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# LINX at 30: Pioneering Interconnectivity for 30 Years and Counting...

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# Celebrating three decades of transformative contributions to the internet



# Introduction to LINX

## Brief overview of LINX

- Global Connectivity Hub
- Redundant Infrastructure
- Multiple Locations

## Founded in 1994

**Key Role:** Facilitates efficient, low-latency data exchange between ISPs, networks, and content providers.

## Importance in internet infrastructure in the UK

- Increased Control
- Lower Costs
- Resilience
- Lower Latency
- Security
- Redundancy

LINX was created based on 2 principles;



Photo shows a group shot from the LINX106 member meeting at the University of London Computer Centre in 1995.

The first traffic  
passed through LINX  
at Telehouse (8th  
November 1994)



# Evolution of Internet Exchange Points (IXPs)

## Historical evolution



# Three Decades of Transformation



# November 2004 – 10 years of LINX

## 10 Years of LINX History

### LINX - Central to the History and Future of the Internet

**The story of LINX parallels the development of the Internet in the UK. Back in 1994 the World Wide Web was in its infancy and Internet exchange points were a novelty with only a handful in the entire world.**

Even the concept that Internet Service Providers (ISPs) should co-operate and share infrastructure to their mutual benefit was novel. In this environment, representatives from the UK's five domestic ISPs - PIPEX, BT Internet Services, Demon Internet, EUnet GB and UKERNA/JANET - agreed to create LINX based on two guiding principles:

- LINX should be neutral to its members
- LINX should be independent of any one provider

Less than two months after the concept was agreed - and with a total absence of contracts, lawyers and paperwork - LINX became operative when the first Internet traffic was transmitted through its switches on 8 November 1994.

In the decade that followed, the growth of LINX has reflected the phenomenal growth in volume and importance of Internet traffic, as more people have

gained access to more data from more sources than could have been imagined at the dawn of the Internet Age.

By 2004, 52 per cent of households in the UK (12.8 million) could access the Internet from home, compared with just nine per cent (2.2 million) in mid-1998. In addition, e-commerce is now seen as vitally important to economic growth. In recognition of its significance in the future performance of the economy, the UK government set itself the target of making the UK 'the best environment in the world to do e-commerce.'

New peaks in volume of Internet traffic crossing LINX switches have been succeeded so rapidly that previous records appear puny when compared with today's figures. Just five years ago traffic was peaking at 2.5 gigabits per second - more than 250 times its original total capacity. Two years later it had quadrupled to 10 Gbit/second.

In order to keep pace with such phenomenal growth LINX has pioneered the introduction of new technologies.

LINX adopted one-gigabit Ethernet standards ahead of even the large US exchanges and in 2002 it was the first exchange to introduce 10-gigabit Ethernet standards.

Today the LINX membership numbers more than 170 leading Internet Service Providers (ISPs) and content delivery service providers from the UK, mainland Europe, USA, Africa and the Far East. Its facilities at eight London-based collocation 'tele-hotels' carry 90 per cent of UK Internet traffic and its members' networks provide access to more than 50 per cent of global Internet routes.

It is not difficult to predict that Internet traffic will continue its rapid growth. Clearly, LINX will play an equally vital role in the future of the Internet as it has done in its history.

#### Science Museum to Exhibit LINX Switches

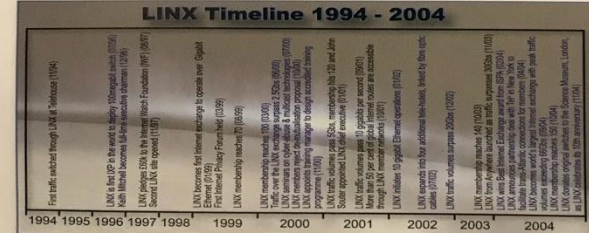


This is LINX's very first switch - a Cisco Catalyst 1200 (serial number 62007011) which is soon to become an exhibit in the Science Museum in London (see front page).

Switch No 1 has eight 10 megabit ports and was connected on a ring with another Catalyst 1200 (Switch 2) and a Cisco 1100. It was given to LINX by PIPEX and installed by PIPEX engineers.

Less than two years later LINX was also using a Catalyst 5000 (serial number: 66024714) which was the first 100 megabit-capable switch deployed at any Internet exchange anywhere in the world.

#### LINX Timeline 1994 - 2004





## The importance of community events, then and still today

Euro-IX

The logo for Euro-IX, featuring the text 'euro-IX' in a blue, lowercase, sans-serif font with a stylized 'X'.

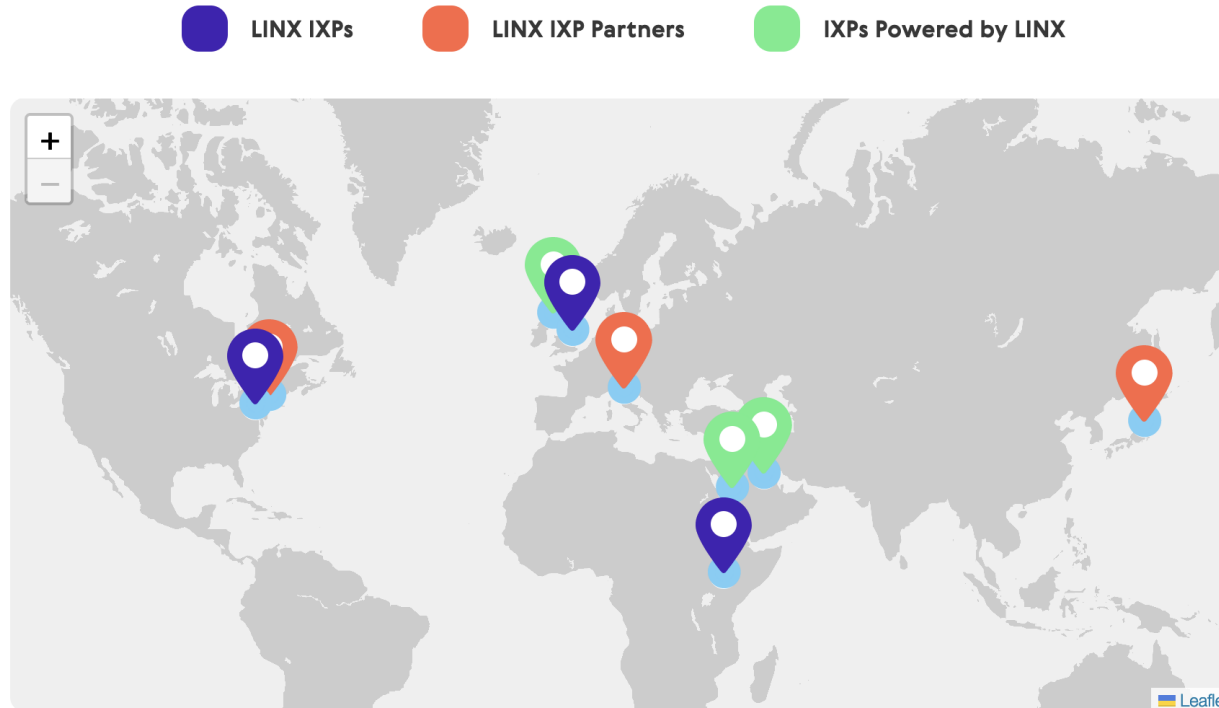
European Peering Forum (EPF) & Global Peering Forum (GPF)

The logo for European Peering, featuring a circle of yellow stars surrounding the text 'EUROPEAN PEERING' in blue, uppercase, sans-serif font.The logo for Global Peering Forum, featuring a network diagram icon with three blue nodes and connecting lines, followed by the text 'GlobalPeering' in blue and 'FORUM' in grey, uppercase, sans-serif font.

NetUK1

The logo for NetUK, featuring a stylized 'NetUK' in white, lowercase, sans-serif font on a dark green background.

# A growing network of interconnection



## Some of Our Partners



NETIX



TELEDATA



TELEDATA



RETN®

SPARKLE

FAELIX

## More than just Peering...



**Colocation**



**Private Interconnect**



**Private VLAN**



**Closed User Groups**

# Engineering Excellence



## Leading the way - Technically

### 100Mb Switch 1996

LINX is the first IXP in the World to deploy 100 megabit switch (Cisco kit) (July 1996) Cisco Catalyst 5000

### Private Interconnection Launch 2001

LINX launch their private interconnection service for members (2001) one of the first IXs to offer this service, a unique fast and simple way of establishing a dedicated connection between two LINX members

### 10G Ethernet Switch April 2002

LINX becomes the first exchange to introduce 10G Ethernet operation, using equipment from Foundry Networks

# Leading the Way - Technically

## Juniper PTX Switching Gear Adopted 2011

Redesigned and switched to a new vendor. Working with Juniper Networks, the new primary London LAN is VPLS-based. LINX also becomes first IXP in the world to utilise Juniper PTX switching gear and Juniper MX routers.

## London 2012 Olympics

Preparing our London network for the online coverage

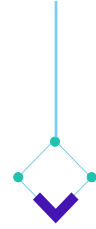
Quite a crucial time for the evolution of networks etc digital transformation starting.

## World First Disaggregated Network Using EVPN

Migration to new disaggregated LON2 network model using EVPN routing technology on open network hardware

# What Does The Future Of Interconnection Look Like?





## Evolution of interconnects

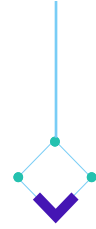
The emergence of in-network caching again changed interconnects  
(Traffic) Growth shifted to be inside access networks  
Growth at IXPs slowed

Initially IXPs had been important in scaling and delivering content

Gradually the role of IXPs shifted to provide access for CDNs to the “long-tail”

This also shifted the economics of IXPs – growth in ports was complemented with growth in number of participants





## From Value chain to Value Constellation



### Interconnect 1.0

- Traffic exchanged for the benefit of ISP's end user

### Interconnect 2.0

- More diverse stakeholders
- All stakeholders can take-away value
- All stakeholders can create value
- Value
  - Can be measured differently
  - Will be different things to different participants
- Operators use, Cloud, Enterprise uses CDNs – Value constellation serves all





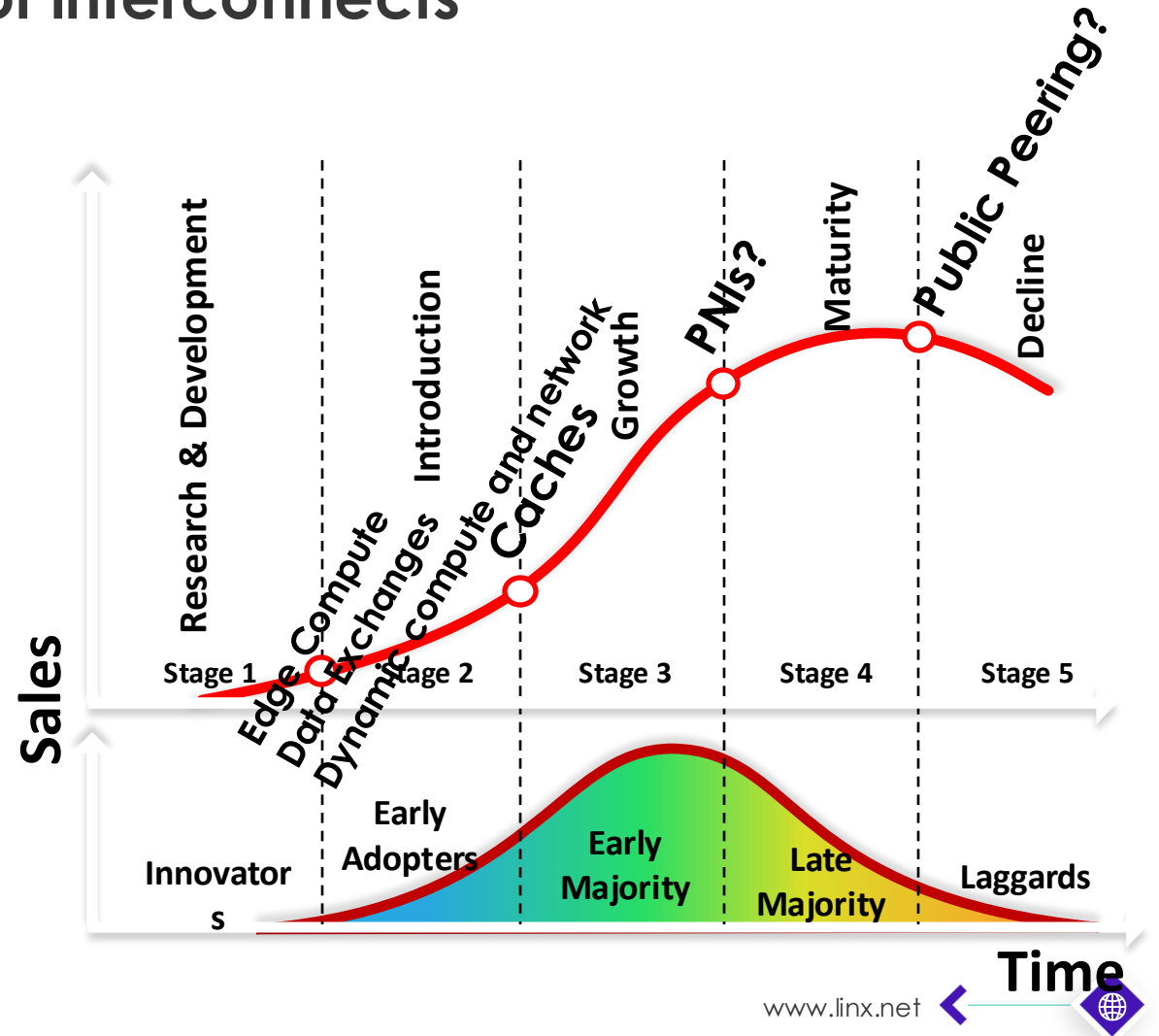


# Challenges and Opportunities Ahead



## Evolution of interconnects

- Where does this leave us?
- Independently of where these interconnections are in maturity – they will evolve
- But what is emerging?





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