




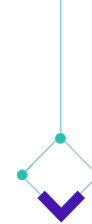
Technology Update




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Monday 27th February 2023
LINX118






2023 Technology Investments



Significant Active Projects



LINX in Numbers



Operations Update





2023 Technology Investments



2023 Technology Investments

- Cloud adoption, observability and tooling
- Security
- Digitalisation
- LAN & Interconnectivity development





2023 Technology Investments

Cloud adoption, observability and tooling

- To deliver a compute platform that is cost efficient, agile and able to meet our CNI needs
- To build a future state tooling platform that addresses the complete technology landscape; networks, security and applications
- Provide company wide business intelligence tooling to deliver clear and reliable KPI data

The membership will see:

- Improvements in portal, stats and API services





2023 Technology Investments

Security

- To have a continuous awareness and education methodology
- Drive towards a zero-trust architecture
- Develop our technical capability to meet the needs of the telecoms security act (TSA) and its application on IXPs

The membership will have:

- Confidence that LINX and our critical national infrastructure is secure, stable and resilient, that data privacy is maintained, and our regulation asks are met.





2023 Technology Investments

Digitalisation

- Continually review end-to-end workflows, the user experience and automate where there is a benefit
- All services should be made available on the LINX portal and IX-API
- The member usage experience should be measured and improved

The membership will see:

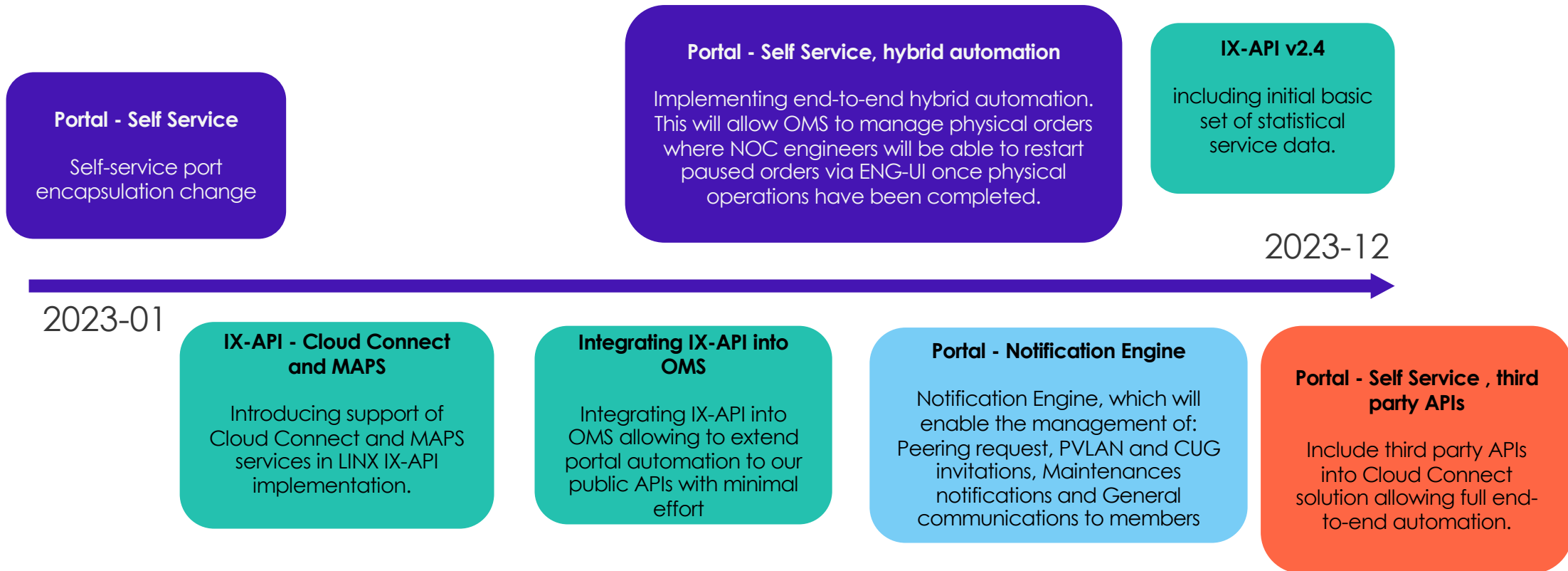
- An increasing number of services on the portal and in the IX-API, allowing them to order, maintain and observe the LINX exchange platforms and their performances





2023 Technology Investments

Digitalisation





2023 Technology Investments

LAN & Interconnectivity development

- To keep up to date with the latest technologies, we need to reduce the vendor risk and manage our cost base.
- To look at all geographies and to explore and develop services that go beyond traditional peering services

The membership will see:

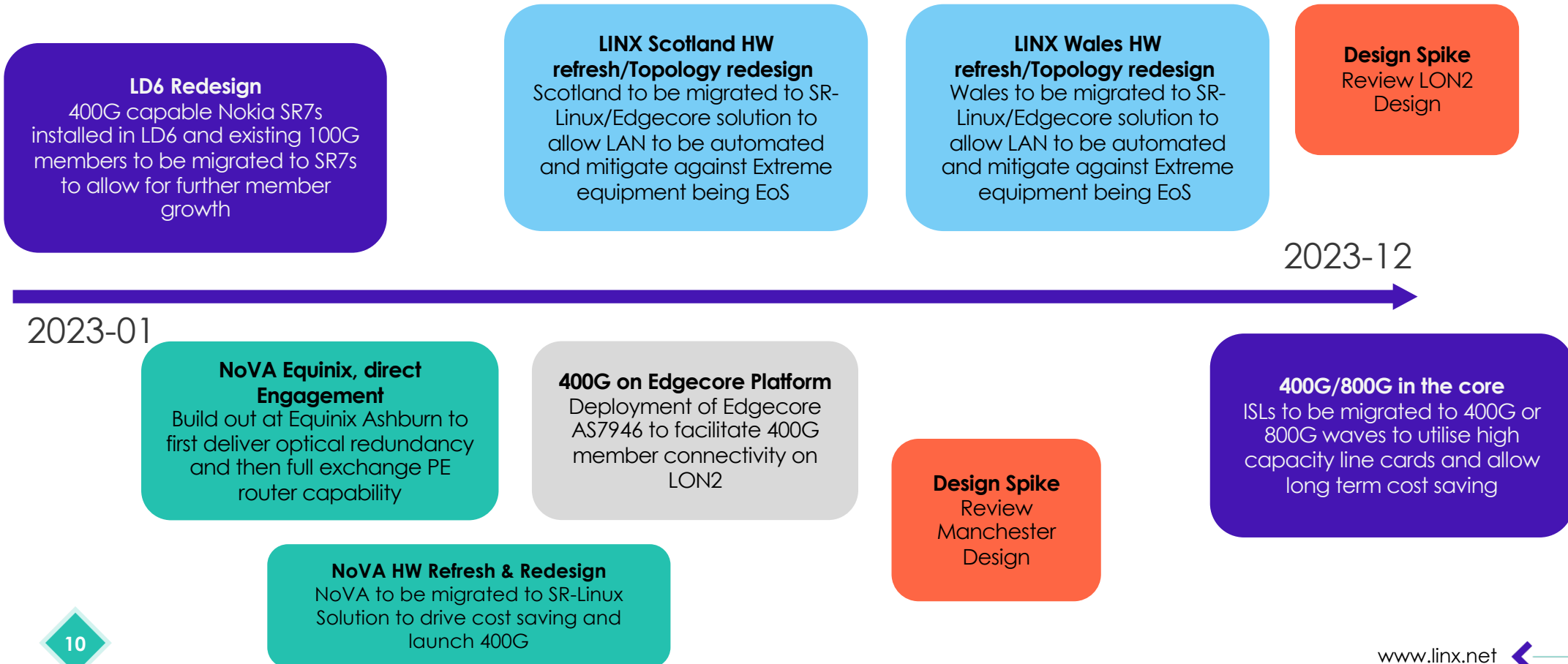
- Improved LAN stability which will drive operational up-time
- Cost improvement in terms of running costs as managed against increasing inflationary pressure and capacity growth
- Improved capital expense in terms of cost per gigabit of delivered capacity





2023 Technology Investments

LAN & Interconnectivity development



2023-12

2023-01





Significant Active Projects



Significant Active Projects

- NoVA
- Nairobi
- Partnership with STC
- Route Servers

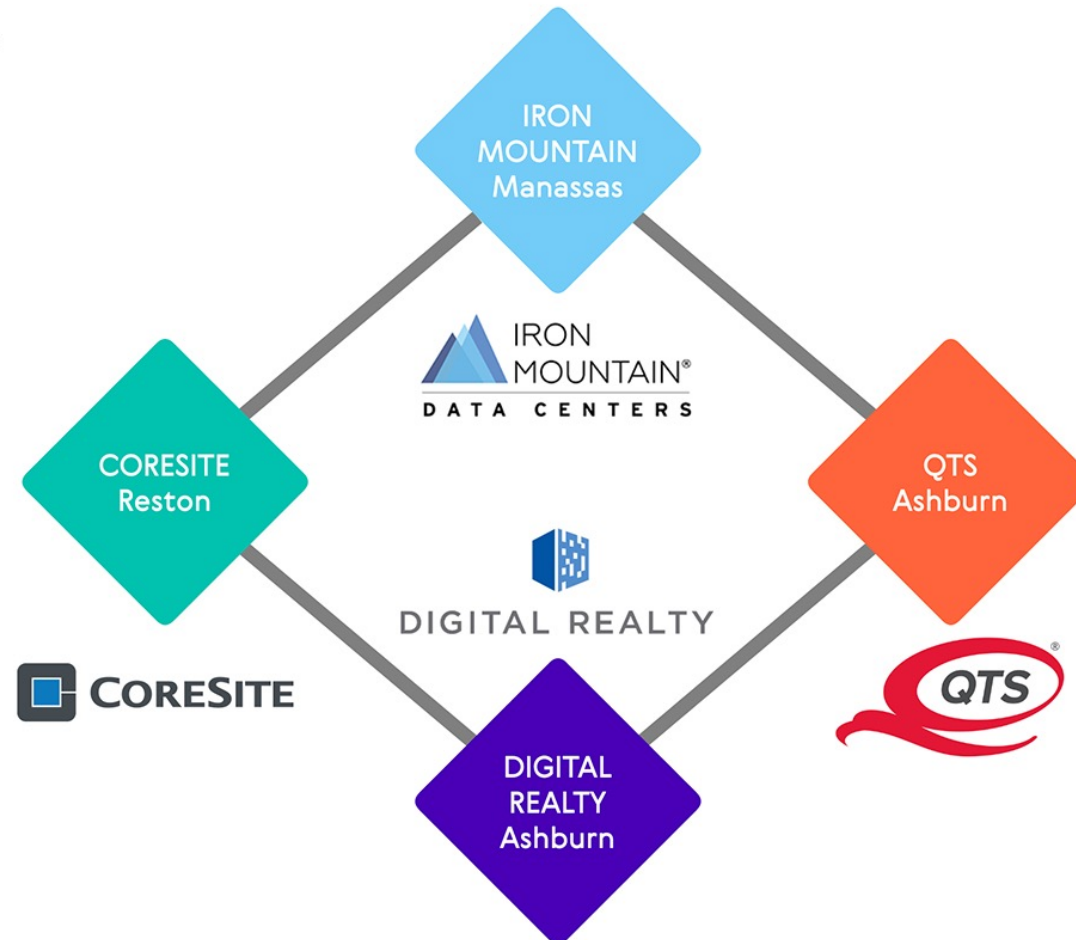




Significant Active Projects

NoVA

LINX NoVA





Significant Active Projects

NoVA

It is run on legacy
Juniper MX960 switches,
ring design



**Upgrade to modern leaf/spine
architecture, new hardware, to offer up to
400GE member connectivity**

Transmission PoP extension to reach
members in Equinix Ashburn via
partner agreement



**Agreement with Equinix to contract direct
in their Ashburn site and to trial a direct
extension of the LINX peering services to
their DC**





Significant Active Projects

Nairobi



Design & Readiness – Jan/Feb 2023

Build - March 2023

Launch - May 2023





Significant Active Projects

Nairobi



- We will use the Nokia 7220-IXR D-series devices for the Peering and Interconnection Services
- The design is a standard leaf and spine architecture
- The new Nokia device means a new SR-LINX NOS that has been tested and will plug into our automation tooling
- LINX Peering and all interconnection products will be supported
- LINX NOC will observe and maintain





Significant Active Projects

JEDIX
POWERED BY 

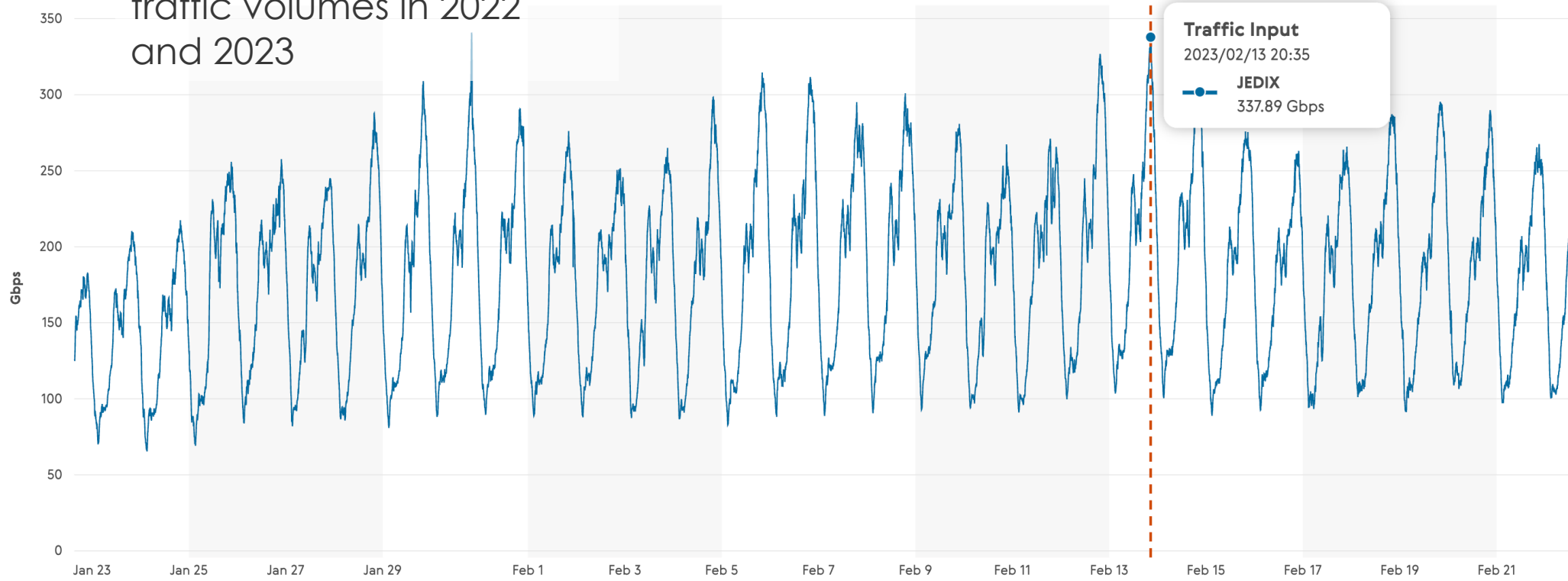




Significant Active Projects

Partnership with STC

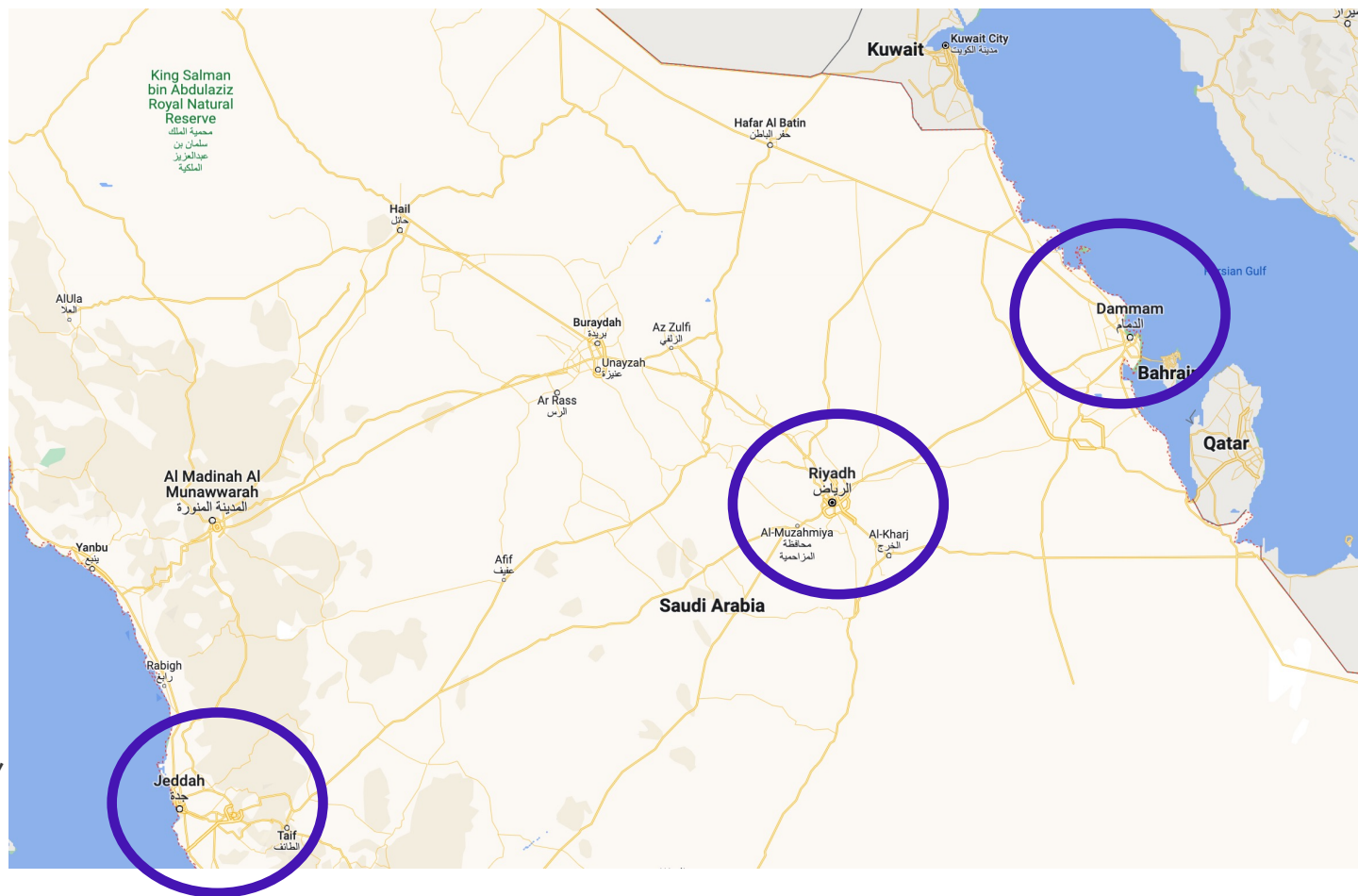
JEDIX has seen significant traffic volumes in 2022 and 2023





Significant Active Projects

Partnership with STC



Dammam, Q3-23

Riyadh, Q2-23

JEDIX in Jeddah,
Live in 2021





Significant Active Projects

Route Servers

Route Servers

- OpenBGPd deployed to Scotland and Wales in 2022
 - OpenBGPd for LON2, RS4 – February 2023
 - NOVA is planned for early March 2023
 - Manchester will be around late April 2023
 - As for LON1, OpenBGPd will be developed and tested more due to scaling to meet LON1 size
-
- BIRD 2.x, lab testing only at this stage as priority is on OpenBGPd deployment. Expectation is to move to BIRD 2 in the 2nd half of the year

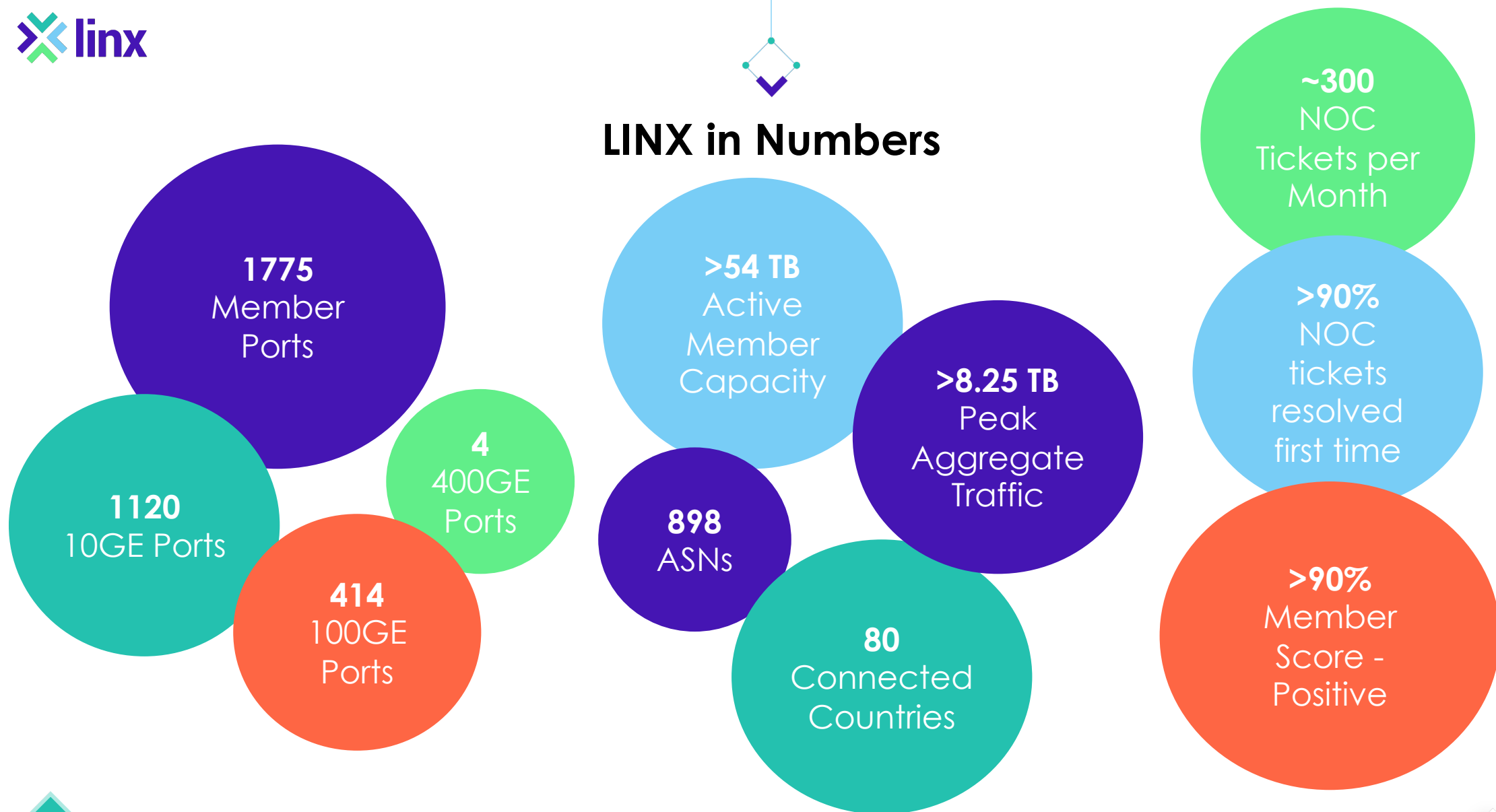




LINX in Numbers



LINX in Numbers





Operations Update

Availability, Service Issues and
Maintenances



Network Availability



- Since LINX118, we have continued to see high service availability and minimal service issues affecting members.

LAN	November 2022	December 2022	January 2022
LON1	99.9996%	99.9998%	99.9982%
LON2	99.9992%	99.9929%	99.9994%
LINXManchester	99.9998%	99.9999%	99.9999%
LINX Scotland	100%	100%	100%
LINXWales	100%	100%	100%
LINXNoVA	100%	100%	100%
JEDIX	100%	100%	100%





Service Issues

November

LON1

- 25/November/2022 - PROBLEM Service Alert: edge1-thw/edge1-thw-Slot4-status is CRITICAL
 - FPC 4 on PIC 2 stop working and this was a member facing card.
 - After a reboot of the card, all members on the FPC came up except one which our NOC contacted the member directly to restore.





Service Issues

December

LON 1

- 5/December/2023 - ** PROBLEM Service Alert: edge1-tca-lon2/ae200.112-metro1-rbs-lon2-status is CRITICAL **
 - Paged for multiple ports down between edge1-tca-lon2 and metro1-rbs-lon2. 8 x 10Gb LAG down over dark fibre.
 - This dark fibre outage caused edge1-tca-lon2 - edge4-eq4-lon2 traffic to re-route over a path with an incorrect next hop, which resulted in traffic between those 2 edges being dropped.
 - Issue was resolved by clearing the BGP session between edge1-tca and edge4-eq4.
 - There were no members on the two switches directly peering with each other.





Service Issues

January

LON 1

- 3 January 2023 06:10 - PROBLEM Service Alert: edge1-tcm/edge1-tcm-ChassisAlarm-status is CRITICAL
 - Errors resulted in the members connected to FPC 2 experiencing a loss of service.
 - Two members down, with one being live.
 - Ticket raised with vendor, reboot of card advised.
 - Emergency maintenance reboot fixed issue.





Service Issues

February

LON1

- 17 February 2023 - Collector1-thn-lon1 (195.66.224.254) lost BGP session
 - Lost BGP sessions with peers only on IPv4
 - The status of birdc ipv4 indicated it was failing and a restart of birdc daemon fixed the issue
- 25 February 2023 - Collector1-thn-lon1 (195.66.224.254) lost BGP session
 - Routing daemon failed, causing IPv4 sessions to drop
 - Fixed by restarting the routing daemon
- 21 February 2023 - DNS Issue for linx.net
 - Appeared to be caused by an issue in a vendor appliance after a failed migration
 - Ultimately traced to a database corruption with vendor TAC and cluster reinstated with a new, empty node





Upcoming Maintenances

LINX LON1 LD6 Slough Redesign – Decommissioning of edge4-eq4

- Completing member and ISL moves in Equinix LD6 from edge4-eq4 to edge1-eq4, and decommissioning of edge4-eq4
- This completes the Slough Redesign Project

LINX LON1 (195.66.224.0/21) edge1-tca switch control board upgrade

- Upgrading the switch control boards from SCBEs to SCBE2s to facilitate a future ISL upgrade to 4*100G using MPC7 cards





Upcoming Maintenances

Route-Servers

- OS Upgrades to Ubuntu 20.04.5 LTS on all Route-Servers on on all LINX LANs by end of March 2023
 - Exception for route-server rs4 on LON2 which has been replaced and upgraded with a newer OS.
- OpenBGPd migrations on remaining rs2 route-servers between late March and April 2023
 - rs2.nva1 - late March 2023
 - rs2.man1 - April 2023



Thank you