

# DENOG15 **IXP Update**

Tim Kleefass

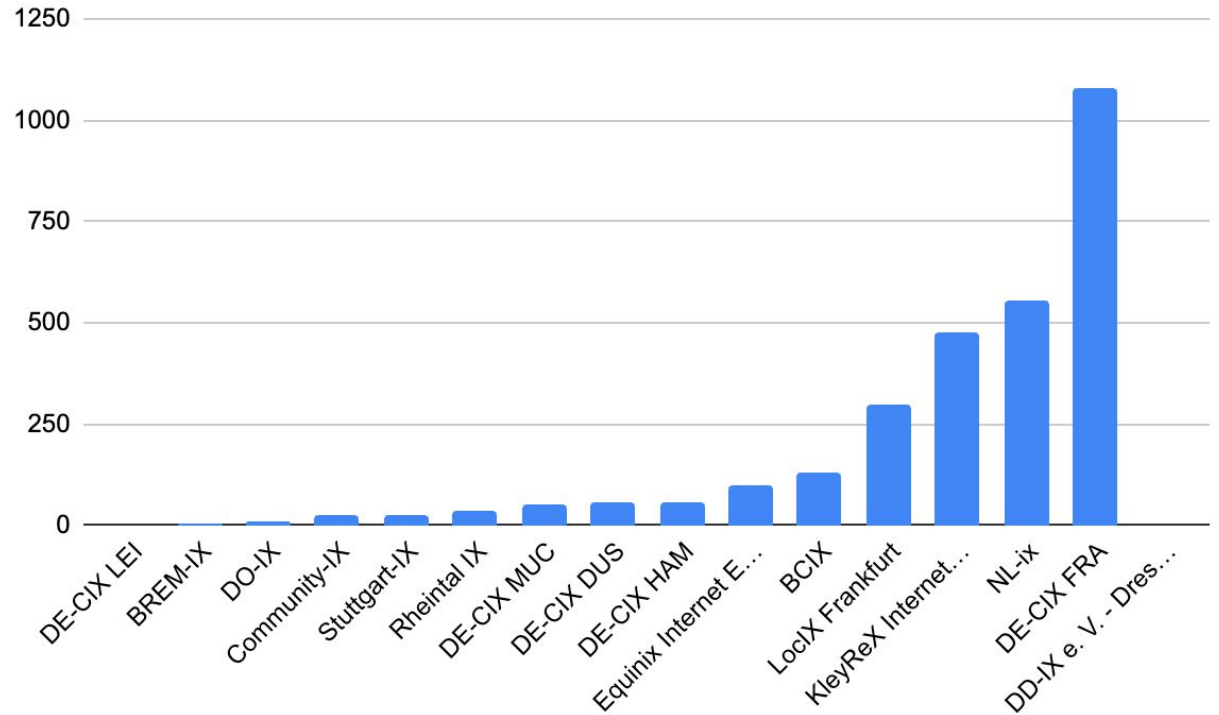
## IXP Update

- As part of the annual DENOOG conference, we would like to give all IXPs in Germany the opportunity to provide a condensed update to the community.
- This year we want to change the talk a bit:
  - We still collect the KPIs and will publish them.
  - But in the talk we will focus more on the bigger picture and new aspects, like sustainability.
- We asked 17 IXPs
  - 12 (16 Metros) responded, same as last year

# Aggregated view on Features

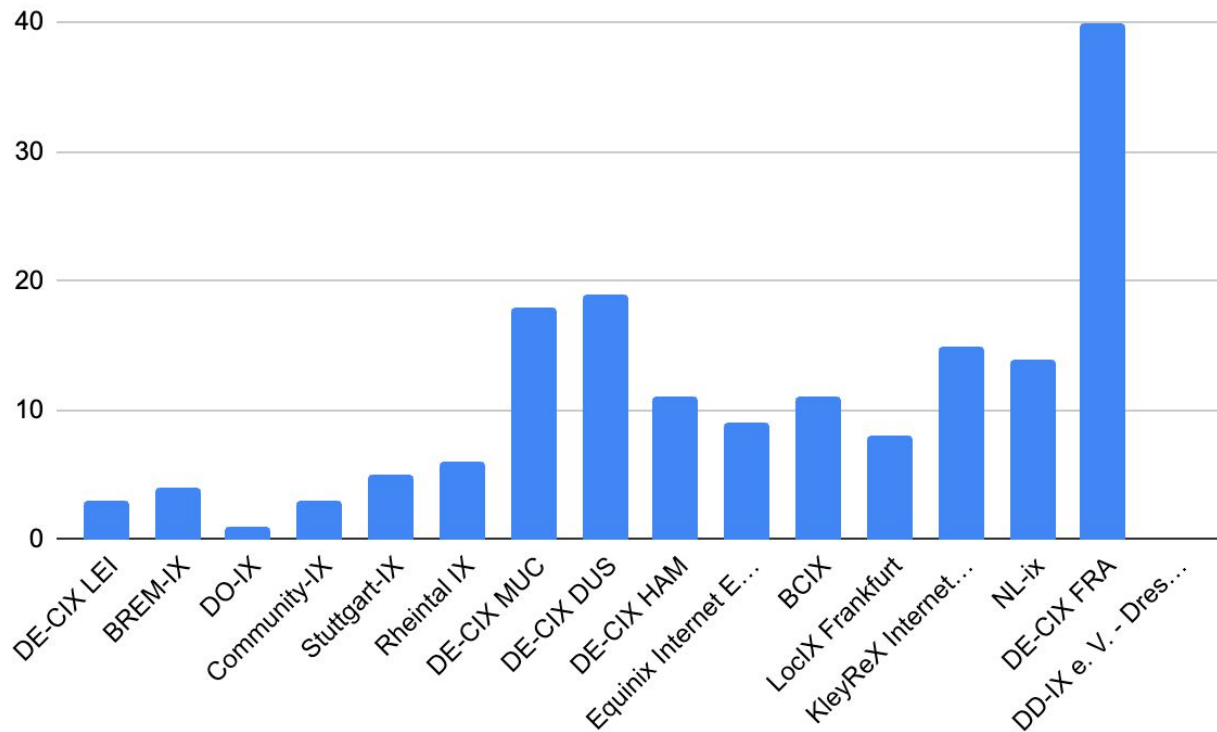
## Number of ASNs (per metro)

Average: 195



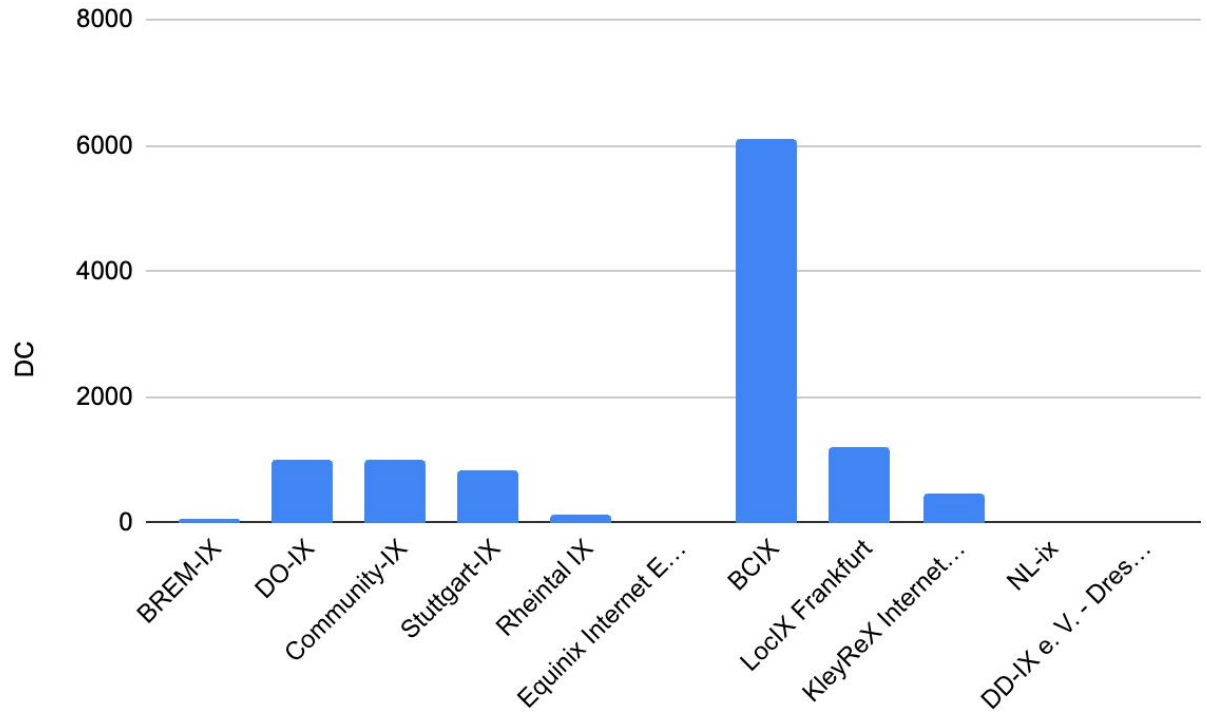
## Number of sites (per metro)

Average: 11



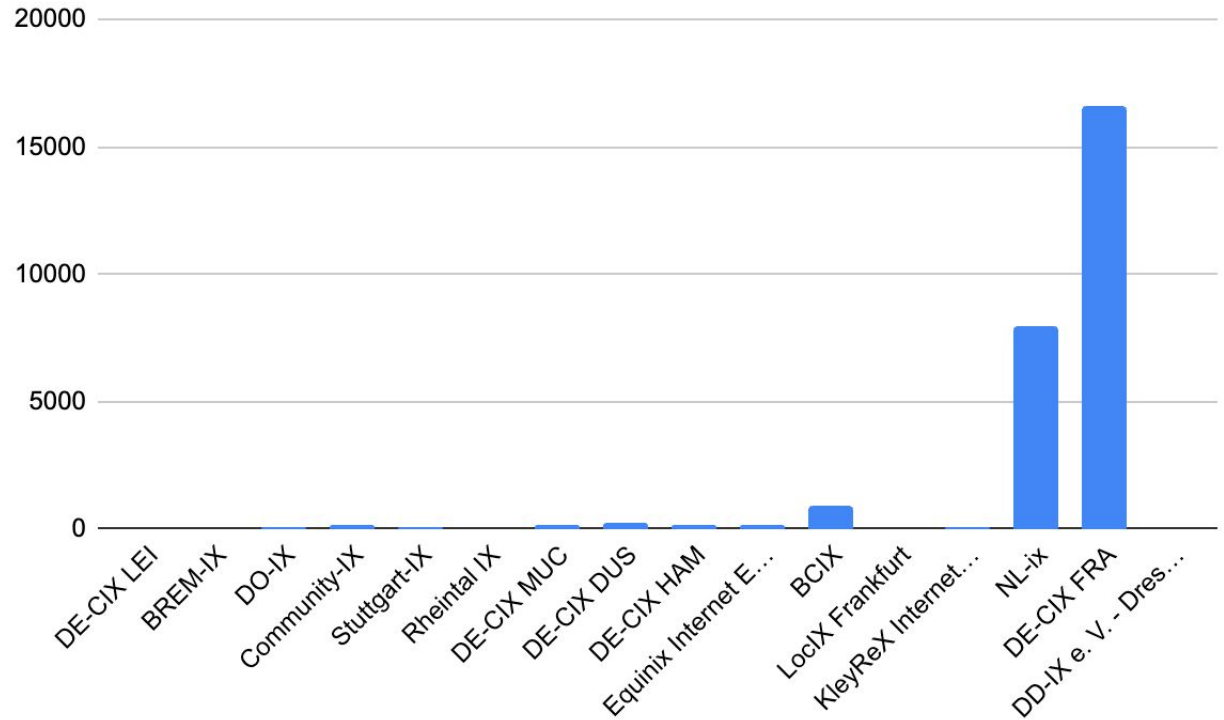
## Connected Capacity

Average: 1352G  
(8x n/a)



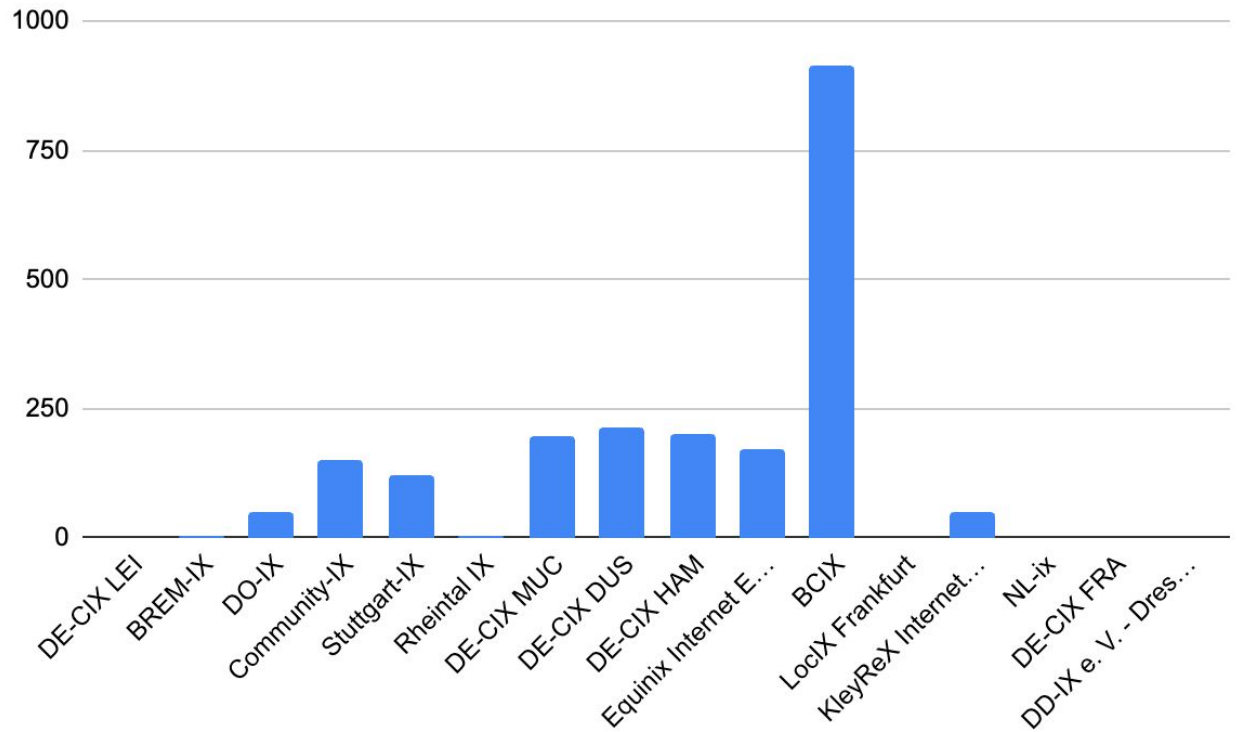
## Peak traffic

Average: 1905G



## Peak traffic

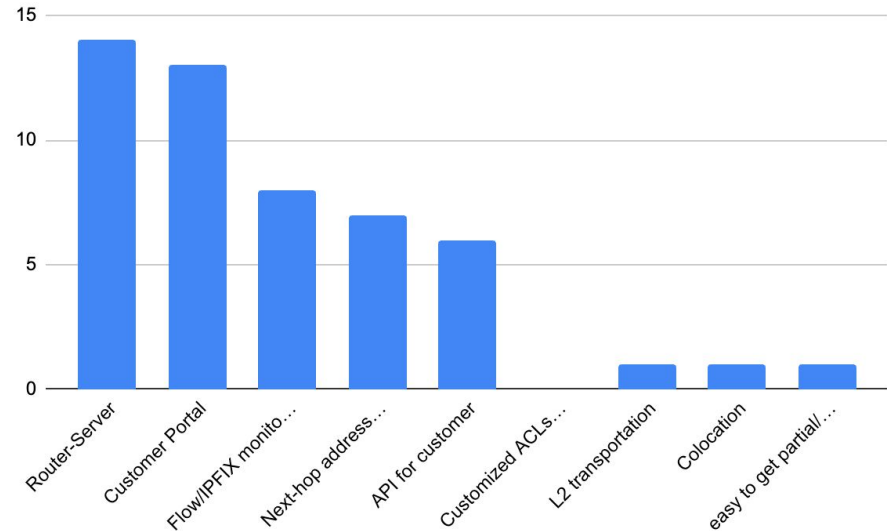
w/o DE-CIX &  
NL-IX 183G





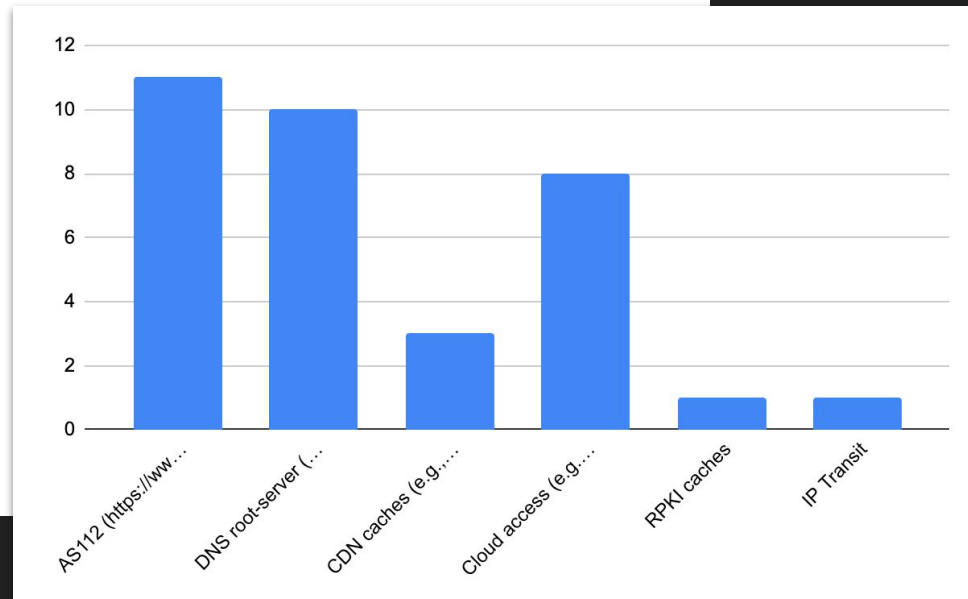
## Services of an IXP

1. Route-Server for the Peering-LAN
2. Customer portal
3. Flow/IPFIX monitoring and/or export to customers
4. Next-hop address for blackholing / blackholing BGP community
5. API for customers
6. Customized ACLs or similar for prefix-based
7. *L2 transportation*
8. *Colocation*
9. *easy to get partial/fulltable bgp connects*



## Connected to the IXP: IP Services

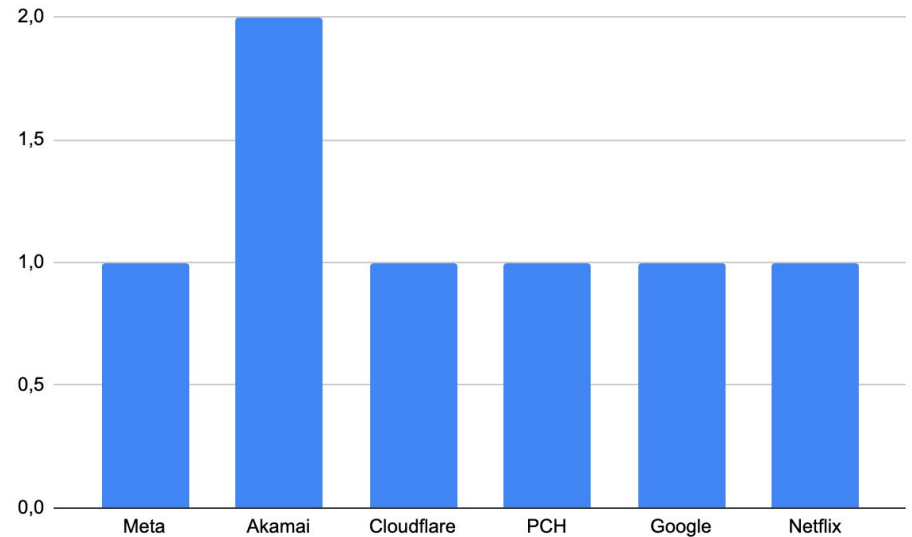
1. AS112 (<https://www.as112.net/>)
2. DNS root-server (e.g., RIPE K-root)
3. CDN caches (e.g., Akamai, Netflix, Google, ...)
4. Cloud access (e.g., AWS, GCP, MS365, ...)
5. *RPKI caches*
6. *IP Transit*



## Connected to the IXP: CDNs

1. Akamai
2. Cloudflare
3. Google
4. Meta
5. Netflix
6. PCH

not  
representative



IXP News / new Features

# Automation

## Automated Peering API

- <https://github.com/bgp/autopeer>  
“Initial proof of concept for Automated Peering API”
- Video from NANOG:  
<https://www.youtube.com/watch?v=kMxsopIROys>

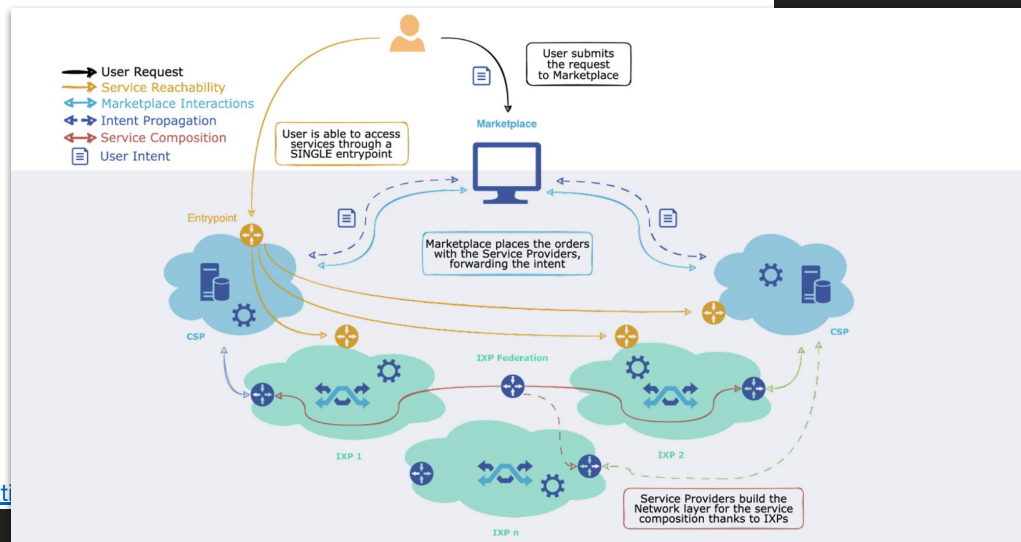
### Peering API Goals and Requirements

- Machine-to-Machine Configuration
  - Reduce human time spent configuring peering
  - Improve network latency
- Security Requirement
  - PeeringDB OAuth support

# Remote Peering

## Proposal for the Federation of IXPs and Cloud Providers

- <https://www.top-ix.org/en/2023/06/05/proposal-for-the-federation-of-ixps-and-cloud-providers/>
- “... proposal to federate the Fabrics of geographically separated IXP's”



# Network slicing / virtualized networks

## DE-CIX Cloud ROUTER and Flex POP

- <https://www.de-cix.net/en/services/cloudrouter>  
“Route traffic directly between public and/or private clouds ...”
- <https://www.de-cix.net/en/services/flexpop>  
“... use DE-CIX's infrastructure As if it was their own”

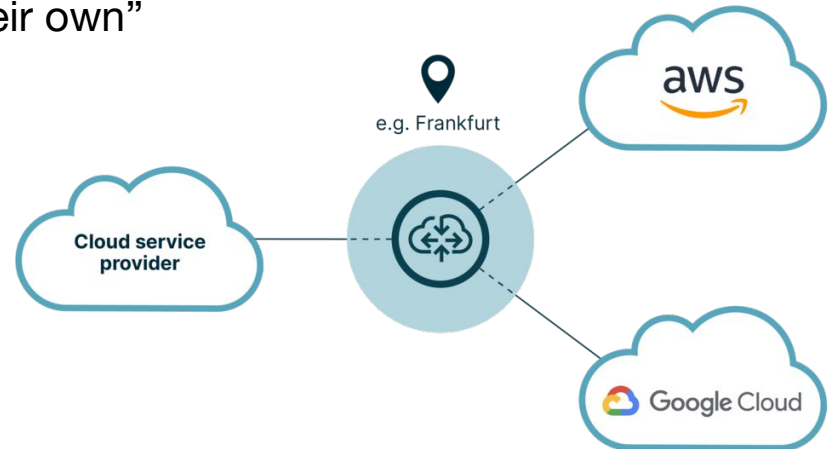


Image source: <https://www.de-cix.net/en/services/cloudrouter>

Sustainability



# Sustainability

## **Question:**

"What do you do about sustainability?"

- Do you have a concept?
- Do you monitor and evaluate your technical environment?
- Did you optimize something specific last year and/or can give an example?"

## **Answers:**

- A main step in sustainability was obtained in reducing electric power usage of our whole network with exchanging all hardware few years ago to a maximized stage.
  - Yes we do monitor all devices and certain activities to make sure everything works fine
- 100G-LR Transceiver save power (on both sides)

KleyReX

DE-CIX

## Sustainability (cont.)

- We will soon operate most of our server hardware in our PoP with the lowest PUE value (1.15).
- Our DC is powered by renewable energy (certificat wise) + we building own PV for solar power here for dc extension space
- IX hosted in Equinix utilizes 100% renewable energy, aligning with our commitment to achieving carbon neutrality by 2030 and net-zero emissions by 2040
- From 2025, around 1,000 households are to be supplied cost-neutrally with excess heat generated by local Equinix data centers. A total of three locations (FR4, FR6, and FR8) are set to be connected to the heat exchanger

Rheintal IX

Equinix

# Outlook

## Next year: develop the format further

- What are important KPIs of an IXP for you?
  - And how should they be presented?
- Extend IXP-Update to a track?
  - Let IXPs submit the small questionnaire
  - Let the PC pick the most interesting topics in the fields:
    1. Technology
    2. Sustainability
    3. Corporate form / governance
  - Let the IXPs speak about the chosen topics
- Please write us in the survey (or to [ixp-update@denog.de](mailto:ixp-update@denog.de))

Fotos



DD-IX







**Matthias**



**Tassilo**



**Marcel**



**Melody**



**Alban**



DD-IX



**Talk to us!**



**Matthias**



**Tassilo**



**Marcel**



**Melody**



**Alban**



DE-CIX





Das gesamte BCIX Team und unsere Sponsoren  
wünschen allen Gästen einen schönen Abend auf  
dem BCIX Stammtisch.



Das gesamte BCIX Team und unsere Sponsoren  
wünschen allen Gästen einen schönen Abend auf  
dem BCIX Stammtisch.



BCIX









NL-IX





Equinix Internet  
Exchange



Thank you

# IXP statistic

Not shown in talk on DENOG15

## BCIX

- **Highlight of last year:** first 400G ports, 100G LR1 optics, technical support or sponsoring of IXP.MK and DD-IX
- **Most significant change last year:** change to EVPN, rebrand of BCIX visuality and Logo
- **The Next Big Thing:** ISO 27001

	Sites	Local ASNs	Local capacity	Peak Traffic
Berlin	11 →	133	6.1T ↗	913G ↗

## Stuttgart-IX

- **Highlight of last year:**  
A great Beerling with visitors from different federal states
- **The Next Big Thing:**  
New Routers once they finally arrive

	Sites	Local ASNs	Local capacity	Peak Traffic
Stuttgart	5 →	28	826G ↗	122G ↗

## DO-IX

- **Highlight of last year:**  
Unfortunately nothing, due to time constraints :-(
- **Most significant change last year:**  
Finally got around to automating the infrastructure a bit more with Ansible
- **The Next Big Thing:**  
MANRS, new Website and more Marketing is on the roadmap for 2024

	Sites	Local ASNs	Local capacity	Peak Traffic
Konstanz	1 →	11	1T ↗	50G ↘

## KleyReX Internet Exchange

- **Highlight of last year:** upgrades of different POPs and Interconnections to offer >10G ports
- **Most significant change last year:** introducing multi 100G/400G WDM systems to certain network parts. expanding our footprint at colofabrik datacenter as main network and service hub
- **The Next Big Thing:** we do have some ideas we are working on but better tell you when it's going public in some future

	Sites	Local ASNs	Local capacity	Peak Traffic
Frankfurt	15+	475	481GB	50G

## LocIX Frankfurt

- **Highlight of last year:** As LocIX is non-profit we got some new Sponsoring Companies which provide Transport, Colocation and Hardware
- **Most significant change last year:** Reaching nearly 300 ASN connected in Frankfurt
- **The Next Big Thing:** Installing new 100G Hardware, and connect some "Big Players" to it.

	Sites	Local ASNs	Local capacity	Peak Traffic
Frankfurt	8	297	1.2T	n/a



## Rheintal-IX

- **Highlight of last year:** Finalist of the European Broadband Awards 2023 in the category 'Cross-border and international connectivity'. The award ceremony is tomorrow. Please keep your fingers crossed for us...
- **Most significant change last year:**  
Implementing the new switching platform
- **The Next Big Thing:**  
Finally getting the ring around the Lake of Constance done, including a second PoP on German soil in Friedrichshafen

We are thinking about a new name for our IXP. "Rheintal IX" doesn't seem to fit anymore...

	Sites	Local ASNs	Local capacity	Peak Traffic
Lake of Constance	6 ↗	36	144G ↗	6G ↗

## DD-IX e. V. - Dresden Internet Exchange

- **Highlight of last year:** The Founding of the DD-IX e. V. And our first presentation at the BCIX roundtable
- **Most significant change last year:**  
Since we just started with the IX in Dresden the year has been full of changes
- **The Next Big Thing:**  
Officially opening our first, community work, many conferences

	Sites	Local ASNs	Local capacity	Peak Traffic
Dresden	to	new	for	stats

## Community-IX

- **Highlight of last year:** We just built a new PoP in Hamburg. IPHH sponsors the colocation and some cross connects and LWLcom is the first connectivity and IP transit sponsor. Local Communities will be connected after RIPE87
- **The Next Big Thing:**  
We are planning to build a PoP in Duesseldorf

	Sites	Local ASNs	Local capacity	Peak Traffic
Berlin	3	27	1T	150G
Frankfurt	2	16	250G	12G
Hamburg	1	1	20G	0

## NL-IX

<https://www.nl-ix.net/about/contact/> or [sales@nl-ix.net](mailto:sales@nl-ix.net)

- **Highlight of last year:** 2.4Tbps of capacity Frankfurt <> Amsterdam, based on 400G waves; first native 400G peering port in Frankfurt connected
- **Most significant change last year:** 400G available in Frankfurt on Nokia platform
- **The Next Big Thing:** connecting enterprises to the peering LAN, 800G in Frankfurt

	Sites	Local ASNs	Local capacity	Peak Traffic
DE	14 (100+) ↗	556	n/a	7.98T ↗

Yes

## BREM-IX

- **Highlight of last year:** nothing new, one new peer, traffic peaks now around 5gig (as prior 2gig?)
- **Most significant change last year:** nothing, year was a bit boring regarding bremix
- **The Next Big Thing:** Currently again expanding our datacenter in Bremen, potentially dragging in new peers / customers

	Sites	Local ASNs	Local capacity	Peak Traffic
Bremen	4 →	7	70G ↗	5G ↗

## Equinix Internet Exchange Frankfurt

- **Highlight of last year:** Our IXP is enriched by our Equinix Fabric and the continuously growing ecosystems within our IBX portfolio. Equinix celebrates the company's 25th anniversary
- **Most significant change last year:** 10% new members over the last 12 months in Frankfurt. IX hosted in Equinix utilizes 100% renewable energy, aligning with our commitment to achieving carbon neutrality by 2030 and net-zero emissions by 2040.
- **The Next Big Thing:** From 2025, around 1,000 households are to be supplied cost-neutrally with excess heat generated by local Equinix data centers. A total of three locations (FR4, FR6, and FR8) are set to be connected to the heat exchanger

	Sites	Local ASNs	Local capacity	Peak Traffic
Frankfurt	Campus	100+		170G

## ECIX

- **Highlight of last year:** The outcomes in current times are no big change as during last year
- **Most significant change last year:** Consolidations and suspected upgrades across metros
- **The Next Big Thing:** Deployment of bigger than 100G ports

	Sites	Local ASNs	Local capacity	Peak Traffic
Frankfurt	28 ↗	101	4.0T ↗	565G ↗
Dusseldorf	5 →	115	4.0T ↗	827G ↗
Hamburg	4 →	60	1.2T ↗	105G ↗
Berlin	5 →	49	0.9T ↘	149G ↗
Munich	3 ↗	42	1.1T ↗	128G ↘

## KA-NIX

- **Highlight of last year:** n/a
- **Most significant change last year:** n/a
- **The Next Big Thing:**  
Migrating all members to a new own dedicated hardware platform

	Sites	Local ASNs	Local capacity	Peak Traffic
Karlsruhe	3	6	72G	17,2G



## N-IX

- **Highlight of last year:** n/a
- **Most significant change last year:** n/a
- **The Next Big Thing:** n/a

	Sites	Local ASNs	Local capacity	Peak Traffic
Nuremberg	6 →	26 ↗	n/a	20G

## DE-CIX

- **Highlight of last year:**  
DE-CIX Leipzig & Cloud ROUTER
- **Most significant change last year:**  
Migration to Peering LAN 2.0 - EVPN
- **The Next Big Thing:**  
Core Upgrade Frankfurt & finalizing edge router migration to next level NOKIA Routers in Frankfurt

## DE-CIX (cont.)

	Sites	Local ASNs	Local capacity	Peak Traffic
Frankfurt	25+ ↗	(1092)	n/a	13.65T ↗
Munich	6 →	(230)	n/a	170G ↗
Hamburg	3 →	(221)	n/a	264G ↗
Dusseldorf	5 →	(274)	n/a	285G ↘
Leipzig	2 ↗	TBD	TBD	TBD



## Costs of Peering

- There was several work done
- Total costs are based in different factors
  - Costs of backbone / transport to peering locations
  - Costs of space / rack / power in locations (datacenters)
  - Costs of Internet Exchange Points

Source of information e.g.

- <https://www.infrapedia.com/>
- <http://peering.exposed/>
- <https://peeringdb.com/>
- <https://ixpdb.euro-ix.net/en/>
- <https://www.pch.net/ixp/data>

Once you have decided for one location, you will stick there a while.

# Metrics for Peering

- Entwicklung lokale carrierneutrale RZs, the place to be?

Statistiken zusammen als Gesamtgrafik  
sowie Auswertung

- Peering zu PNI
- Fußball / Premierleague via IXPs (bspw. Flavio)
  - > Trafficauswertung von waipu.tv ??
- Traffic zu unique ASN ?