



euro-IX

Euro-IX Update

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➤ What do we do?

- 2 Forums per year
- Maintaining the Website, database and tools
- Mailing Lists
- Newsletter – Subscribe here: <https://www.euro-ix.net/news-and-events/newsletter/>
- Working Groups
- Working with IEEE Ethernet Study Group
- Annual European IXP Report
- Twinning Program
- Benchmarking

Why do we do it? Good of the community!

> Association of IXPs

76 affiliated IXPs:

- 53 IXPs in the Euro-IX Region
=> in 49 Countries, operating over 100 Peering LANs
- 23 IXPs from the rest of the world
- Newest Members:
STHIX (Sweden), TOUIX (France)

> Association of IXPs

13 Patrons

- ADVA Optical Networking
- Alcatel-Lucent
- Brocade
- BTI Systems
- **ECI Telecom**
- Extreme Networks
- **FlexOptix**
- Huawei
- Interxion
- Juniper Networks
- MRV
- Telecity
- Telehouse



IX-F Database

IXP Database Project

- There are many IXP Databases...

https://www.peeringdb.com/private/exchange_list.php

Navigation: Home Page, Logout, Your Records, Peering Record, User Account

Search Public Exchange Points

Exchange Name: City:

IP Block: Country:

Media Type: Continental Region:

Search

Search Records: Networks, Exchange Points, Facilities, Common Points

Suggestions: Comments, New Exchange, New Facility

Help: FAQ, Statistics

List of Public Exchange Points

Exchange Name	Long Name	City/Region	Country	Continental Region	Media Type	Participants
AIX	Alps AIX Internet Exchange	Klagenfurt	AT	Europe	Ethernet	4
ACTIX	ACT Internet Exchange	Canberra, ACT	AU	Australia	Ethernet	11
ADN-IX		Valence	FR	Europe	Ethernet	0
AlbertaIX	AlbertaIX	Calgary	CA	North America	Ethernet	4
AMPATH	AMPATH - Florida International University/CISRA	Miami	US	North America	Multiple	0
AMS-IX	Amsterdam Internet Exchange	Amsterdam	NL	Europe	Ethernet	1229
AMS-IX Caribbean	Amsterdam Internet Exchange Caribbean	Curacao	CW	South America	Ethernet	11
AMS-IX Hong Kong	Amsterdam Internet Exchange Hong Kong	Hong Kong	HK	Asia Pacific	Ethernet	27
AMS-IX NY	AMS-IX New York	New York	US	North America	Ethernet	14
Angola-IXP / ANG-IXP	Angola Internet Exchange point	Luanda	AO	Africa	Ethernet	3
APX	Auckland Peering Exchange	Auckland	NZ	Asia Pacific	Ethernet	56
ArmIX	Armenian Internet Exchange	Yerevan	AM	Europe	Ethernet	0
ASIX6	Academia Sinica Internet Exchange 6	Taipei	TW	Asia Pacific	Multiple	1
ASSOCIQ	mpls ASSOCIQ	Tokyo, Nation wide	JP	Asia Pacific	Multiple	0
AZIX	Arizona Internet Exchange	Phoenix, Arizona	US	North America	Ethernet	10
B-IX	Balkan Internet Exchange	Sofia	BG	Europe	Ethernet	13

www.datacentermap.com/ixps.html

Map Database Search Request quote Research About Login / Signup

Internet Exchange Points
→ IXPs

On the map below you can see an overview of internet exchange points (IXPs) around the world, zoom in and click on a city marker to see the internet exchange points available in the city.

Map | Satellite

How to Safely Avoid Overcooling Your Data Center and Save Money Today

DOWNLOAD NOW

Peerlink Research Related Reports & White Papers

- Multi-Tenant Datacenter: North American Providers - 2013
- To Build or Not to Build - Part 1: Should Service Providers Build or Lease Their Datacenters?

Related News

- Almalat first connected customer at DE-CIX New York
- DE-CIX New York signs on Almalat as its first customer
- Microsoft Adds Private Azure Units at 37 European Data Centers
- Almalat Becomes First DE-CIX New York Customer
- TelecityGroup adds Microsoft Azure to Cloud-IX ecosystem

Latest Facilities

- Caronet XB, Charlotte

TRUSTED SERVER HOSTING SINCE 1994

Managed Hosting Hybrid Hosting

www.telegeography.com/research-services/internet-exchange-points-directory/

TeleGeography

AUTHORITATIVE TELECOM DATA

RESEARCH SERVICES CUSTOM RESEARCH TELECOM MAPS TELECOM RESOURCES

HOME > RESEARCH SERVICES > Internet Exchange Points Directory

Internet Exchange Points Directory

The data provided in our Internet Exchange Points Directory is now accessible via our free interactive [Internet Exchange Map](#). The map provides information for active Internet exchanges and buildings. Select an Internet exchange from the list provided to view the buildings in which that exchange is present. Or, select a building from the map projection to access data about the building, including its street address and a list of Internet exchanges present there.

The Internet Exchange Map is based on data compiled by TeleGeography, and is updated regularly to ensure that it is as accurate and as up-to-date as possible. Click [here](#) for more information about the map, or try it out at [www.internetexchangemap.com](#).

Related Service

Interactive Internet Exch

An interactive, regularly exchanges worldwide.

Colocation Database

Comprehensive online

https://prefix.pch.net/applications/ixpdir/

PCH Packet Clearing House

Log In search.pch.net

Home About Purpose Technology Resources Calendar Sponsors Contact

EDUCATION RESEARCH POLICY

Help

- Show inactive IXPs
- Hide inactive IXPs
- Show summary views
- Submit a change
- Featurebug report

World map showing Internet Exchange Points (IXPs) worldwide.

Region	Country	City	Internet Exchange Name	Participants	Traffic	Peering	Established	URL
Asia-Pacific	Alghanistan	Kabul	National Internet Exchange of Afghanistan	5	5	5	May 2011	
Algeria	Algeria	Algiers	Algeria Internet Exchange	5	5	5	2013	
Angola	Angola	Luanda	Angola Internet Exchange	10	13M	5	2008	
		Luanda	Ponto de Interconexão Internet Angola	5	5	5	5	
Latin America	Argentina (10)	Bahia Blanca	NAP CABASE Bahia Blanca	12	180M	5	2013	
		Buenos Aires	NAP CABASE Buenos Aires	79	7.04G	100	Aug 2006	
		Cordoba	NAP CABASE Cordoba	5	100M	5	Aug 2012	

➤ Existing database issues

- No single trusted data source
- Poor quality & no or very little APIs / automation
- “We’ll only peer with you, if you’re in PeeringDB”
- Databases are updated manually
- We’re moving into a world of automation
- ...IXPs hold accurate information but lack automation

> Historical Problem



PeeringDB - Database for networks and data centres

IX-F Database

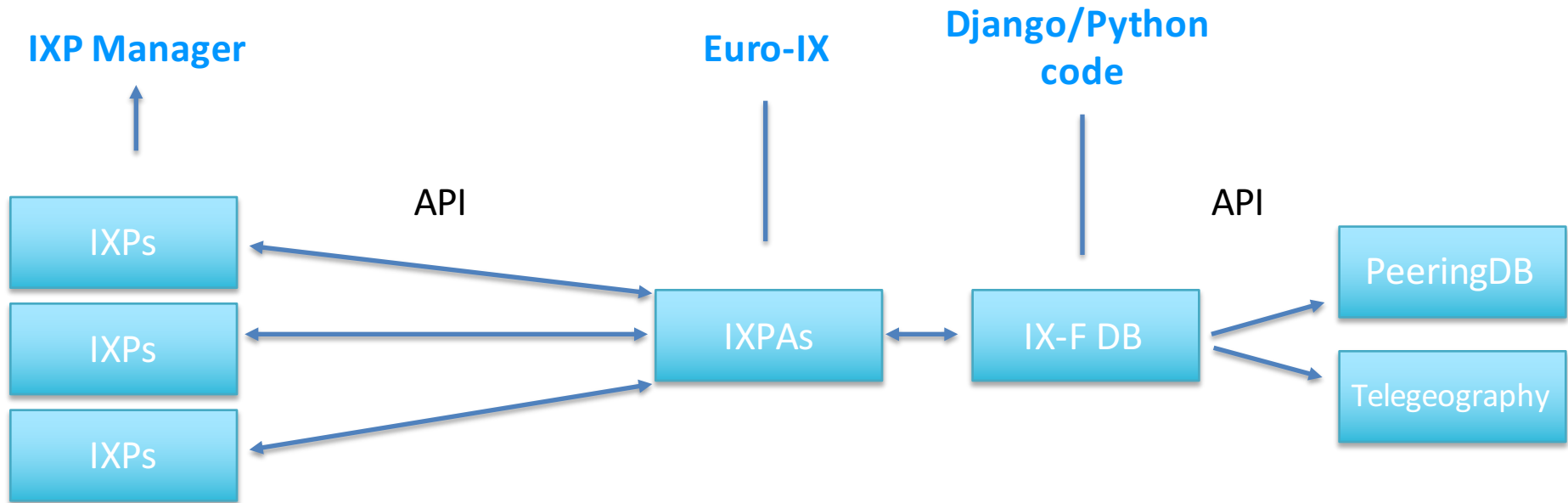
IX-F DB API server written using Python / Django, which can:

- get / create / update / delete IXP, organisation, IP addressing and network information
- all interaction is JSON
- all non-sensitive information will be publicly available
- Members of IXPA's will be able to create, update and delete IXPs from the databases.
- <https://db.ix-f.net/api/ixp>

➤ IX-F Database

- We have a proof of concept client to interact with this database in Python including unit test code at:
<https://github.com/euro-ix/ixf-client-py>
- The PHP version of this with unit tests also available at:
<https://github.com/euro-ix/ixf-client-php>

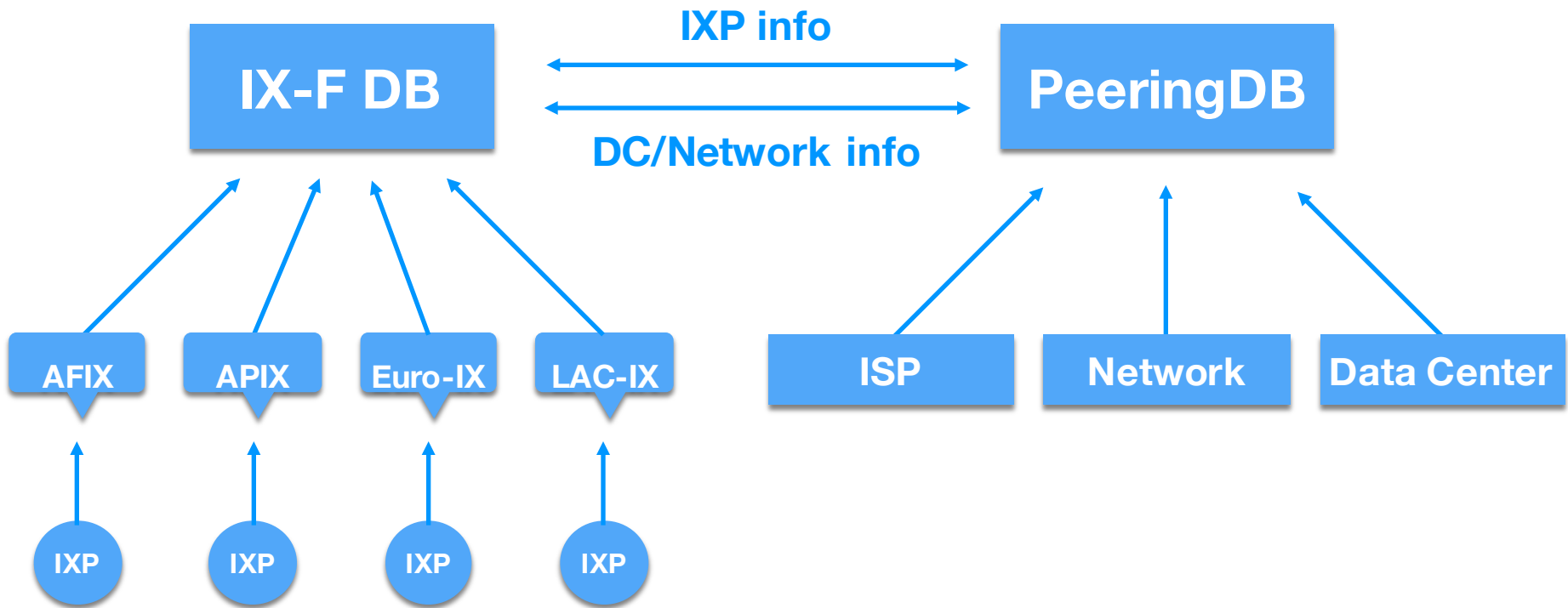
> Where we are...



➤ IX-F Database

Where are we..

- Designed for IXPs to export (push) data with minimal intervention
- Simple modifications can be used for IXP to IXPA or to PeeringDB
- At present Euro-IX is the only IXPA interface ready to talk with PeeringDB - we encourage **ALL** IXPs to use the Euro-IX website while others are being worked on.
- APIX started work, LAC-IX and AFIX to come..





Euro-IX IXP JSON Schema

➤ A real life example..

Thanks to Andy Davidson for the example!

“Who am I not peering with at LONAP?”

- You have a script which load direct adjacencies into an array.
- You need a complete and canonical list of peers to compare differences

IX-F Database

- <https://db.ix-f.net/api/ixp>

Very very easy mate

```
{
  "ixp_info": {
    "status": "active",
    "updated": "2014-02-17T10:07:51Z",
    "name": "London Network Access Point",
    "created": "2011-08-16T13:26:26Z",
    "shortname": "LONAP",
    "ixp_id": "IX-F#18"
  },
  "timestamp": "2015-09-16T08:17:31.116Z",
  "version": "2014110401",
  "member_list": [
    {
      "asnum": 20915,
      "name": "100 Percent"
    },
    {
      "url": "http://www.2connectbahrain.com/",
      "asnum": 51406,
      "name": "2Connect"
    },
    {
      "url": "http://www.34sp.com",
      "asnum": 41357,
      "name": "34SP.com Ltd"
    },
    {
      "url": "http://4d-dc.com/",
      "asnum": 31463,
      "name": "4D Data Centres"
    },
    {
      "url": "http://www.afilias.info",
      "asnum": 12041,
      "name": "Afilias"
    },
    {
      "url": "http://www.akamai.com",
      "asnum": 20940,
      "name": "Akamai Technologies"
    },
    {
      "url": "http://www.alentus.com",
      "asnum": 21321,
      "name": "Alentus UK Ltd"
    },
    {
```

ewP Switc Ports ports impo ports admin Circu circu VXCn instal db_sc apiw€ switc test_

```
import urllib, json

url = "http://db.ix-f.net/api/ixp/18/member-list"
response = urllib.urlopen(url)

ixpdata = json.loads(response.read())

my_peers = [8916,20940,20915, 51406, 41357, 31463, 12041, 21321, 12536, 16509, 20712, 33920, 4

for member in ixpdata["member_list"]:
    if member["asnum"] not in my_peers:
        print "Get some peering with " + str(member["asnum"]) + " (" + member["name"] + ")"
```

```
enigma:Desktop andy$  
enigma:Desktop andy$ python ixp.py  
Get some peering with 6871 (PlusNet)  
Get some peering with 8689 (PowerGroup (Power Internet Ltd))  
Get some peering with 8676 (PRT Systems)  
Get some peering with 28792 (Public Internet Limited)  
Get some peering with 31402 (Rank Interactive (Blue Square Limited))  
Get some peering with 35662 (Redstation)  
Get some peering with 5552 (Redstone Communications Ltd)  
Get some peering with 5503 (RM Education Plc)  
Get some peering with 51409 (Sectorsix)  
Get some peering with 50056 (Advantage Interactive Ltd)  
Get some peering with 29550 (Simply Transit Ltd.)  
Get some peering with 48961 (Warwicknet Ltd)  
Get some peering with 20738 (Webfusion)  
Get some peering with 44444 (Websense Hosted R&D Ltd. (UK))  
Get some peering with 49158 (Wifinity)  
Get some peering with 13037 (Zen Internet)  
enigma:Desktop andy$
```

➤ Why not just use the IXPs own data?

- This gives you a single API for many IXPs
- Get the same format for all IXPs, it's standard - wohoo!
- Data is fed from the IXP - IXPs have accurate data!
- Portable, supportable and scaleable!

➤ Euro-IX IXP JSON Schema

- Contains both IXP data & IXP Participant data
 - ASN (member list), locations, switch, IXP info
- Open, consistent & an atomic design
- Currently 12 IXP independent implementation
- Open source implementation in IXP Manager
- Source available on github:
<https://github.com/euro-ix/json-schemas>

➤ In search of accurate information

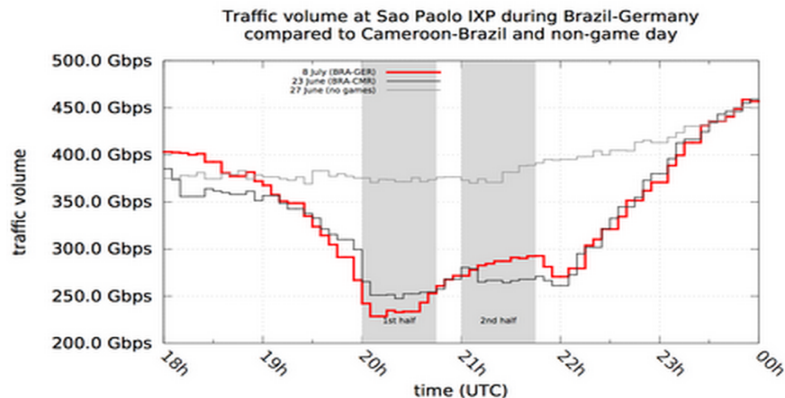
- Give network operators the choice of getting accurate information from either IX-F or PeeringDB
- This data can be obtained using APIs
 - PeeringDB & Telegeography
- Increases use of automation
 - saves time, saves money, increases accuracy.



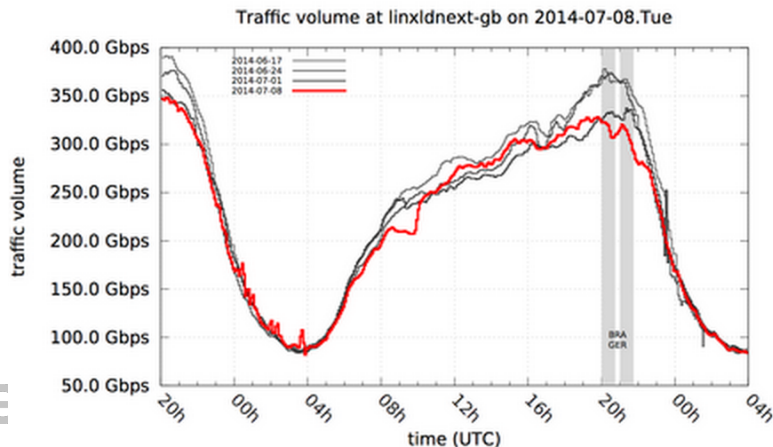
Euro-IX projects

➤ Traffic during FIFA World Cup

- Collaboration with RIPE NCC
 - <https://labs.ripe.net/Members/emileaben/internet-traffic-during-the-world-cup-2014>



Traffic at PTT Sao Paulo during the Brazil vs. Germany Game



Traffic at LINX London (Extreme LAN) during the Brazil vs. Germany Game

➤ Other Projects

- IXP BCOPs updated - <https://www.euro-ix.net/euro-ix-bcp>
- IXP Bogon list Project with Team Cymru - <http://www.team-cymru.org/ixp>
- Work done by the Data TF is being implemented, thanks to Elisa and Nick - <https://www.euro-ix.net/euro-ix-bcp> we now have an IXP Member list JSON Scheme



Euro-IX Tools

➤ Euro-IX Tools

- IXP Service Matrix - <https://www.euro-ix.net/tools/ixp-service-matrix/>
- Peering Matrix - <https://www.euro-ix.net/tools/peering-matrix/>
- ASN Search - <https://www.euro-ix.net/tools/asn-database/?tool=search>
- Newest ASN entries - <https://www.euro-ix.net/tools/asn-database/?tool=recent>
- Most common ASNs - <https://www.euro-ix.net/tools/asn-database/?tool=common>

ASN Filter

« ASN Database

[Stats](#)

[Search](#)

[Recent](#)

[Common](#)

Search

ASN, IXP or Organization

Advanced Filters

All at



Angola-IXP



And at



Beirut Internet Exchange



And at

But not at

And other IXPs

And other IXPs, but not at

Peering Matrix

Peering Matrix

[CSV Download](#)

IXP	Total listed ASNs		ASNs that don't peer at other IXPs		% of ASNs that don't peer at other IXPs		ASNs that peer at other IXPs		% of ASNs that peer at other IXPs		ALB-IX	AMS-IX	AMS-IX Caribbean	ARMIX	Angonix	BBIX - Tokyo	BCIX	BIX	BIX.BG	BNIX	CATNIX	CIX
AMS-IX	726	144	19.83	582	80.17	0	726	2	0	0	2	29	15	19	20	7	1					
AMS-IX Caribbean	13	8	61.54	5	38.46	0	2	13	0	0	1	1	0	1	0	1	1					
ARMIX	10	10	100.00	0	0.00	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	0	0
Angonix	2	1	50.00	1	50.00	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0
BBIX - Tokyo	8	3	37.50	5	62.50	0	2	1	0	0	8	2	1	2	0	0	0	0	0	0	0	0
BCIX	63	20	31.75	43	68.25	0	29	1	0	0	2	63	3	6	3	1	0					
BIX	49	30	61.22	19	38.78	0	15	0	0	0	1	3	49	3	4	0	0					
BIX.BG	60	25	41.67	35	58.33	0	19	1	0	0	2	6	3	60	1	0	1					
BNIX	45	21	46.67	24	53.33	0	20	0	0	0	0	3	4	1	45	2	0					
CATNIX	29	21	72.41	8	27.59	0	7	1	0	0	0	1	0	0	2	29	1					
CIX	26	17	65.38	9	34.62	0	1	1	0	0	0	0	0	1	0	1	26					
CIXP	37	10	27.03	27	72.97	0	19	0	0	0	0	1	1	0	3	0	0					
DE-CIX Frankfurt	634	170	26.81	464	73.19	0	332	1	0	1	2	32	17	21	17	4	3					
DIX - Lyngby	44	18	40.91	26	59.09	0	24	1	0	0	2	4	2	2	4	1	0					
ECIX Berlin	49	8	16.33	41	83.67	0	25	1	0	0	2	22	3	5	1	0	1					
Equinix Zurich	190	39	20.53	151	79.47	0	70	1	0	0	2	7	2	6	4	1	0					
FICIX - Helsinki	24	9	37.50	15	62.50	0	8	0	0	0	0	1	2	0	3	0	0					
FVG-IX	8	2	25.00	6	75.00	0	3	0	0	0	0	1	0	1	1	0	0					
France-IX	255	42	16.47	213	83.53	0	111	1	0	0	2	14	7	7	12	3	0					
GN-IX	28	9	32.14	19	67.86	0	11	0	0	0	0	2	1	1	0	0	0					
GR-IX	18	12	66.67	6	33.33	0	5	0	0	0	0	0	1	2	1	0	0					

IXP Service Matrix

IXP Service Matrix

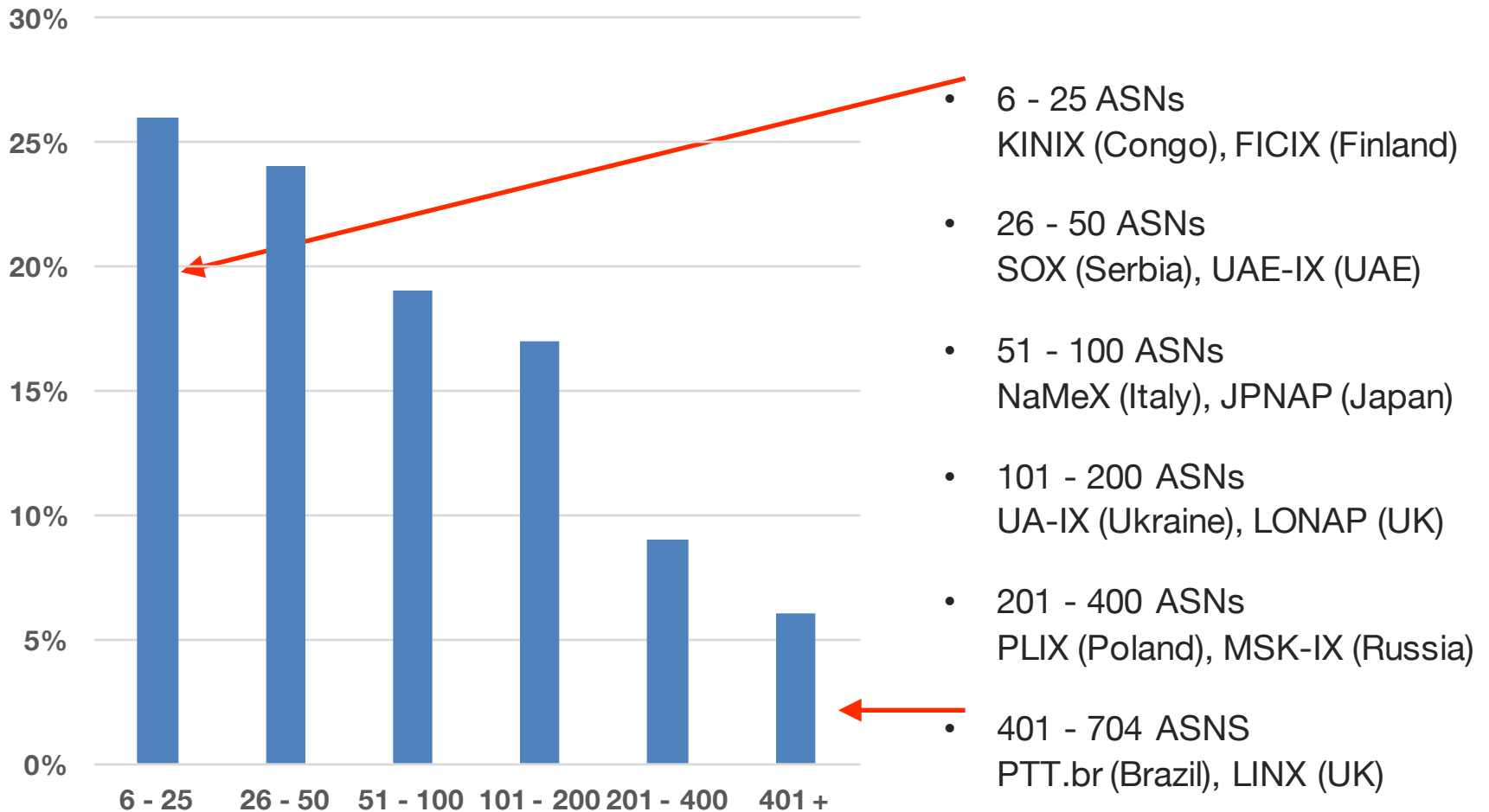
[CSV Download](#)

IXP	Location	ASN	RS ASN	# of customers	# IPv6 ready	% IPv6 ready	# of Sites	La tra
ALB-IX	Tirana					0.0		0
AMS-IX	Amsterdam	1200	6777	726	572	78.79	12	0
AMS-IX Caribbean	Willemstad, Curacao	28017		13	4	30.77	1	0
ARMIX	Yerevan	51225		10	8	80.00	1	0
Angonix	Luanda	327788		2	2	100.00		0
BBIX - Tokyo	Tokyo	23640		8	1	12.50	7	0
BCIX	Berlin	16374		63	49	77.78	6	0
BIX	Budapest	5507		49	37	75.51	3	0
BIX.BG	Sofia	15669		60	20	33.33	8	0
BNIX	Brussels	5406		45	14	31.11	3	0
CATNIX	Barcelona	49638		29	14	48.28	2	0
CIX	Zagreb	51702		26	9	34.62	1	0
CIXP	Geneva	57859		37	7	18.92	3	0
CyrusOne	Carrollton					0.0		0
DE-CIX Frankfurt	Frankfurt am Main	6695	6695	634	634	100.00	18	0
DIX - Lyngby	Lyngby	198391		44	32	72.73	3	0
ECIX Berlin	Berlin	9033		49	49	100.00	12	0
Equinix Zurich	Zurich	24115		190	183	96.32	4	0
FICIX - Helsinki	Helsinki	0		24	24	100.00	1	0
FVG-IX	Udine	51909		8	1	12.50	1	0
France-IX	Paris	57734		255	249	97.65	8	0
GN-IX	Groningen	24957		28	0	0.00	8	0
GR-IX	Athens	199399		18	13	72.22	2	0
GigaPix	Lisbon	12833		23	17	73.91	2	0



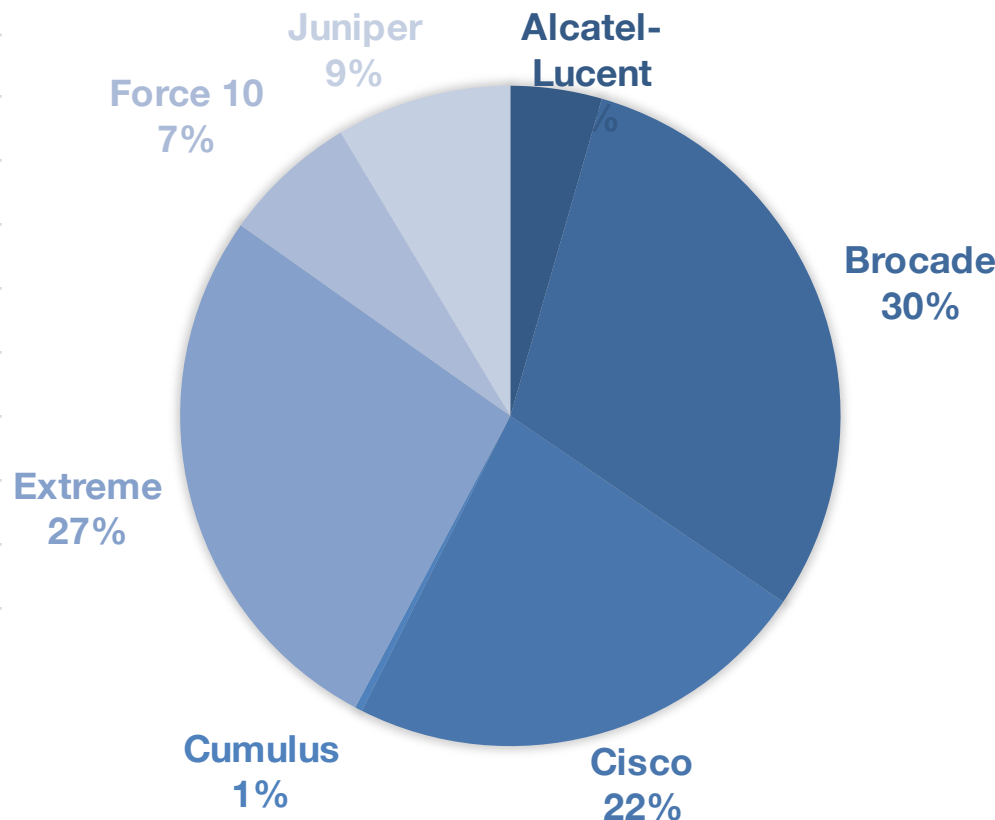
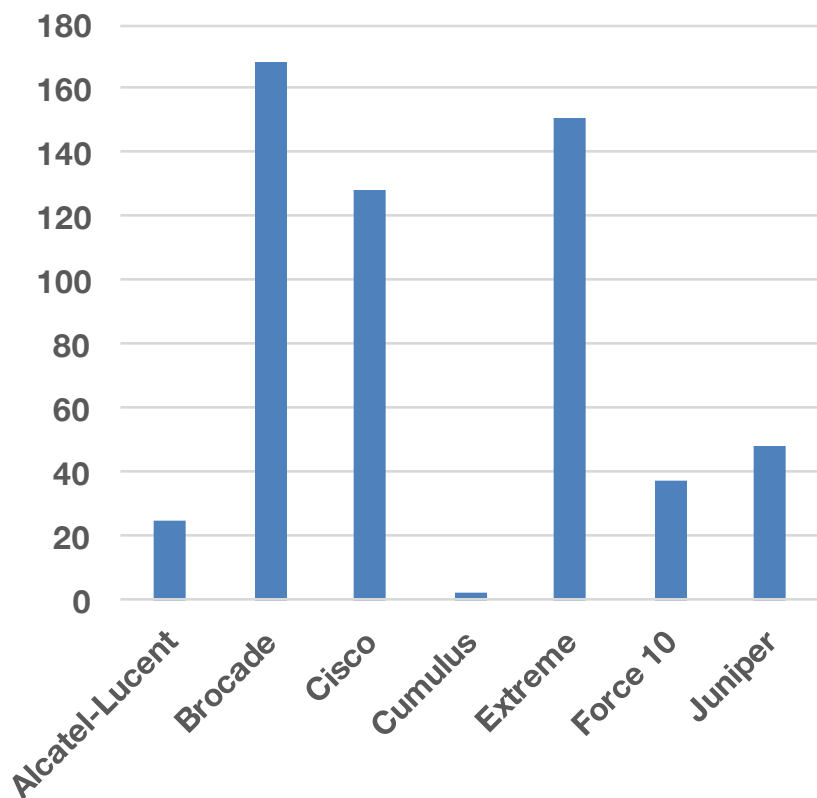
Euro-IX Database

Range of ASNs connected to Members



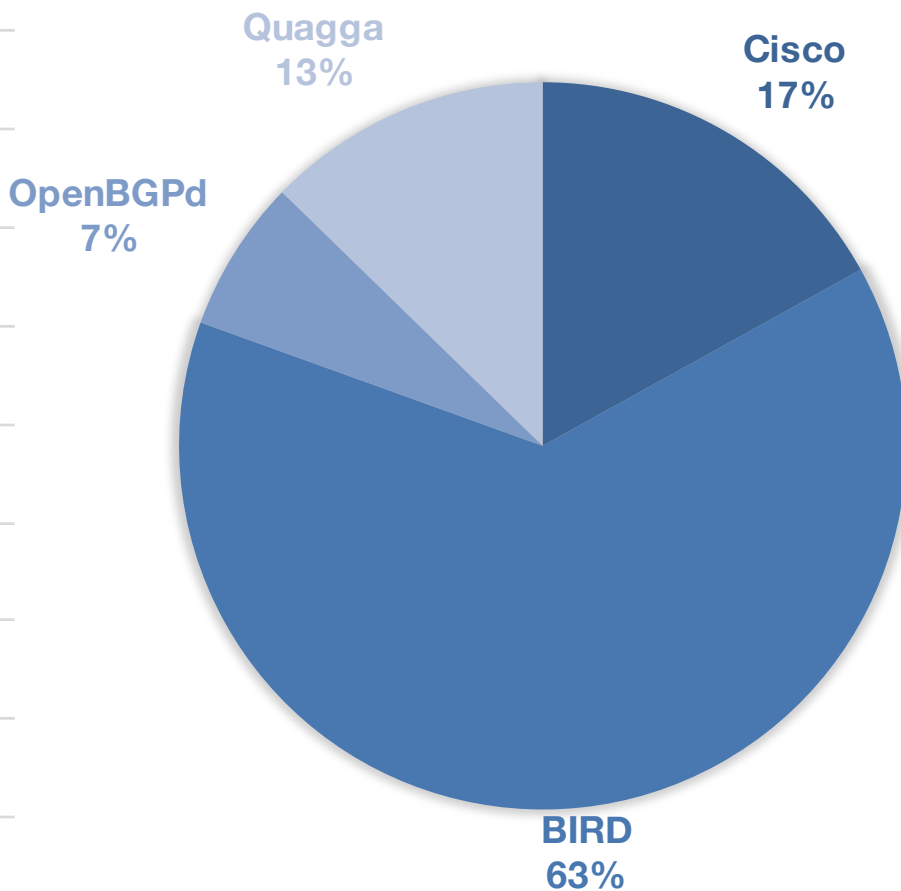
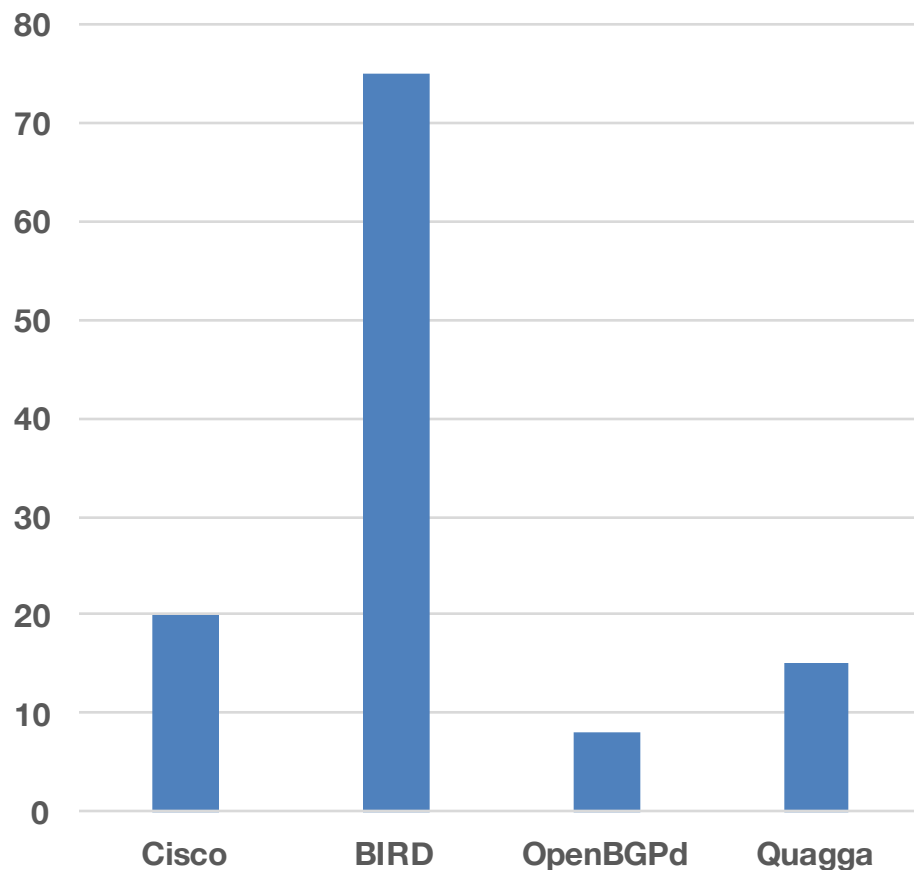


Switch/Router DB – Vendors used





Route Server DB – Daemons used



IXPs in Euro-IX Region

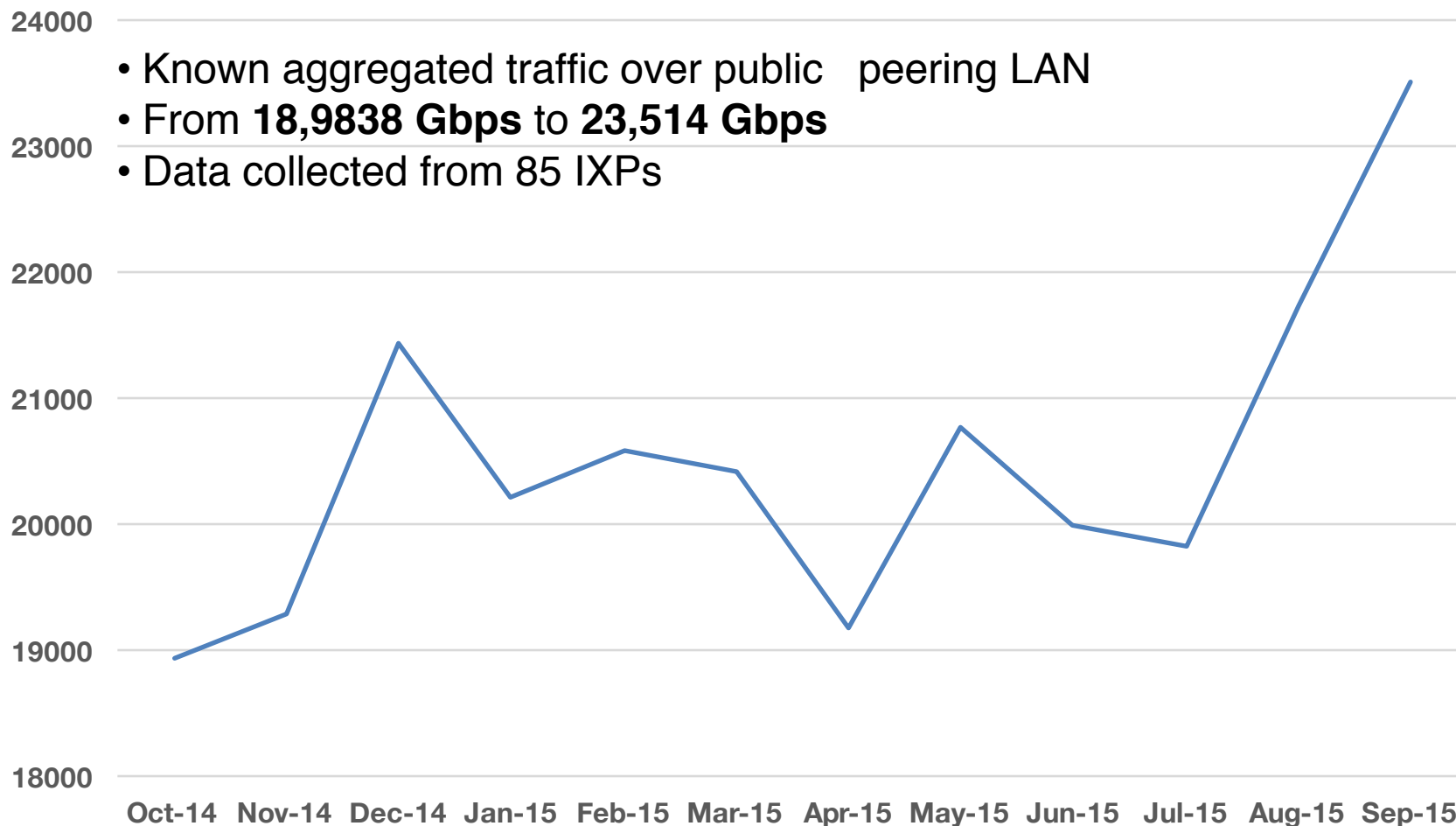


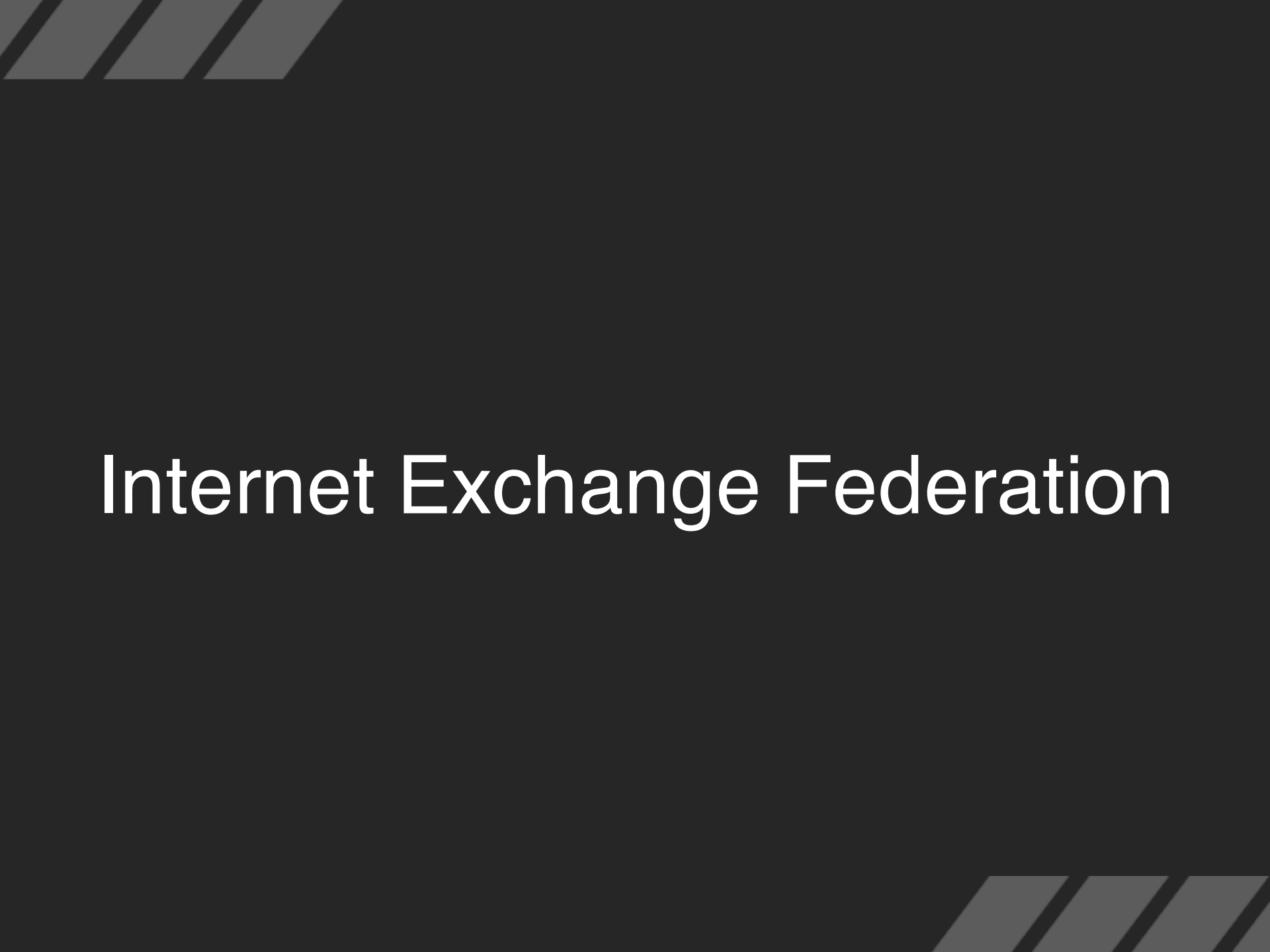
189 known IXPs
48 Countries
142 Cities

Check our Map:
<https://www.euro-ix.net/ixps/ixp-map/>



Traffic Growth in Euro-IX Region





Internet Exchange Federation

➤ Other IXPA's



➤ Internet Exchange Federation (IX-F)

- MOU signed by APIX, Euro-IX and LAC-IX to form the IX-F in November 2012 – www.ix-f.net
- Af-IX signed the MoU to join the IX-F
- Idea to have a Global IXP DB
- Global IXP BCPs
- Automate Data Collection from IXPs
- Plans to collaborate with other external Databases

> What is the IX-F?

IX-F Board

- **AFIX**
Nishal Goburdhan – JINX (South Africa)
Kyle Spencer – UIXP (Uganda)
- **APIX**
Gaurab Raj Upadhaya - NPIX (Nepal)
Katsuyasu Toyama - JPNAP (Japan)
- **Euro-IX**
Arnold Nipper - DE-CIX (Germany)
John Souter - LINX (United Kingdom)
- **LAC-IX**
Ariel Graizer - NAP CABase (Argentina)
Milton Kashiwakura - PTT.br (Brazil)



IXPs outside Euro-IX Region

IXPs in APIX Region



89 known IXPs

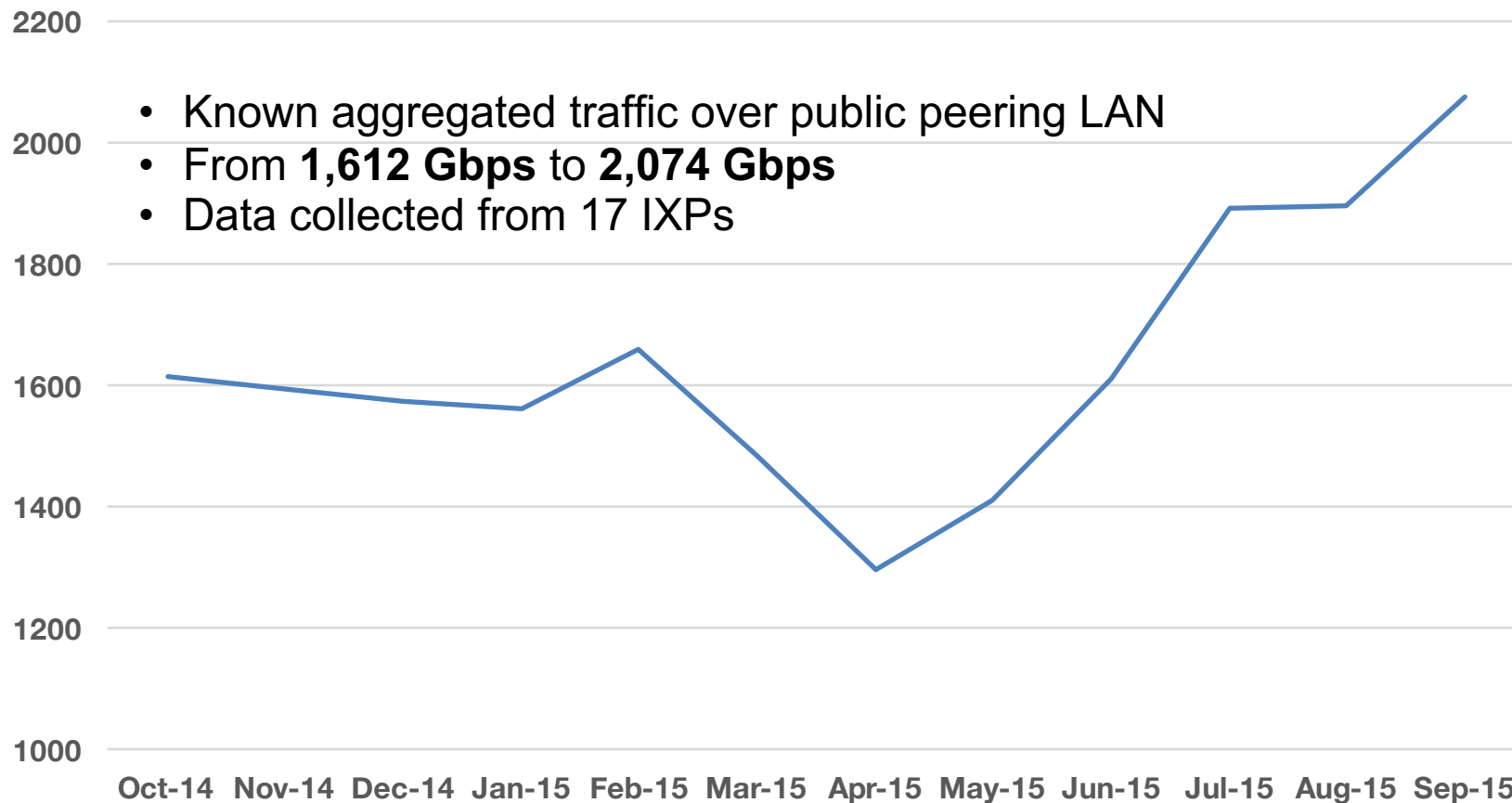
19 Countries

49 Cities

Check our Map:

www.euro-ix.net/location-of-ixps

➤ Traffic Growth in APIX Region



IXPs in Af-IX Region



33 known IXPs

25 Countries

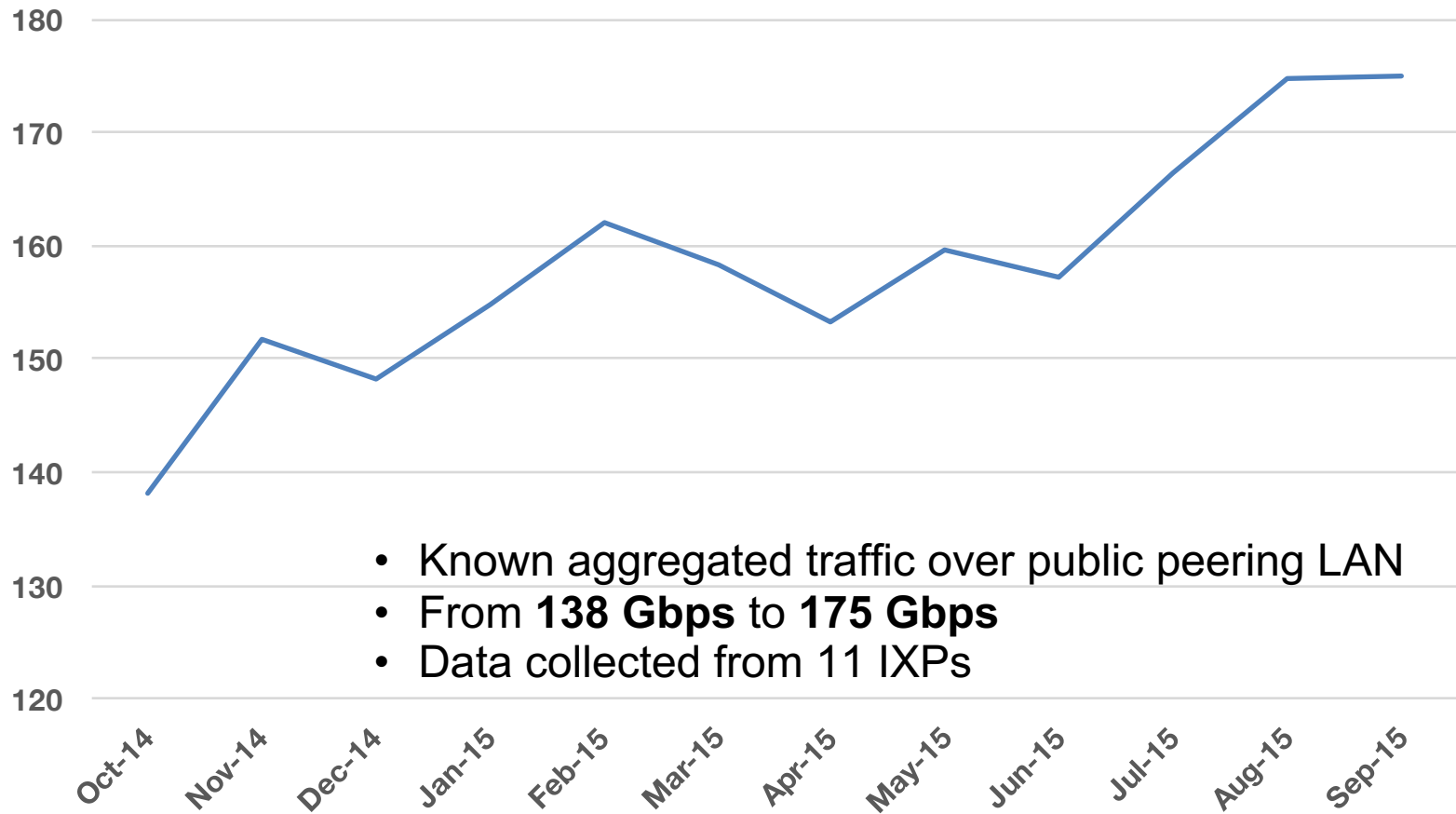
31 Cities

Check our Map:

www.euro-ix.net/location-of-ixps



Traffic Growth in AFIX Region



IXPs in LAC-IX Region



56 known IXPs

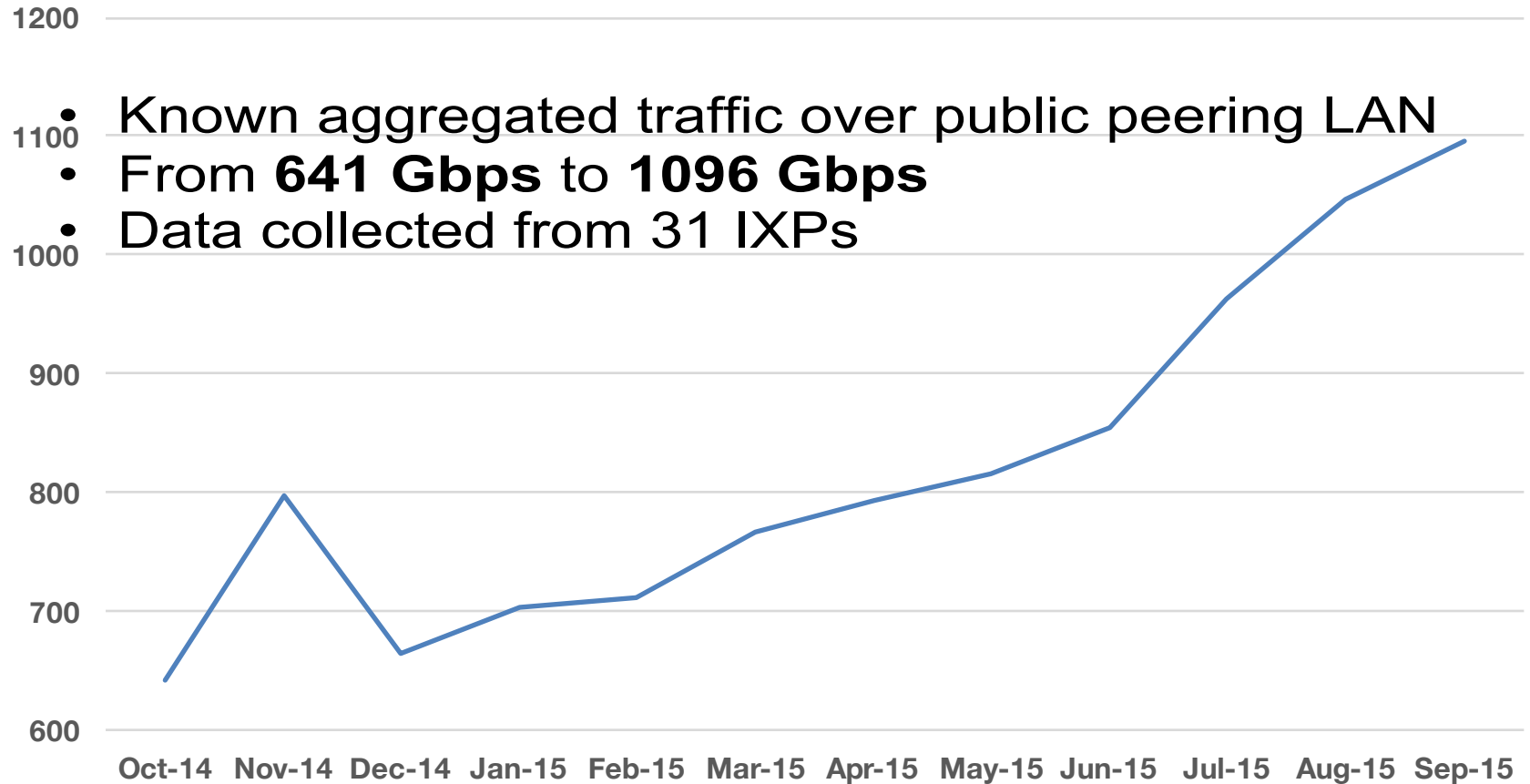
16 Countries

49 Cities

Check our Map:

www.euro-ix.net/location-of-ixps

➤ Traffic Growth in LAC-IX Region

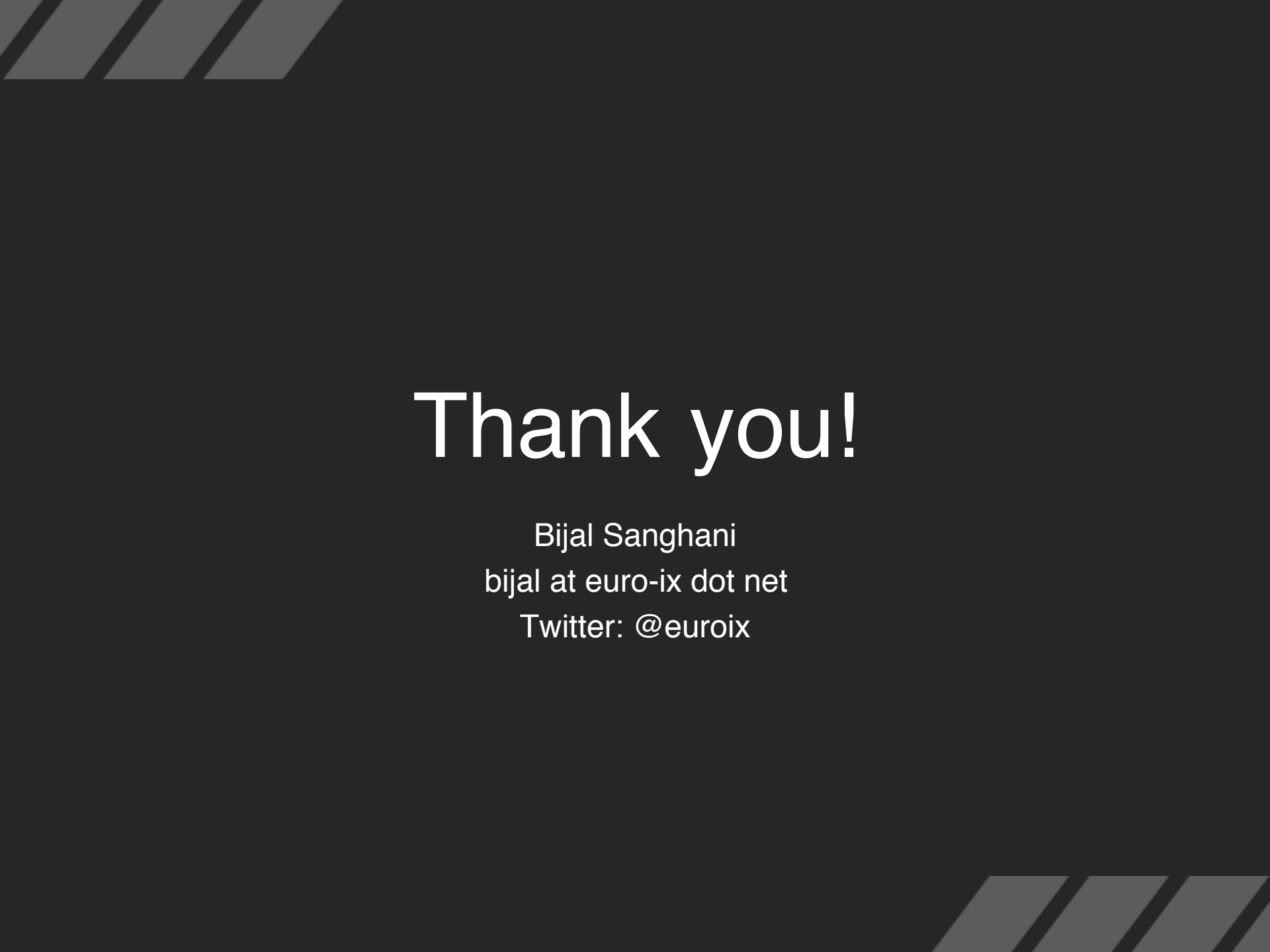


➤ The Internet Revealed – IXP Movie



Now available in English, French, Turkish, Spanish, Romanian, Portuguese, Arabic and German, check out our Youtube channel:
<https://www.youtube.com/channel/UCFyucVRAAMzxyJIsxnGwsjW>

more languages to come!



Thank you!

Bijal Sanghani
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Twitter: @euroix