

IXPDB & Euro-IX Tools

ENOG16, Tbilisi

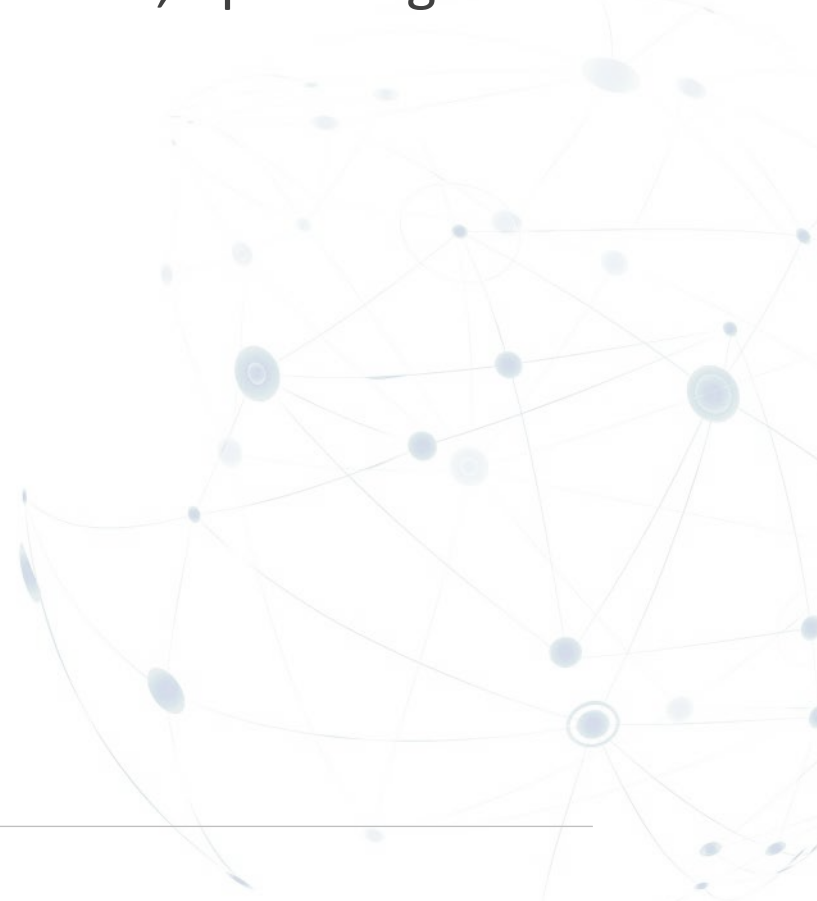
Arnold Nipper – IXPDB Admin



Association of IXPs

73 affiliated members

- 54 IXPs in the Euro-IX region, 49 countries, operating over 100 peering LANs
- 19 IXPs from the rest of the world
- Newest Member:
 - Piter-IX - Russia
 - ANIX - Albania





10 Euro-IX Patrons



NOKIA

ciena®

smartoptics

interxion™

JUNIPER®
NETWORKS

ARISTA



EQUINIX

E Extreme®
Connect Beyond the Network

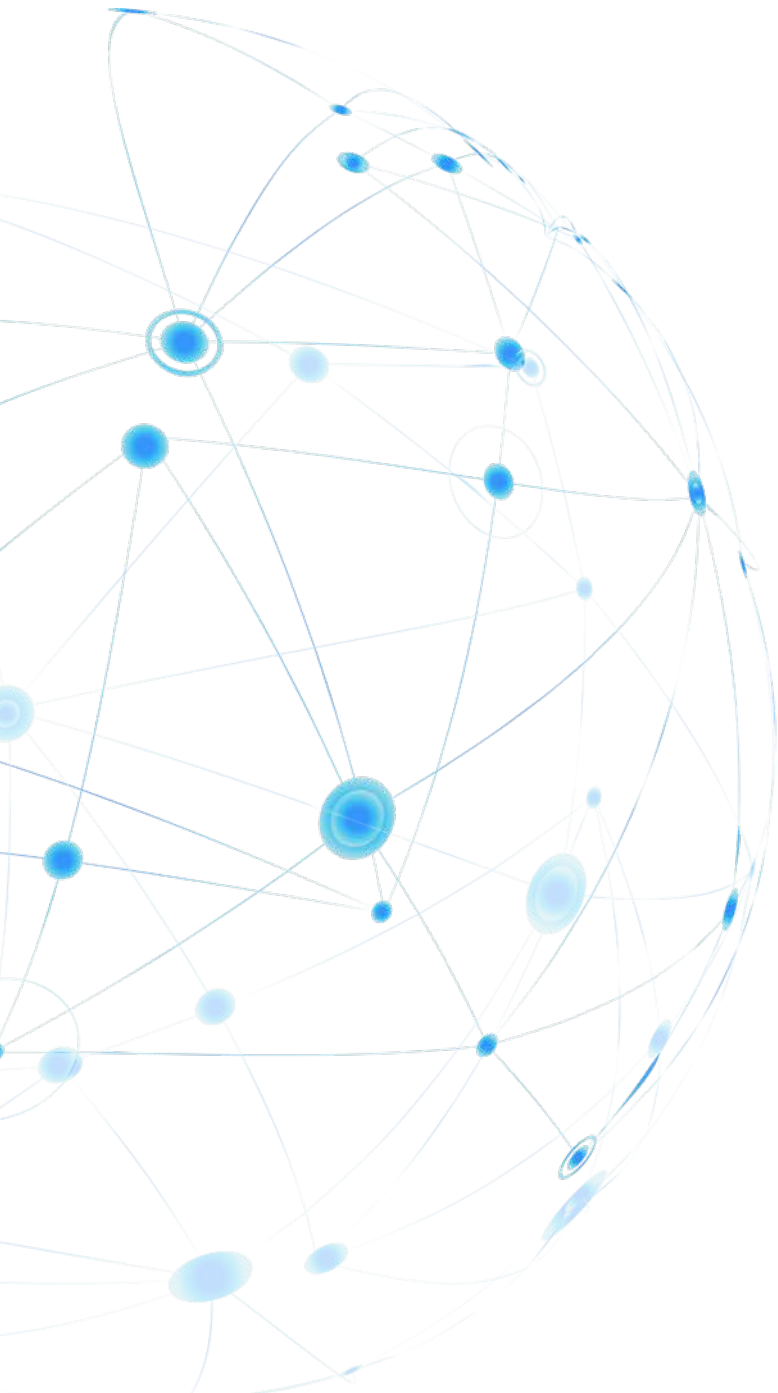
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euro-ix



Euro-IX Activities

- 2 Fora a year
 - 34th in Toulouse hosted by TOUIX and France-IX
 - 35th in Zandaam hosted by AMSIX
- Manage Website & Database
- Fellowship & Mentor-IX Programs to support IXPs in need
- Peering Toolbox – BCPs and other information for Peers and on Peering – Coming Soon!
- Reports – Benchmarking, traffic, hardware, route servers.
- Newsletters - <https://www.euro-ix.net/en/communications/newsletters/>
- Route Server Large BGP communities list: <https://www.euro-ix.net/en/forixps/large-bgp-communities/>
- Speak to me about joining or benefits!



IXPDB & Euro-IX Tools





Some History

- It's not new, the original code was written around 15 years ago...
- Membership feedback from consultations and the Membership Survey clearly showed IXPs wanted a place to publish an accurate and complete data set.
- As members of IX-F it didn't make sense for all of us to create individual databases or directories
- In 2016 we considered the limitations of the underlying database and structure.
- We wanted to move forward with automation and work started on the IXP Member List JSON Schema, which is also available for IXP in PeeringDB
- In 2017 we contracted the website and IXP Database work to CZ.NIC.



What we've been working on - Home

You can access the IXPDB via <https://ixpdb.euro-ix.net/>



New: Regional ASN Count

	AFIX	APIX	EURO-IX	LAC-IX	North America
# of ASNs	836	2347	11026	759	2748
# Unique ASNs	379	1141	2777	471	1013

IXPs With the Most ASNs Connected

IX-F ID	Name	City	Country	Last updated	API	MANRS	# of ASNs
9	DE-CIX FRA (DE-CIX Frankfurt)	Frankfurt am Main	DE	Feb. 11, 2019, 4:03 p.m.	✓	✓	855
2	AMS-IX	Amsterdam	NL	Feb. 11, 2019, 4:03 p.m.	✓	✓	831
1	LINX LON1	London	GB	Feb. 11, 2019, 4:03 p.m.	✓	✓	771
548	EPIX (e-Poludnie Internet Exchange)		PL	Dec. 17, 2018, 3:01 p.m.	✓	✗	473
13	msk-ix (MSK-IX public peering VLAN)	Moscow	RU	Feb. 11, 2019, 4:03 p.m.	✓	✓	452
39	Equinix Paris (Equinix Internet Exchange - Paris)	Paris	FR	Feb. 11, 2019, 4:03 p.m.	✗	✓	366
600	LINX LON2	London	GB	Feb. 11, 2019, 4:03 p.m.	✓	✓	359



What we've been working on – IXP Directory

<https://ixpdb.euro-ix.net/en/ixpdb/ixps/>

IXPDB

EURO-IX IXPDB VALIDATOR IX-F SPONSORS

IXP Directory
ASN Directory
Route Server Directory
Switch Directory

IXPDB / IXPDB / IXP Directory

IXPS

IX-F ID, name, city or count

☐ Only with API

☐ AFIX
☐ APIX
☐ Euro-IX
☐ LAC-IX
☐ North America

SEARCH

COMPARE	IX-F ID	Name	City	Country	Last updated	API	MANRS	# of ASNs
+	9	DE-CIX FRA (DE-CIX Frankfurt)	Frankfurt am Main	DE	Feb. 11, 2019, 4:03 p.m.	✓	✓	855
+	2	AMS-IX	Amsterdam	NL	Feb. 11, 2019, 4:03 p.m.	✓	✓	831
-	1	LINX LON1	London	GB	Feb. 11, 2019, 4:03 p.m.	✓	✓	771
+	548	EPIX (e-Poludnie Internet Exchange)		PL	Dec. 17, 2018, 3:01 p.m.	✓	✗	473
+	13	msk-ix (MSK-IX public peering VLAN)	Moscow	RU	Feb. 11, 2019, 4:03 p.m.	✓	✓	452
+	39	Equinix Paris (Equinix Internet Exchange - Paris)	Paris	FR	Feb. 11, 2019, 4:03 p.m.	✗	✓	366



What we've been working on – ASN at the IXPs

MSK-IX (MSK-IX PUBLIC PEERING VLAN)

IXPDB / IXPDB / IXP Participants

IXP	Networks	Points of presence	ASNs	Traffic			
ASN ↓	Organisation	Type	IP addresses	MAC addresses	MANRS	Entry in PeeringDB	# of IXP connection
112	RIPE NCC	Non-Profit	195.208.209.248 2001:7f8:20:101::209:248		✗	✓	25
714	Apple Europe Limited	Content	195.208.210.50 195.208.210.51		✗	✓	17
1547	Verso, LLC	Cable/DSL/ISP	195.208.208.89 2001:7f8:20:101::208:89		✗	✓	5
1820	Wnet	NSP	195.208.209.186 2001:7f8:20:101::209:186		✗	✗	2
2118	NPO Relcom		195.208.208.33 195.208.209.182		✗	✗	1
2683	Institute of Nuclear Physics, MSU		195.208.208.39		✗	✗	1
2854	Orange Business Services	NSP	195.208.210.19 2001:7f8:20:101::210:19		✗	✓	13
2895	N.D.Zelinsky Institute of Organic Chemistry,Russian Academy of Sciences	Cable/DSL/ISP	195.208.208.36 195.208.209.77		✗	✓	1
3058	Academinform		195.208.209.25 2001:7f8:20:101::209:25		✗	✗	1
3218	Space Research Institute RAS		195.208.208.38		✗	✗	1
3249	Elion Ettevotted Aktsiaselts	Cable/DSL/ISP	195.208.208.53 2001:7f8:20:101::208:53		✗	✓	3
3267	State Institute of	Educational/Research	195.208.208.44		✓	✓	5



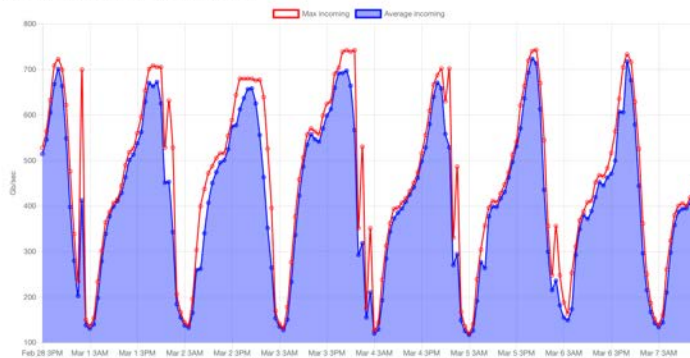
What we've been working on – IXP Traffic

NIX.CZ (NIX.CZ, Z.S.P.O.)

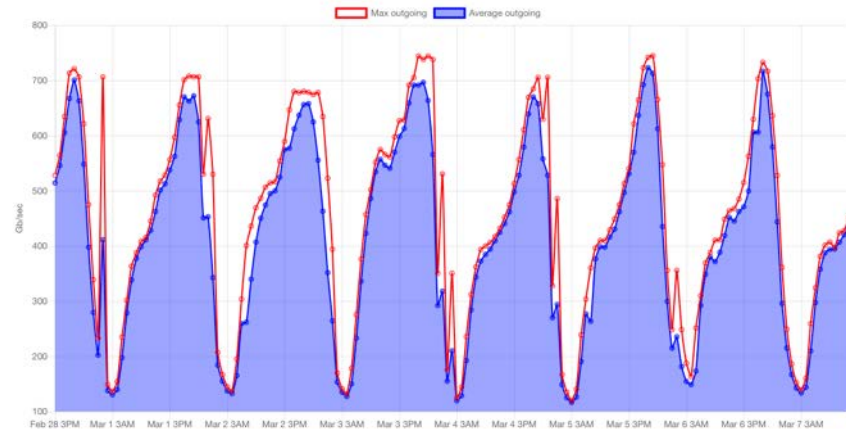
IXPDB / IXPDB

IXP Networks Points of presence ASNs Traffic-

Incoming traffic for the last week



Outgoing traffic for the last week





What we've been working on – Compare IXPs

IXPDB

EURO-IX IXPDB VALIDATOR IX-F SPONSORS

IXPS

IXPDB / IXPDB / IXP Directory

IX-F ID, name, city or count

☒ Only with API

☐ AFIX
☐ APIX
☐ Euro-IX
☐ LAC-IX
☐ North America

SEARCH

COMPARE	IX-F ID	Name	City	Country	Last updated	API	MANRS	# of ASNs
			Amsterdam	NL	Feb. 11, 2019, 4:03 p.m.	✓	✓	831
	1	LINX LON1	London	GB	Feb. 11, 2019, 4:03 p.m.	✓	✓	771
	9	DE-CIX FRA (DE-CIX Frankfurt)	Frankfurt am Main	DE	Feb. 11, 2019, 4:03 p.m.	✓	✓	855
	351	NAPAfrica IX Johannesburg (NAPAfrica)		ZA	Feb. 7, 2019, 1 p.m.	✓	✗	336
	548	EPIX (e-Poludnie Internet Exchange)		PL	Dec. 17, 2018, 3:01 p.m.	✓	✗	473
	13	msk-ix (MSK-IX public peering VLAN)	Moscow	RU	Feb. 11, 2019, 4:03 p.m.	✓	✓	452
	600	LINX LON2	London	GB	Feb. 11, 2019, 4:03 p.m.	✓	✓	359
	648	NAPAfrica IX Cape Town (NAPAfrica)		ZA	Feb. 7, 2019, 1 p.m.	✓	✗	170
	148	SIX (Seattle Internet Exchange)		US	Feb. 6, 2019, 1 a.m.	✓	✗	326
	15	NIX.CZ (NIX.CZ, z.s.p.o.)		CZ	Feb. 11, 2019, 5 a.m.	✓	✗	163
	436	EPIX Warsaw (e-Poludnie Internet Exchange)		PL	Dec. 17, 2018, 3:01 p.m.	✓	✗	324

Select the IXPs you want to compare and click here to see the results

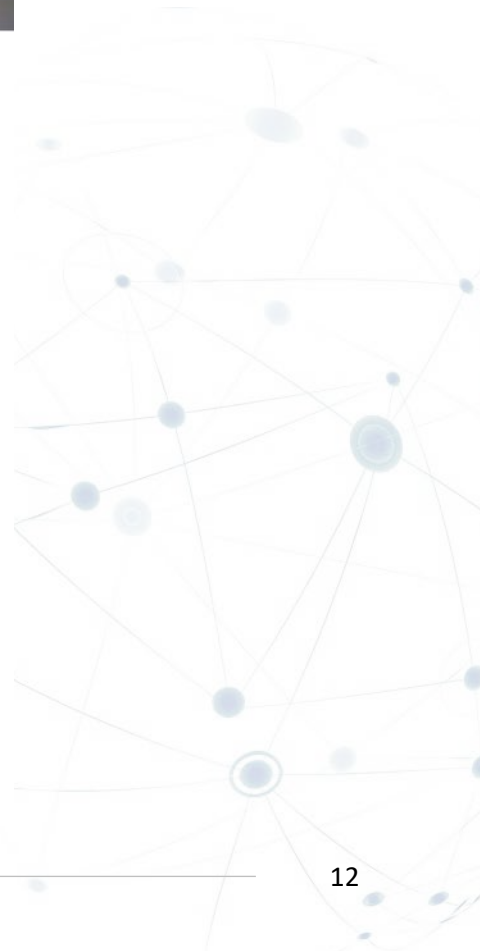


What we've been working on – Compare IXPs

Lets compare two Euro-IX Members who export their JSON API



	msk-ix (MSK-IX public peering VLAN)	Piter-IX (Piter-IX)
Number of locations	1	1
MANRS	✓	✗
Type	-	Non-profit
Joining requirements	http://www.msk-ix.ru/en/ix/msk/	
Application form	http://www.msk-ix.ru/en/ix/msk/	
Monitoring tools	ixp-watch	http://lg.piter-ix.ru
Topology		
Reseller program	✓	✗
Private peering	✓	✓
24x7 services	✓	✓
24x7 access	✓	✗
Multi-protocol Labels, MPLS	✗	✗
Jumbo frames	✓	✓
Maximum Transmission Unit, MTU	-	9216
Speed 10M	-	-
Speed 100M	-	-
Speed 1G	-	-
Speed 10G	-	-
Speed 40G	-	-



What we've been working on – Compare IXPs

	msk-ix (MSK-IX public peering VLAN)	Piter-IX (Piter-IX)
Number of ASNs	454	224
Common ASNs	#114 CDNetworks Unilink Cloudflare Inc. ROPNET Corporation JSC PAKT Ltd. LLC Transneft Telecom Svyaz-Holding Ltd. Unilink Miranda-Media LIMITED S-Inform Limited Liability Company ArpNet SST	
Unique ASNs	#340 Academinform ACOD CJSC Afiliat Limited AG Telecom Ltd Akamai Technologies, Inc. alibaba Annet Ltd. AO Datacenter AO Kaspersky Lab Apex Telecom LLC Apple Europe Limited ArtX ASVT Avantel JSC Avantel JSC Avelacom Ltd Azertelecom LLC Best Telecommunications Ltd. Blizzard Entertainment, SAS Business System Telecom Capiral Telecom LTD Central Communication Station - branche JSC RRR CEO, PrJSC Farlep-Invest China Internet Network Information Center City Connect LLC	#110 AdRiver Aiconet AirNet Arbiat ArtPlanet Asarta BetaTelecom BFA_Telecom BonchiIT British Telecom Communications SA BT_Telecom CDNet CGN Compic COMPNET Connecto Dancer_2 DipHost Dnevnik DTS EstNOC_Global Eurotele_Plus evro_telecom FlyTech



What we've been working on – ASN Directory

<https://ixpdb.euro-ix.net/en/ixpdb/asns/>

IXPDB

EURO-IX IXPDB VALIDATOR IX-F SPONSORS

IXP Directory
ASN Directory
Route Server Directory
Switch Directory

IXPDB / IXPDB / ASN Directory

ASNS

ASN, participant name, city SEARCH

COMPARE	ASN	Organisation	Type	IP addresses	MAC addresses	MANRS	# of IXP connection
+	6939	Hurricane Electric	NSP	103.247.139.6 185.1.114.20 105.1.58.17	00:0c:db:de:68:33 cc:4e:24:1f:28:d3 c0:0a:06:02:70:0b	✗	105
-	15169	Google	Content	103.247.139.57 185.1.114.26 105.1.46.2	84:18:88:04:5f:ca 88:a2:5e:10:17:c4 fa:b5:76:7b:73:27	✗	92
-	20940	Akamai Technologies, Inc.	Content	103.247.139.17 103.247.139.73 105.1.114.41	84:c1:c1:07:65:52 ec:13:db:f0:37:0b a4:13:db:f0:37:0b	✗	90
+	3856	Packet Clearing House (PCH)	Educational/Research	185.1.58.30 185.1.68.15 105.1.36.61	00:0c:29:b9:25:ee 00:0c:29:94:58:41 00:0c:29:93:8b:73	✗	81
+	42	Packet Clearing House (PCH)	Educational/Research	185.1.58.29 185.1.68.87 105.1.36.60	7c:69:f6:43:0f:b2 54:a2:74:72:9d:91 74:a0:b3:66:75:60	✗	75
+	8075	Microsoft	Content	103.247.139.28 176.126.38.18 176.126.38.20	64:64:9b:b5:59:c7 64:64:9b:b7:a9:c4 60:14:7d:0c:15:f4	✗	69
+	13335	Cloudflare Inc.	Content	103.247.139.50 176.126.38.5	58:00:bb:fa:9e:31 7c:25:86:ee:db:7c	✗	64



What we've been working on – Compare ASNs

IXPDB EURO-IX IXPDB VALIDATOR IX-F SPONSORS

ASNS IXPDB / IXPDB / ASN Directory

ASN, participant name, city

COMPARE	ASN	Organisation	Type	IP addresses	MAC addresses	MANRS	# of IXP connection
<input type="button" value="+"/>	6939	Hurricane Electric	NSP	103.247.139.6 185.1.114.20 185.1.58.17	00:0c:db:de:68:33 cc:4e:24:1f:28:d3 50:0e:06:82:20:0b	✗	105
<input type="button" value="+"/>	15169	Google	Content	103.247.139.57 185.1.114.26 185.1.46.2	84:18:88:04:5f:ca 88:a2:5e:10:17:c4 64:b5:26:7b:73:e7	✗	92
<input type="button" value="-"/>	20940	Akamai Technologies, Inc.	Content	103.247.139.17 103.247.139.73 185.1.114.41	84:c1:c1:07:65:52 ec:13:db:f0:37:0b 5e:13:db:f0:37:0e	✗	90
<input type="button" value="+"/>	3856	Packet Clearing House (PCH)	Educational/Research	185.1.58.30 185.1.68.15 185.6.26.61	00:0c:29:b9:25:ee 00:0c:29:94:58:41 00:0e:20:02:0b:73	✗	81
<input type="button" value="+"/>	42	Packet Clearing House (PCH)	Educational/Research	185.1.58.29 185.1.68.87 185.6.26.60	7c:69:f6:43:0f:b2 54:a2:74:72:9d:91 24:a0:b2:66:2f:50	✗	75
<input type="button" value="+"/>	8075	Microsoft	Content	103.247.139.28 176.126.38.18 176.126.38.28	64:64:9b:b5:59:c7 64:64:9b:b7:a9:c4 64:64:9b:b7:a9:c4	✗	69
<input type="button" value="+"/>	13335	Cloudflare Inc.	Content	103.247.139.50 176.126.38.5	58:00:bb:fa:9e:31 7e:2f:06:ca:ad:b7	✗	64



What we've been working on – Compare ASNs



IXPDB

EURO-IX IXPDB VALIDATOR IX-F SPONSORS

ASNS COMPARISON

IXPDB / IXPDB

	Akamai Technologies, Inc.	Limelight Networks UK Ltd.
MANRS	✗	✗
ASN	20940	22822
Type	Content	Content
Number of IXPs	90	60
Common IXPs	<div>#48</div> <div>LINX LON1</div> <div>AMS-IX</div> <div>VIX (Vienna Internet Exchange)</div> <div>Netnod - Stockholm (Netnod - Stockholm)</div> <div>MIX (Milan Internet Exchange)</div> <div>DE-CIX FRA (DE-CIX Frankfurt)</div> <div>NIX.CZ (NIX.CZ, z.s.p.o.)</div> <div>AMS-IX USA Chicago</div> <div>Equinix Zurich (Equinix Internet Exchange - Zurich)</div> <div>NL-ix (Neutral Internet Exchange)</div> <div>SwissIX (SwissIX - Swiss Internet Exchange)</div> <div>Equinix WA IX (Equinix Warsaw)</div> <div>InterLAN Internet Exchange (Interlan IX)</div> <div>Equinix Paris (Equinix Internet Exchange - Paris)</div> <div>France-IX Paris (France-IX Paris)</div>	



What we've been working on - Compare ASNs

Akamai Technologies, Inc.



Unique IXPs

#42

AAIX (Alpes Adria Internet Exchange)
AMS-IX Caribbean
AMS-IX USA Bay Area
Bangkok Neutral Internet Exchange (BKNIX)
BBIX - Tokyo (BroadBand Internet eXchange - Tokyo)
Big APE (The big apple peering Exchange)
BIX.BG (Bulgarian Internet eXchange)
BostonIX (Markley Boston Internet Exchange)
CATNIX (Catalunya Neutral Internet eXchange)
CRIX (NIC Costa Rica - Academia Nacional de Ciencias)
DE-CIX Dallas (DE-CIX Dallas)
DE-CIX Istanbul (DE-CIX Istanbul)
Digital Realty - Phoenix (Digital Realty Phoenix)
DIX - Lyngby (Danish Internet eXchange point)
ECIX-BER
ECIX-HAM
ECIX-MUC
Equinix Singapore (Equinix Singapore Exchange)
Equinix Sydney (Equinix Sydney Data Centers)
France-IX Marseille (Marseille IX)
GIGAPIX (Gigabit Portuguese Internet Exchange)

Limelight Networks UK Ltd.



#12

Any2 (CoreSite) Chicago (Any2 (CoreSite) Chicago)
AZIX (Arizona Internet Exchange)
DE-CIX Marseille (DE-CIX Marseille)
DE-CIX PMO (DE-CIX Palermo)
Digital Realty - New York (Digital Realty New York)
LAIIX (Los Angeles International IX)
LINX LON2
PAIX Virginia (Palo Alto Internet Exchange Virginia)
PIX Vancouver (Peer1 Internet Exchange Vancouver)
SFNIX (Service for French Internet eXchange)
SFMIX (San Francisco Metropolitan Internet Exchange)
TOP-IX (Torino Piemonte Exchange Point)



What we've been working on..

Don't forget to clear your search 😊

	1	LINX LON1	London	GB	Oct. 30, 2018, 2 p.m.	✓	756
	600	LINX LON2	London	GB	Oct. 30, 2018, 1 p.m.	✓	356
	349	LINX Manchester	Manchester	GB	Oct. 30, 2018, 1 p.m.	✓	100
	426	LINX NoVA	Ashburn	US	Oct. 30, 2018, 1 p.m.	✓	46



Added to compare: 7,11,55

Total providers: 77



What we've been working on - ASN Details

AKAMAI TECHNOLOGIES, INC.

IXPDB / IXPDB / Participant Providers

ASN

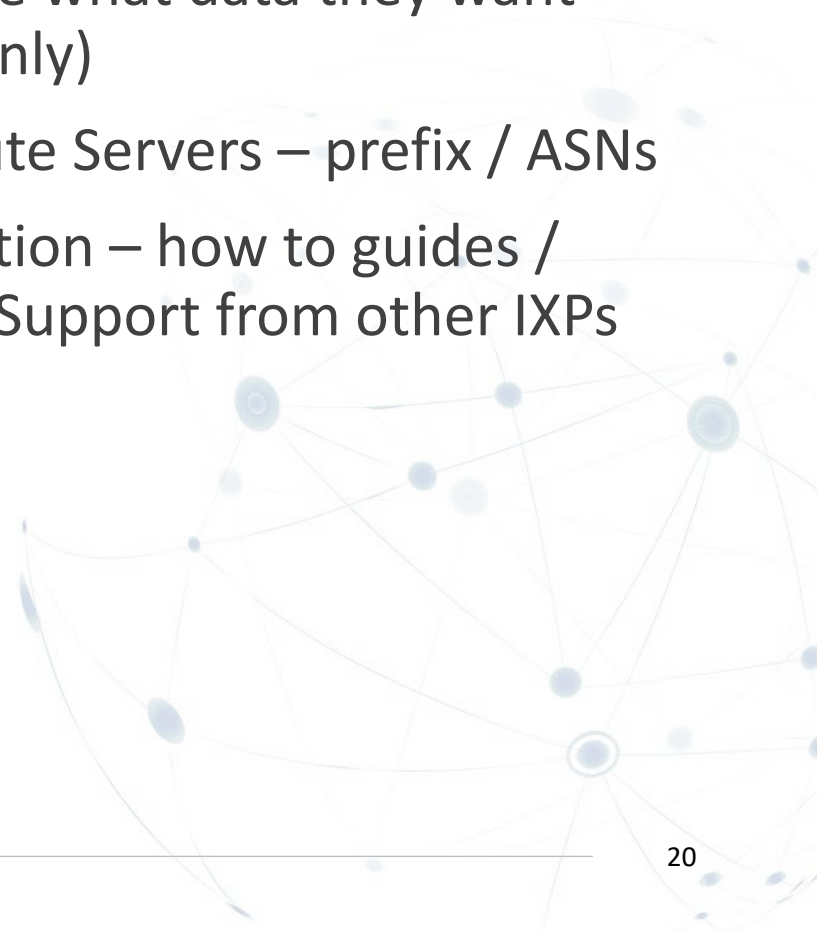
IXPs

IX-F ID	Name	City	Country	Last updated	API	MANRS	# of ASNs
1	LINX LON1	London	GB	Feb. 25, 2019, 6:04 a.m.	✓	✓	774
2	AMS-IX	Amsterdam	NL	Feb. 25, 2019, 6:04 a.m.	✓	✓	832
3	VIX (Vienna Internet Exchange)		AT	Feb. 20, 2019, 2:01 p.m.	✓	✗	142
5	Netnod - Stockholm (Netnod - Stockholm)	Stockholm	SE	Feb. 25, 2019, 6:04 a.m.	✗	✓	159
8	MIX (Milan Internet Exchange)		IT	Feb. 25, 2019, 6:04 a.m.	✓	✓	250
9	DE-CIX FRA (DE-CIX Frankfurt)	Frankfurt am Main	DE	Feb. 25, 2019, 6:04 a.m.	✓	✓	854
10	GIGAPIX (Gigabit Portuguese Internet Exchange)		PT	Feb. 20, 2019, 10:06 a.m.	✓	✗	33
11	CATNIX (Catalunya Neutral Internet eXchange)		ES	Feb. 25, 2019, 6:04 a.m.	✓	✓	41
13	msk-ix (MSK-IX public peering VLAN)	Moscow	RU	Feb. 25, 2019, 6:04 a.m.	✓	✓	450
15	NIX.CZ (NIX.CZ, z.s.p.o.)		CZ	Feb. 25, 2019, 1 a.m.	✓	✗	163



What's next

- New JSON spec to be published
 - Further Route Server & Switch data
- API Authentication – IXPs can choose what data they want public and private (IXPs/Members only)
- Other data collection work with Route Servers – prefix / ASNs
- Work with IXPs to implement a solution – how to guides / tutorials / IXP Manager / Asteroid / Support from other IXPs
- You too can help, speak to your IXPs
- 96 APIs today!





Other Information

- Mailing list for users - <https://lists.euro-ix.net/mailman/listinfo/ixpdb>
- GitHub JSON Member List Schema – <https://github.com/euro-ix/json-schemas>
- API is live – <https://api.ixpdb.net>
- IXPDB admin team - ixpdb-admin@euro-ix.net

If you think this is good work like we do, support us!

secretariat@euro-ix.net



IXPDB Sponsors - Thank You!

euro-IX

(::) APNIC



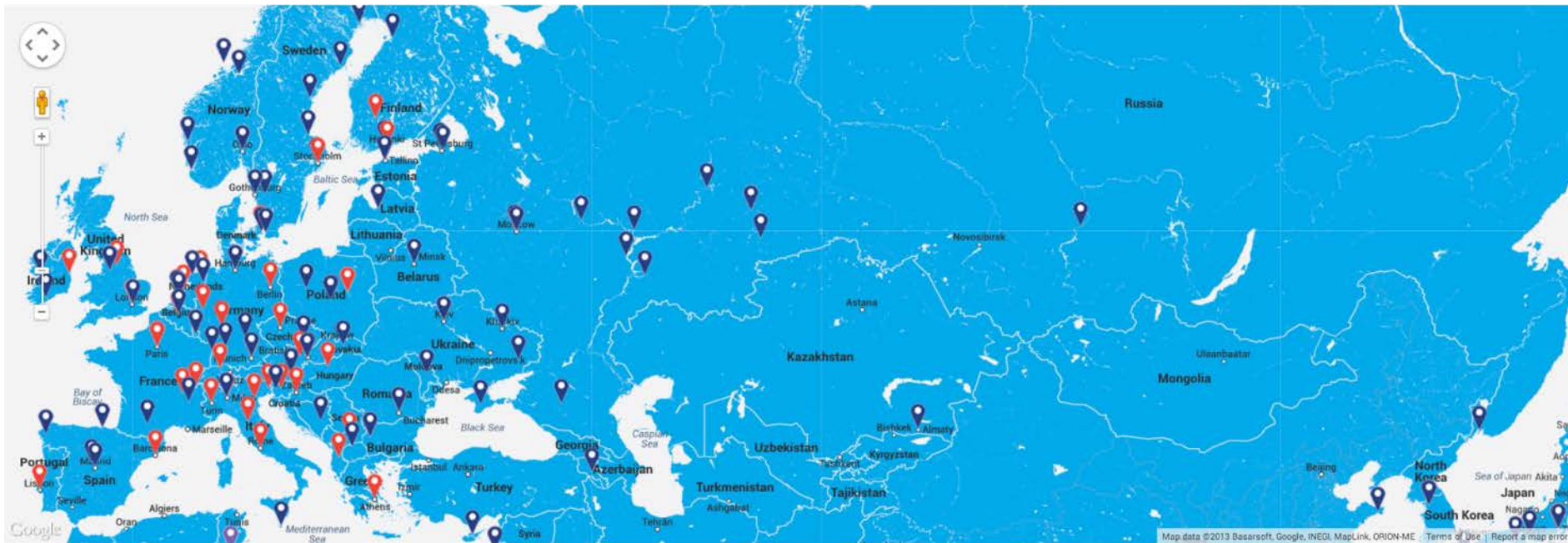
cz.nic





A look into the ENOG region..

- 62 IXPs in the ENOG region
- 216 in the Euro-IX region





A look into the ENOG region..

- With data from the IXPDB we see 62 IXPs in the ENOG region
- Data from the region is limited and not complete ☹️
- We need your help, speak to your IXPs and ask them to speak to us 😊
- This table shows the countries that we have data on, we know data is missing, let's fix this together!

Country	IXP Count	ASN Count
Armenia	1	8
Belarus	1	0
Georgia	1	0
Kazakhstan	2	0
Poland	13	1572
Ukraine	9	253
Kyrgyzstan	1	0
Russia	34	984
Total	62	2817



A look into the ENOG region..

- Here's a nice traffic graph showing growth in IXP traffic
- Data is missing, next year we would like to show more IXP data and ASNs peering in the region!

10 Year traffic growth at IXPs in ENOG region in Gbps





The Internet Revealed a film about IXPs



Short video about IXPs, available now in English, Italian, German, French, Spanish, Portuguese, Arabic, Mandarin, **Russian**, Romanian and Greek subtitles.



Thank You

euro-IX