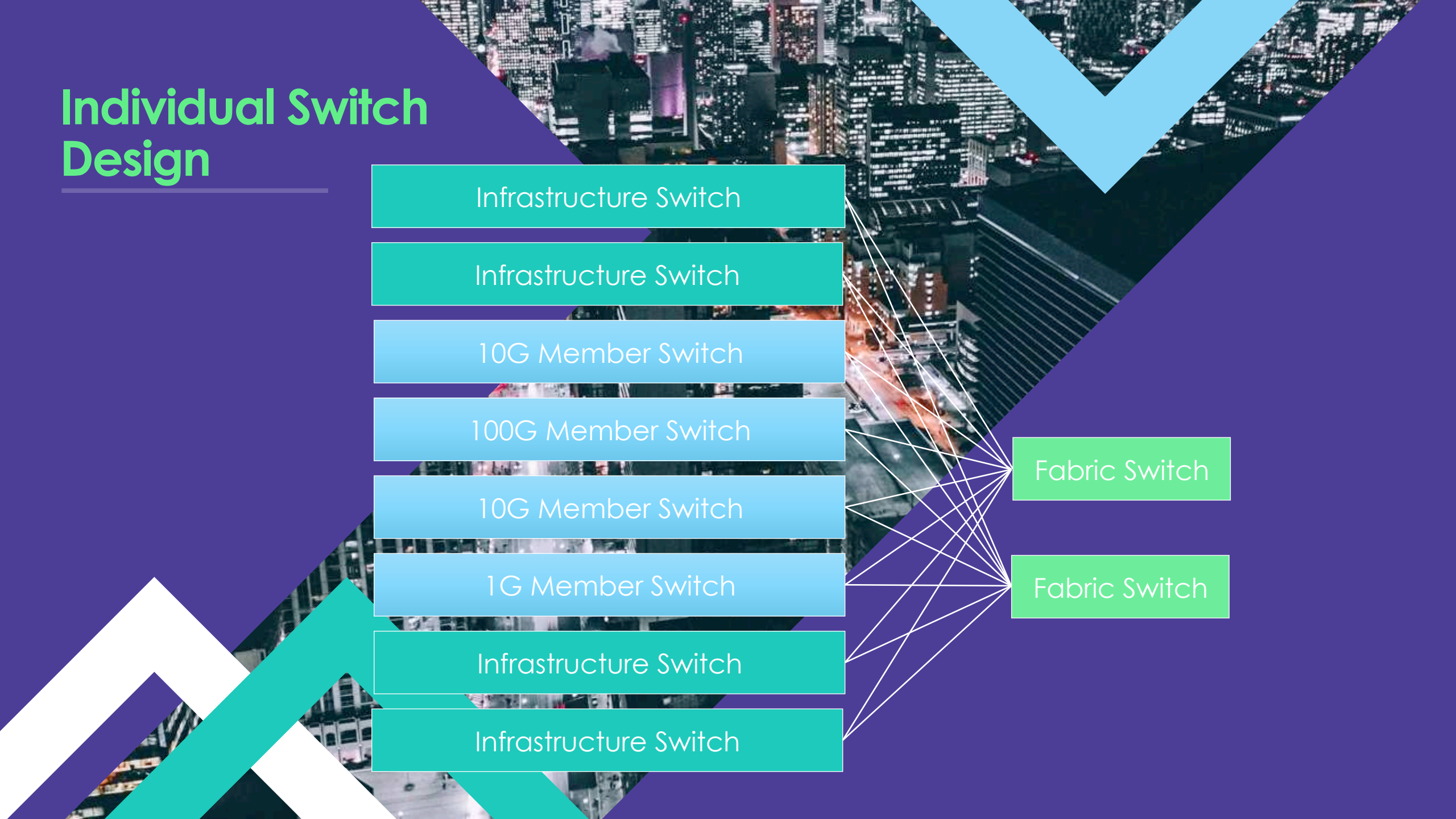
1G Member Switch

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",  
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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:
```



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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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in the Market Place?

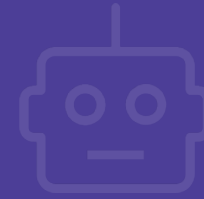
LINX is one of the **Top 3**  
exchanges in Europe/world

All networks will benefit from the new infrastructure



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

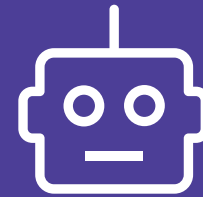
All networks will benefit from the new infrastructure



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**





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Questions

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**Thank you**

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