INEX Operations Update September 2024
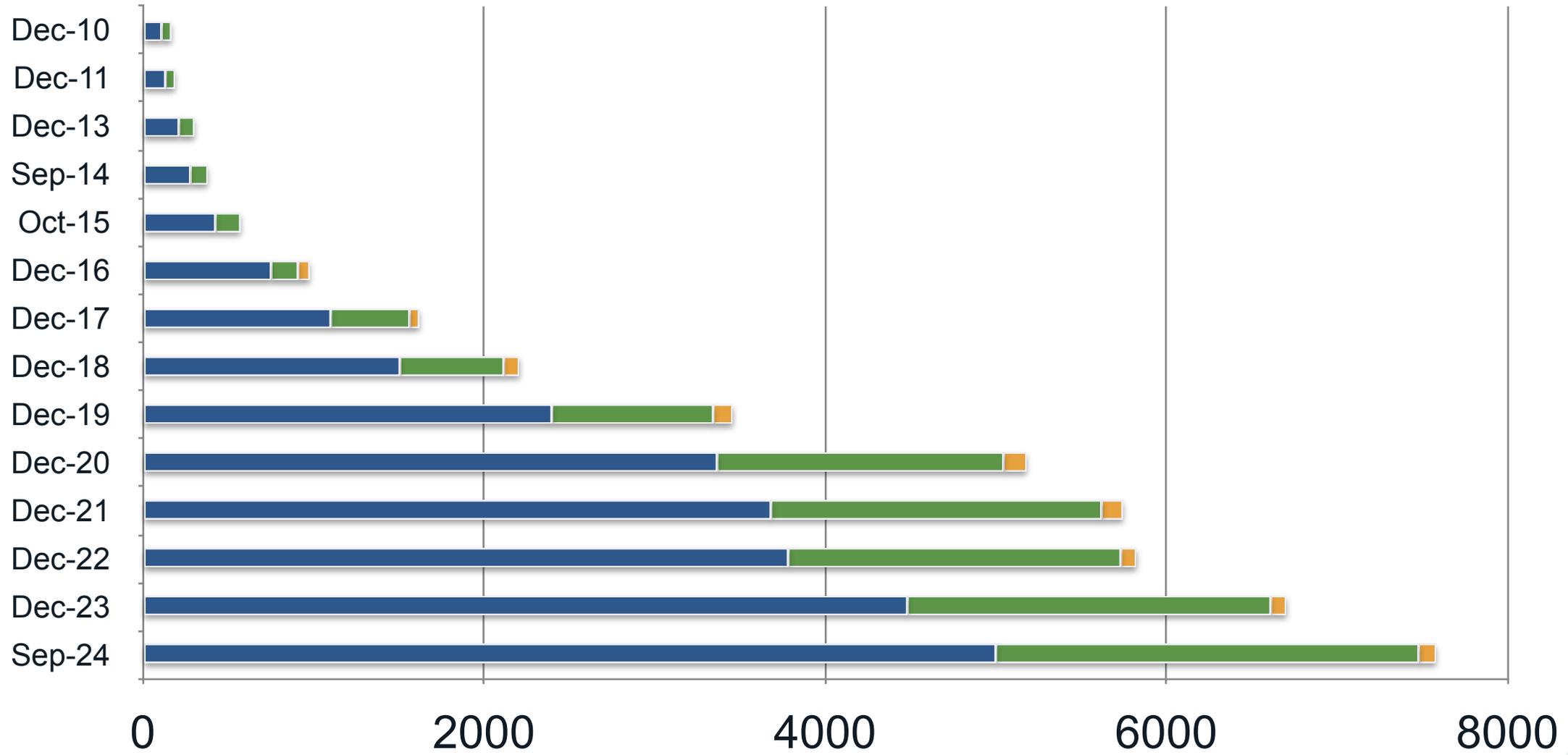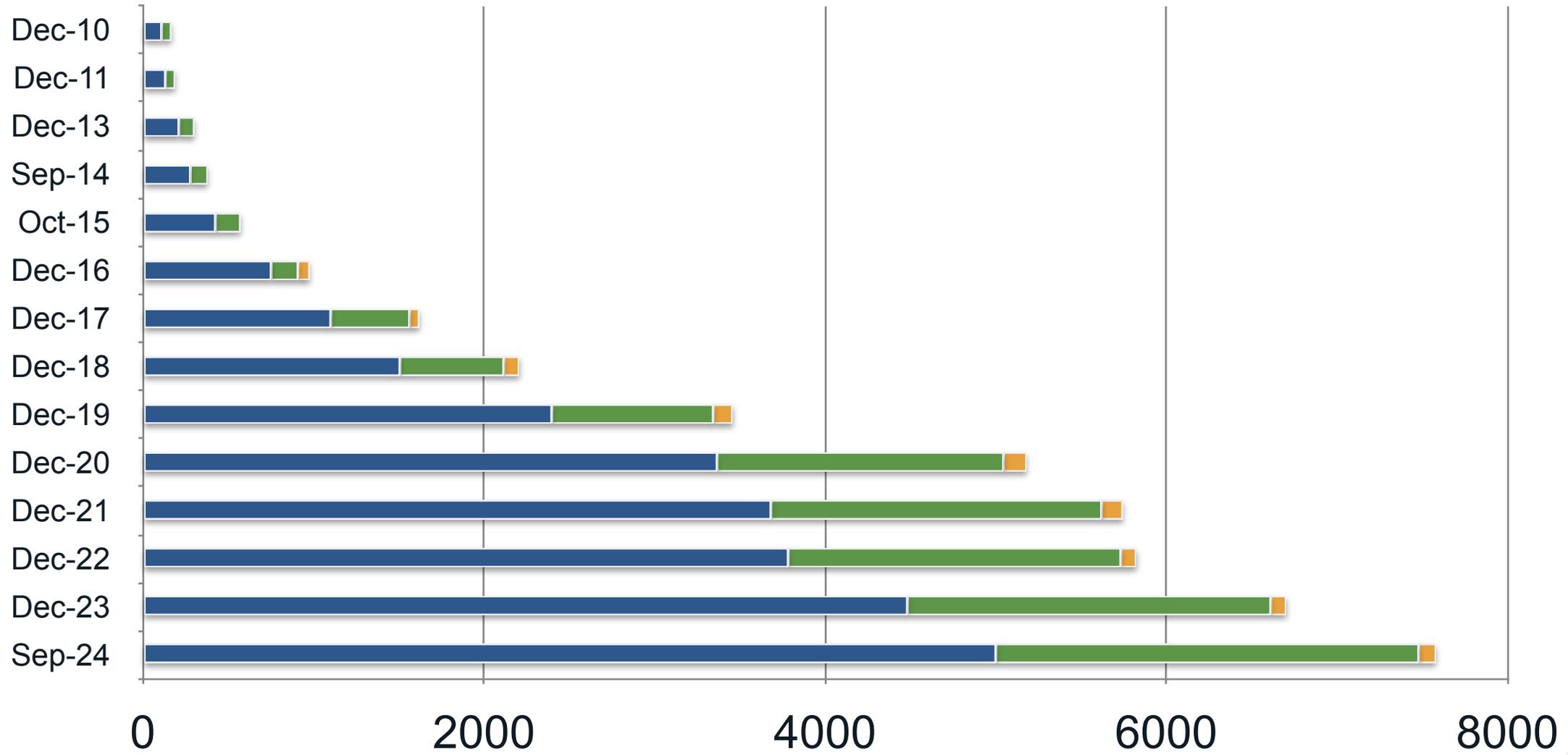
Barry O'Donovan

INEX Members' Meeting

September 12th, 2024, Dublin

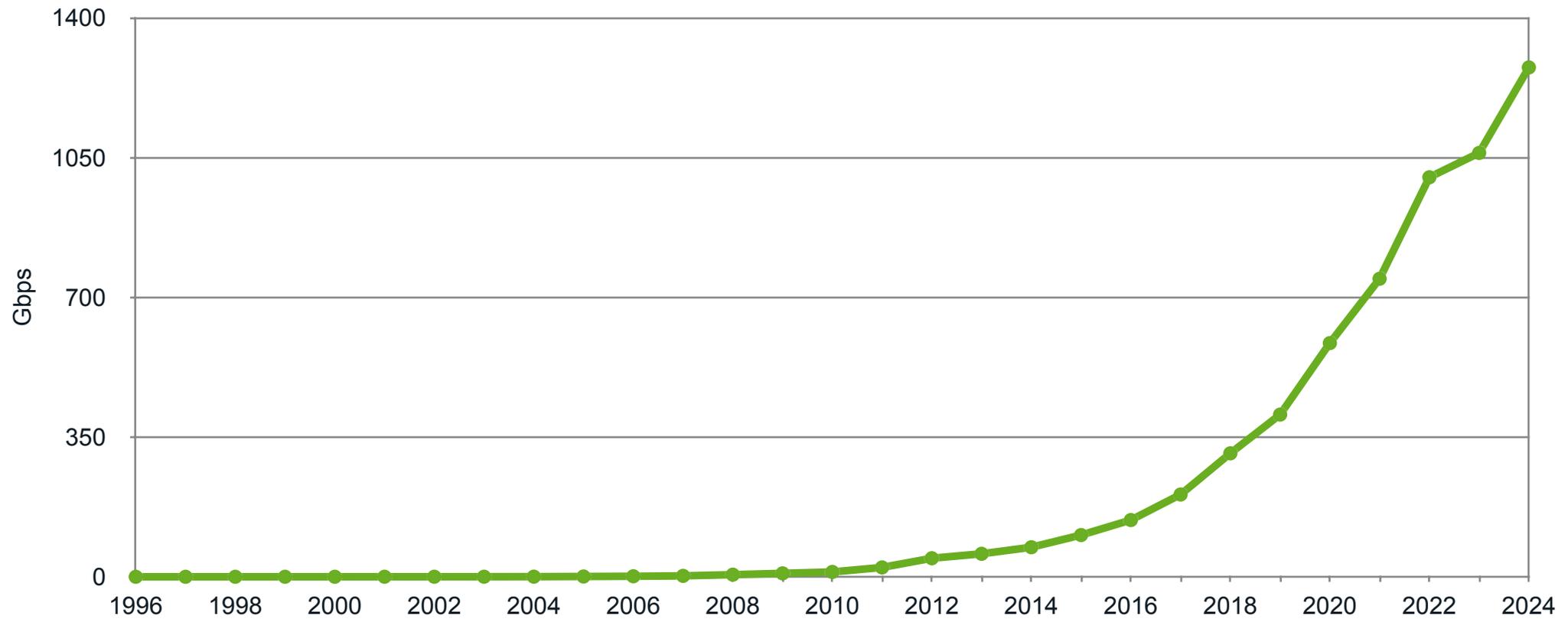INTERCONNECTING NETWORKS AND PEOPLE FOR OVER 25 YEARS

Traffic & Trends

Connected Edge Capacity
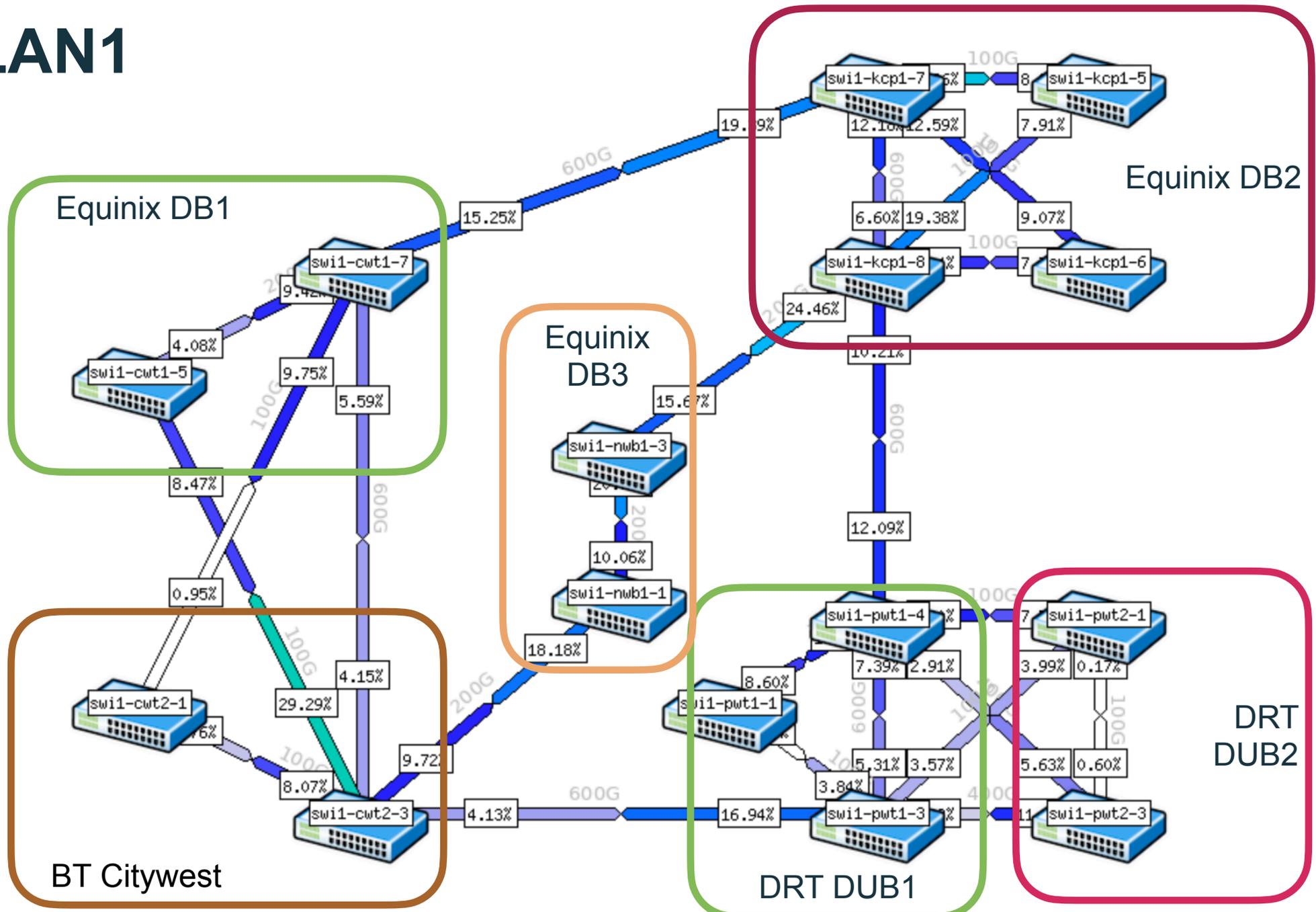
Connected Edge Capacity
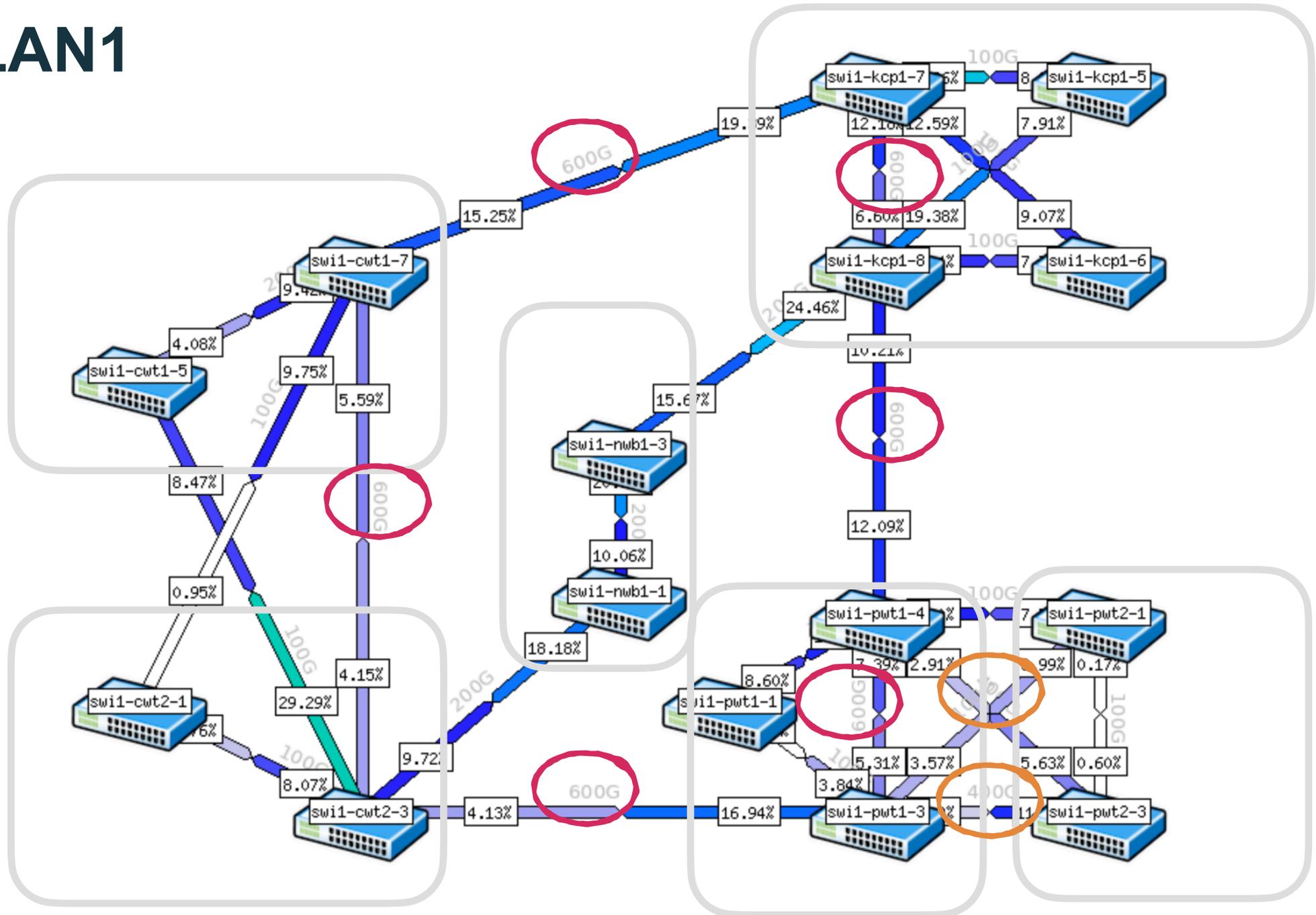
Traffic Peaks :: 1996 - Now

Operations Update

Core Network

INEX LAN1

INEX LAN1

Core Network

- 8.3Tbps of provisioned capacity (March: ~7Tbps)

- INEX LAN1 - NWB1 - 200Gbps currently, plan for >= 300Gbps
- INEX LAN2 ring at 200Gbps - sufficient for now

- Added 100Gb switch to INEX LAN2 in DRT DUB2

- Nick will discuss 2025 plans in December

Quarantine Efficiencies

```
# python3 quarantine.py -4  194.88.240.x  -6  2001:7f8:18:12::x  --mac  xx:xx:xx:xx:xx:xx
+-----------------------------+-------------------------------------+---------+-------+
| Module                      | Test Description                    | Result  | Debug |
+=============================+=====================================+=========+=======+
| ixpquarantine.tests.ping    | device is pingable (small packet size) | [True]  |       |
+-----------------------------+-------------------------------------+---------+-------+
| ixpquarantine.tests.ping    | supports 1500 byte MTU              | [True]  |       |
+-----------------------------+-------------------------------------+---------+-------+
| ixpquarantine.tests.tcp     | device closed on TCP port 21 (ftp)  | [True]  |       |
+-----------------------------+-------------------------------------+---------+-------+
| ......                      |                                     |         |       |
+-----------------------------+-------------------------------------+---------+-------+
| ixpquarantine.tests.dns     | device does not reply to DNS queries | [True]  |       |
+-----------------------------+-------------------------------------+---------+-------+
| ixpquarantine.tests.snmp    | snmp public community disabled      | [True]  |       |
+-----------------------------+-------------------------------------+---------+-------+
| ixpquarantine.tests.ntp     | device ignores NTP queries          | [True]  |       |
+-----------------------------+-------------------------------------+---------+-------+
| ixpquarantine.tests.proxyarp | proxy arp is disabled (DFZ)        | [True]  |       |
+-----------------------------+-------------------------------------+---------+-------+
| ixpquarantine.tests.proxyarp | proxy arp is disabled (INEX LAN2)  | [True]  |       |
+-----------------------------+-------------------------------------+---------+-------+
```

IXP Manager

IXP Manager — New Developer

- New full-time developer since March 2024.
  - Working closely with Barry since and for remainder of 2024

- Fully funded via the "IXP Manager Sponsorship Program"
  - https://www.ixpmanager.org/sponsorship/terms

- Rewrote frontend of www.ixpmanager.org.
  - Laravel/Vue.js -> Laravel/Blade
  - Chart.js graphing of the statistics we collect
  - Non-critical low-risk way to integrate a new developer

IXP Manager — New Releases

- V6.4.0 — May 2024 — Route Server Resilience
    - UI Based Filtering (available to INEX members Dec 2023)
    - Reconfiguration resilience via pairing routers
    - Additional unit test coverage via Laravel Dusk UI (new dev)
    - Platform updates inc. 3rd party security fixes

- V6.4.1 — June 2024 — Bug fix release

- V6.4.x will be the last v6 release and has moved to bug and security fixes only.

IXP Manager — V7 Release

- V7 is now in active development (currently internal repo)
- Targets Ubuntu 24.04.1 LTS, PHP 8.3, Laravel v11
- Psalm - static analysis tool for PHP added to CI pipeline
  - Edits to >100 files by new dev
  - No security issues, stricter typing, modern Laravel use
  - Typical for a project that is ~17 years old (9 on Laravel)
- *340 changed files with 101,497 additions and 24,879 deletions.*
- dotenv frontend for configuration
- Brand new Vagrant environment - `vagrant up`
  - LAMP stack, IXP Manager, snmpsims, mrtg, route servers and clients, Birdseye, …

IXP Manager V7 — P2P Ordering

- P2P Graphs are the most used feature in IXP Manager
- Awkward to get 'total traffic exchanged with peer X'
  - Up to 6 different sources for traffic exchanged with another peer
  - >100 graphs ordered alphabetically
  - Y-axis not aligned

- Long-term solution is a time-series database, but this is a big project.

- Quick solution: "Your top peers yesterday"
  - Available via table and graph ordering

IXP Manager V7 — Diagnostics

- Many sources of information when troubleshooting a member issue
  - Many elements of IXP Manager database configuration
  - IRRDB - prefixes and as sets current
  - Database / switch configuration in sync?
  - Port enabled, up, mtu, speed, optic type
  - Transceiver light levels within spec *(switch support)*
  - IPv4/6 ping tests, arping for mac address
  - BGP sessions (RS1 + RS2 + RC + AS112) x 2 ipv4/6
  - Switchport errors, discards, …

IXP Manager V7 — Diagnostics

Debug	ℹ	Live	Switch port last change registered 6 months ago
Info	ℹ	Live	MTU - configured as null/0 but switch port reports 9214
Debug	ℹ	Live	Admin status: Enabled in IXP Manager; Switch port configured as up
Good	ℹ	Live	Operating status: Enabled in IXP Manager; Switch port reports as up
Debug	ℹ	Live	Within IXP Manager, the phsyical interface is enabled and the switchport is active
Error	ℹ	Live	Switch port speed configured as 10 Gbps; actual switch port speed: null
Trace	ℹ	Live	Switch supports MAU (optic) information via SNMP
Info	ℹ	Live	MAU type: 10GigBaseLR
Debug	ℹ	Live	MAU state: operational

Route Server Resilience

Previous Configuration Update Method

- Via script 4 times per day
- Times for different route servers are offset against each other

1. Sanity check - don't install a rs2 config on rs1 ('rs1-lan1-ipv4')
2. Get new configuration via curl api call and check return value
3. Check downloaded file exists and is non-zero size
4. Check there are member BGP config stanzas in file (grep)
5. Use Bird to parse the config file and check retval
6. Backup old config file and replace with new
7. Is Bird running? Either start or reconfigure as appropriate
8. If reconfiguring and it fails, revert to old configuration file
9. API call to IXP Manager to signal update complete

New Configuration Update Method

- IXP Manager database updated so that all routers now have named pairs

Handle	Name	Vlan	Pair	Peering IP	ASN	Last Updated	Actions
rs1-cork-ipv4	RS1 - Cork - IPv4	INEX Cork	rs2-cork-ipv4	185.1.69.8	43760	5 minutes ago	👁 ▾
rs1-cork-ipv6	RS1 - Cork - IPv6	INEX Cork	rs2-cork-ipv6	2001:7f8:18:210::8	43760	3 minutes ago	👁 ▾
rs1-lan1-ipv4	RS1 - LAN1 - IPv4	INEX LAN1	rs2-lan1-ipv4	185.6.36.8	43760	36 minutes ago	👁 ▾
rs1-lan1-ipv6	RS1 - LAN1 - IPv6	INEX LAN1	rs2-lan1-ipv6	2001:7f8:18::8	43760	36 minutes ago	👁 ▾
rs1-lan2-ipv4	RS1 - LAN2 - IPv4	INEX LAN2	rs2-lan2-ipv4	194.88.240.8	43760	36 minutes ago	👁 ▾
rs1-lan2-ipv6	RS1 - LAN2 - IPv6	INEX LAN2	rs2-lan2-ipv6	2001:7f8:18:12::8	43760	36 minutes ago	👁 ▾

New Configuration Update Method

- IXP Manager database updated so that all routers now have named pairs

- Script now obtains a lock before starting the update process
  - A locked router prevents its pair from updating

- Additionally, old config and new config are diff'd
  - Bird only reloaded if configuration has actually changed
- API signal to mark update as complete also releases lock

- **I.e. A failed update run will prevent the paired router from updating**
- Nagios and IXP Manager UI alerts