



Internet Society

Pulse Internet Measurement Forum

IXPert: a platform to analyze the network benefits of connecting to IXPs

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Ignacio Castro, Emily Marques

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Traffic delivery is key for Internet operations

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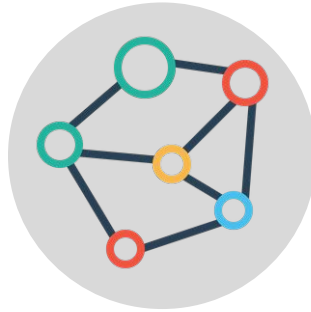


Increasing
traffic volumes

Traffic delivery is **key for Internet operations**



Increasing
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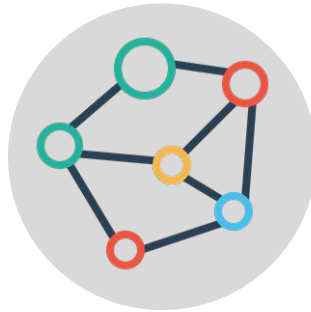


Application
requirements

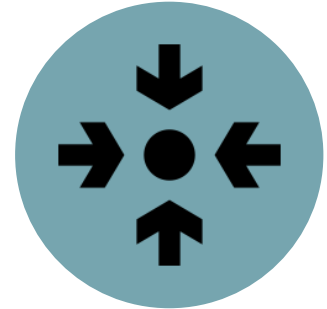
Traffic delivery is **key for Internet operations**



Increasing
traffic volumes



Application
requirements



Network
resilience

IXPs are essential elements in this process...

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+1000 IXPs

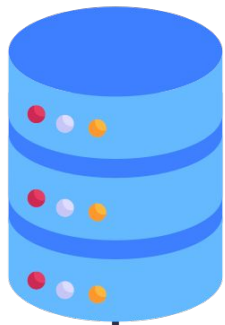
... and each one offers different opportunities to improve connectivity and traffic delivery



Before interconnecting to a given IXP,
it is fundamental to understand the
benefits each IXP is offering

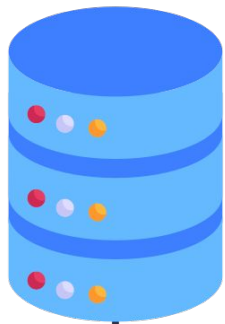
Estimating these benefits is a **non-trivial task**

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Multiple
datasets

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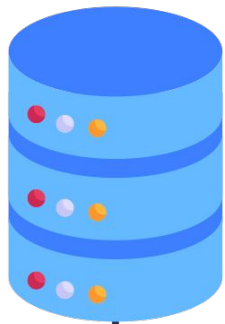


Multiple
datasets



Different
granularities

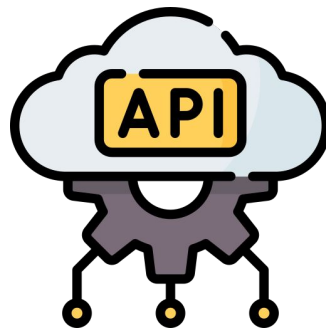
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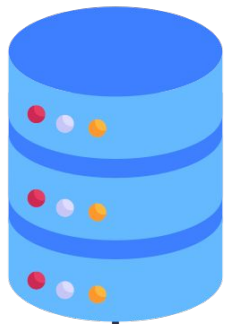


Different
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Various
APIs

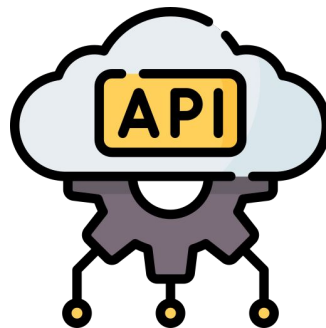
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Multiple
datasets



Different
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Various
APIs



Insightful
information



IXPert: a platform to analyze data from IXPs
and understand their network benefits

IXPert combines multiple data sources to provide insightful information about IXPs

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Offering insights from different perspectives

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Regional Internet
Registries

Offering insights from different perspectives



Regional Internet
Registries



Countries

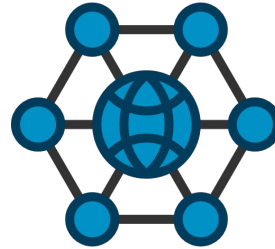
Offering insights from different perspectives



Regional Internet
Registries



Countries



IXPs

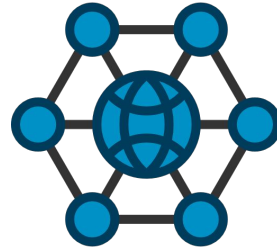
Offering insights from different perspectives



Regional Internet
Registries



Countries



IXPs



ASes and
prefixes



Welcome to IXPert

Your personal Internet eXchange Point expert

Find...



A network operator wearing glasses and a blue shirt is looking at a laptop in a server room. The background is filled with server racks and glowing green lights, creating a blue-toned, high-tech environment.

Use case #1

A network operator needs to find better connectivity to a given AS

ASN or AS Name



AS Name

Rede Nacional de Ensino e Pesquisa

AS Connections

24

AS Reachables

7

Last Updated: 2025-11-28



LACNIC

[BGP](#)

Type

business

Lowest Latency (IXP)

Unknown



ASN or AS Name

1916



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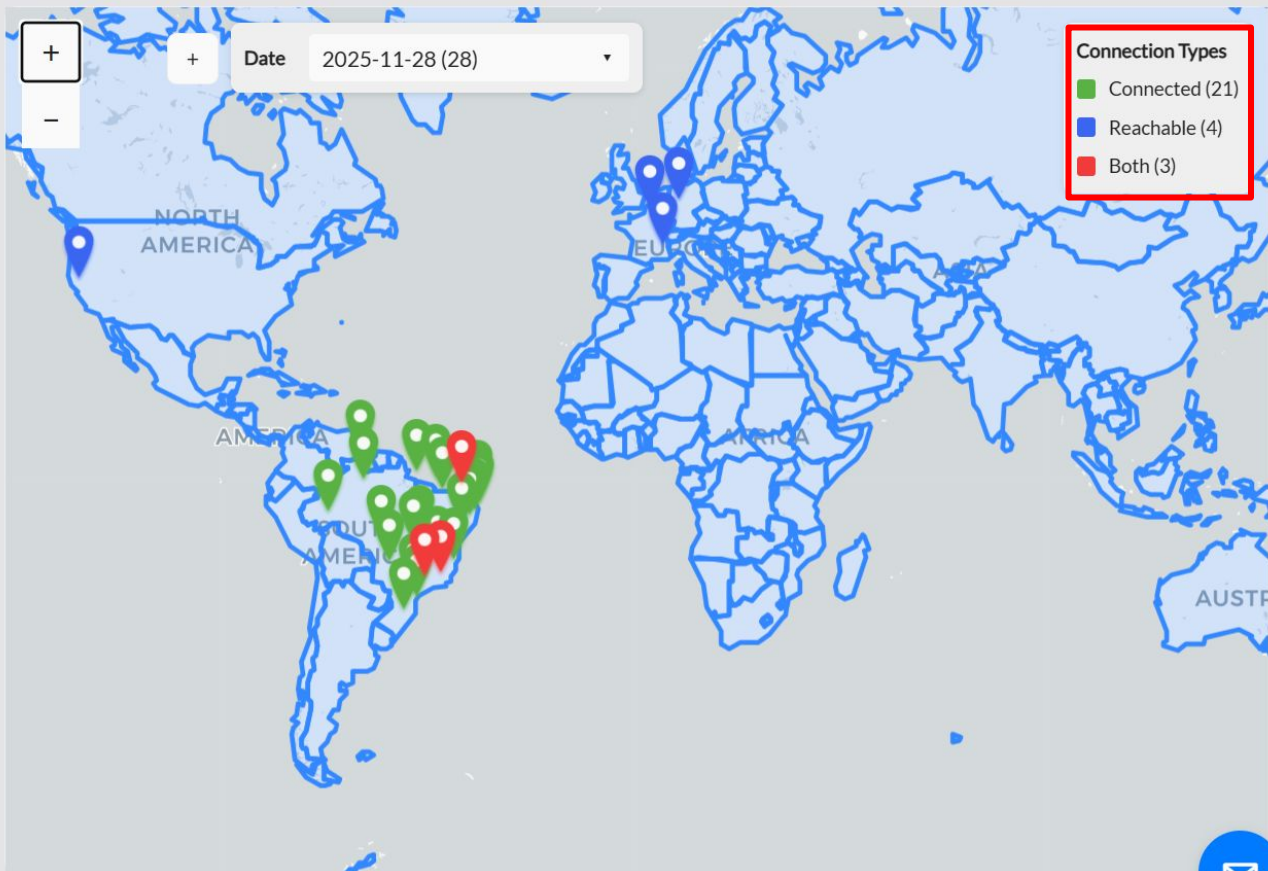
[BGP](#)

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Lowest Latency (IXP)

Unknown





IXPs where the AS1916 is connected



IXP Name	Originated Prefixes		Originated Address space		Cone ASes		Cone Prefixes		Cone Address space		Latency
	↑↓IPv4	IPv6	/24	/48	IPv4	IPv6	IPv4	IPv6	/24	/48	
IX.br Manaus	39	17	80	20	0	0	0	0	0	0	RTT = unknown
IX.br Belém	47	38	60	71	3	1	6	1	100	1	RTT = unknown
IX.br Aracaju	51	25	2,068	4,096	83	54	503	90	5,568	1.79M	RTT = unknown
IX.br Belo Horizonte	51	25	2,068	4,096	78	52	489	88	5,343	1.72M	RTT = unknown
IX.br Brasília	51	25	2,068	4,096	80	53	478	87	5,197	1.79M	RTT = unknown
IX.br Campina Grande	51	25	2,068	4,096	85	44	513	74	5,683	1.52M	RTT = unknown
IX.br Cuiabá	51	25	2,068	4,096	85	53	513	84	5,683	1.84M	RTT = unknown
IX.br Fortaleza	51	25	2,833	4,096	85	55	513	95	8,742	1.85M	RTT = unknown



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IXP Name	Originated Prefixes		Originated Address space		Cone ASes		Cone Prefixes		Cone Address space		Latency
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IXPs where the AS1916 is reachable



IXP Name	Prefixes Announced		Address Space		Seen By # Members		
	↑↓	IPv4	IPv6	IPv4	IPv6	IPv4	IPv6
IX.br Fortaleza		0	25	0	4,096	0	1
IX.br Rio de Janeiro		0	25	0	4,096	0	1
IX.br São Paulo		0	25	0	4,096	0	1
France-IX Paris		0	25	0	4,096	0	1
France-IX Marseille		0	25	0	4,096	0	1
DE-CIX Frankfurt		0	25	0	4,096	0	1
SFMIX San Francisco		0	25	0	4,096	0	





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It is also possible to query for given prefix and identify in which IXPs it is being announced



Use case #2

A peering manager needs to understand if
it is worth connecting to a new IXP

RIB Comparator

RIB



IXP 1



LACNIC



IXP

Compare



RIB Comparator

RIB



ufinet_melhor_formatado_v4_IN5k9JF_PYh1v0F.txt

IXP 1



IX.br São Paulo



LACNIC



IXP

Compare

RIB Comparator

RIB



IXP 1



LACNIC



IXP

Compare



RIB Comparator

RIB



ufinet_melhor_format




IXP

Compare

RIB File Usage Consent

By uploading this RIB file you consent to our system processing and storing the data for the purpose of analysis. Do you agree to allow us to use this data?

Only this analysis ☒ 

☐ Remember this choice

Cancel

I Agree



RIB Comparator

RIB



ufinet_melhor_formatado_v4_IN5k9JF_PYh1v0F.txt

IXP 1



IX.br São Paulo



LACNIC



IXP

Compare

ASes

0 20,000 40,000 60,000 80,000

27250

26440

76230

IX.br São Paulo Intersection RIB

RIB is 179.74% higher than IX.br São Paulo

Prefixes

0 500,000 1.00M

203054

187396

1.00M

IX.br São Paulo Intersection RIB

RIB is 394.74% higher than IX.br São Paulo

Prefixes /24

0 5.00M 10.00M

900179

884321

12.14M

IX.br São Paulo Intersection RIB

RIB is 1248.76% higher than IX.br São Paulo



RIB Comparator

RIB



ufinet_melhor_formatado_v4_IN5k9JF_PYh1v0F.txt

IXP 1



IX.br São Paulo



LACNIC



IXP

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LACNIC



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IXP 1



IX.br São Paulo



LACNIC



IXP

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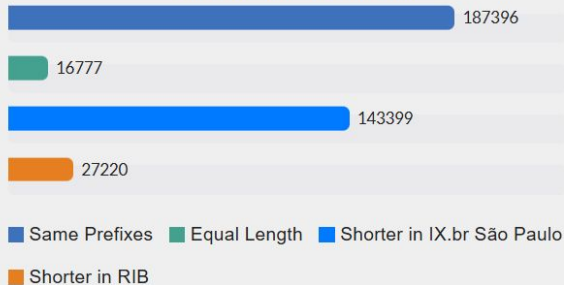
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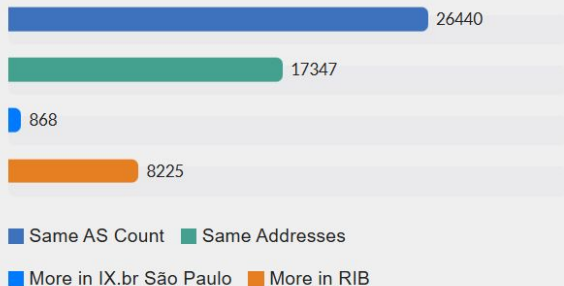
Prefixes - Aspath ?

Comparison of AS paths for identical prefixes observed across both the IXP and the RIB



ASes - Address space

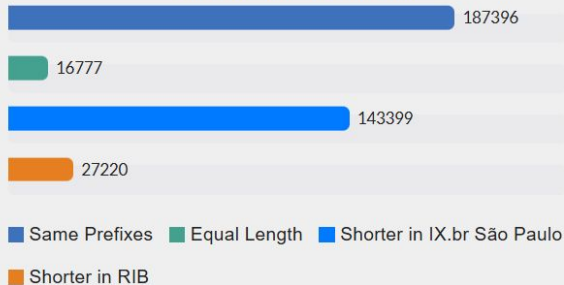
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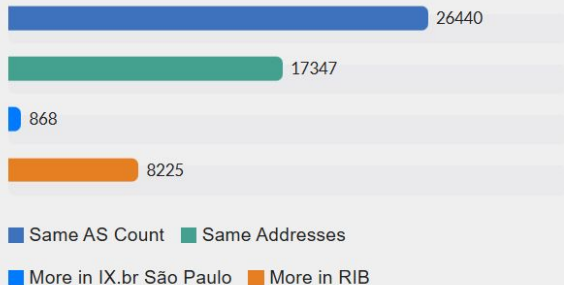
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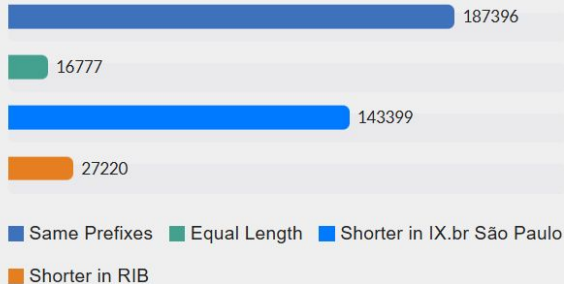
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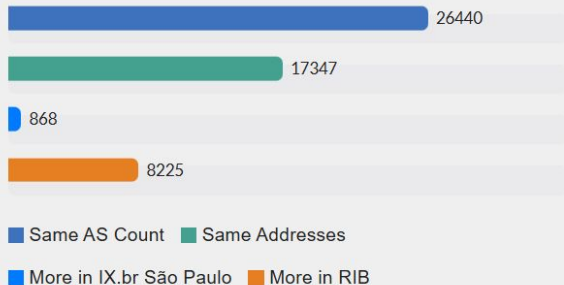
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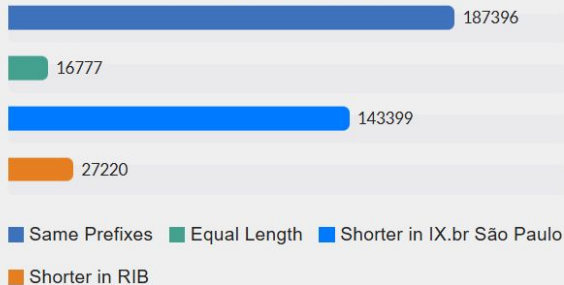
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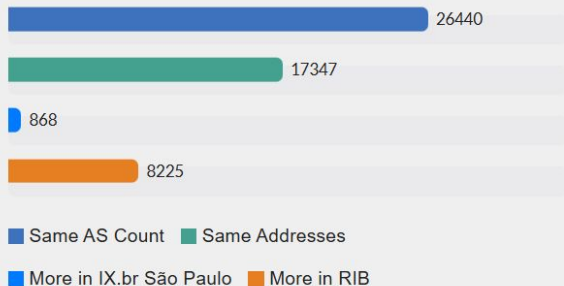
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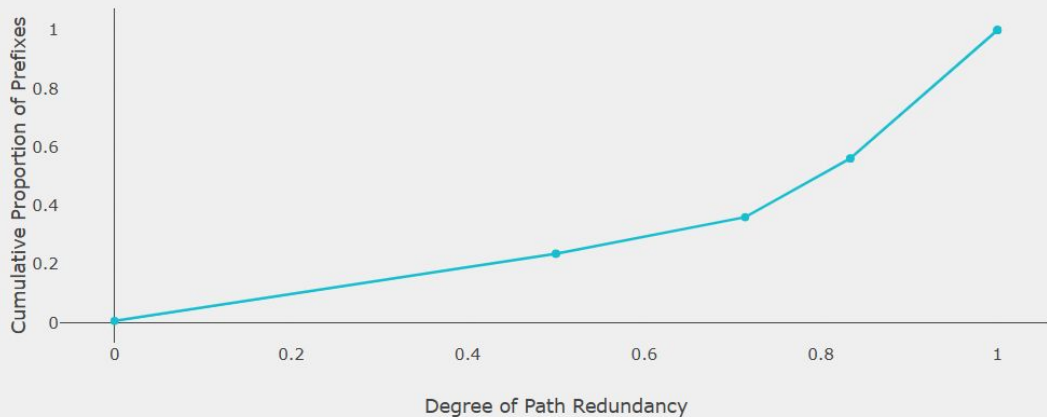
Comparison of address space announced by identical ASes across both the IXP and the RIB.



How similar are the Prefix Paths?

This CDF graph shows the redundancy of paths for prefixes common to both **IX.br São Paulo** and **RIB**. It illustrates how frequently multiple paths exist for the same prefix, with higher redundancy indicating better network resilience.

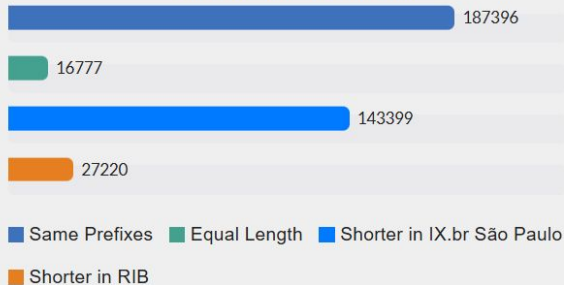
Prefixes - Path Redundancy





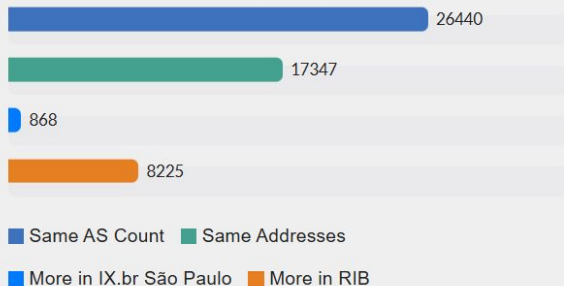
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ASes - Address space

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How similar are the Prefix Paths?

This CDF graph shows the redundancy of paths for prefixes common to both **IX.br São Paulo** and **RIB**. It illustrates how frequently multiple paths exist for the same prefix, with higher redundancy indicating better network resilience.

Prefixes - Path Redundancy



Use case #3

An IXP manager is interested in identifying ASes from a given region that are not connected or reachable at the regional IXP



IX.br São Paulo

Region
São PauloASes v4 Geolocated
2565/24 v4 Geolocated
57119ASes v6 Geolocated
2745/48 v6 Geolocated
124324967

ASes reachable through IXP in IX.br São Paulo

ASes Member	ASes Reachable	ASes Not in IXP	ASes Member in Other IXPs	Not Reachable ASes in Other IXPs
951 (37.08%)	1417 (55.24%)	197 (7.68%)	58 (2.26%)	3 (0.12%)

Address space reachable through IXP in IX.br São Paulo

Address Space Member	Address Space Reachable	Address Space Not in IXP	Prefixes Member in Other IXPs	Not Reachable Prefixes in Other IXPs
17440 (30.53%)	11875 (20.79%)	27804 (48.68%)	293 (0.51%)	723 (1.27%)



IX.br São Paulo

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951 (37.08%)	1417 (55.24%)	197 (7.68%)	58 (2.26%)	3 (0.12%)

Address space reachable through IXP in IX.br São Paulo

Address Space Member	Address Space Reachable	Address Space Not in IXP	Prefixes Member in Other IXPs	Not Reachable Prefixes in Other IXPs
17440 (30.53%)	11875 (20.79%)	27804 (48.68%)	293 (0.51%)	723 (1.27%)



IX.br São Paulo

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2565/24 v4 Geolocated
57119ASes v6 Geolocated
2745/48 v6 Geolocated
124324967

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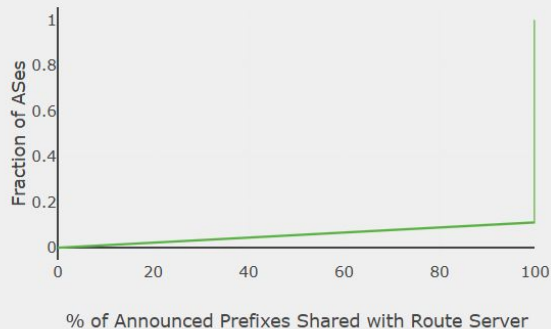
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CDF of ASNs by % of Address Space Shared with IXP



IX.br São Paulo

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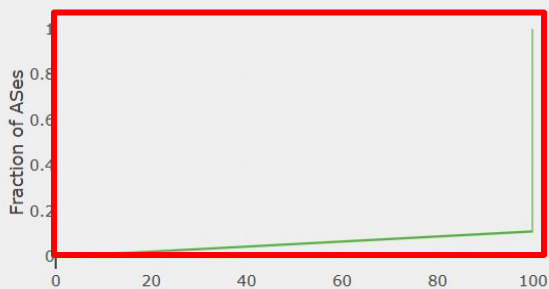
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CDF of ASNs by % of Address Space Shared with IXP



% of Announced Prefixes Shared with Route Server

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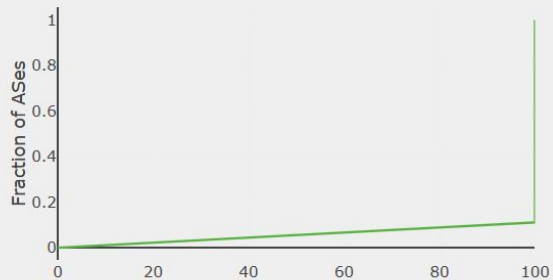
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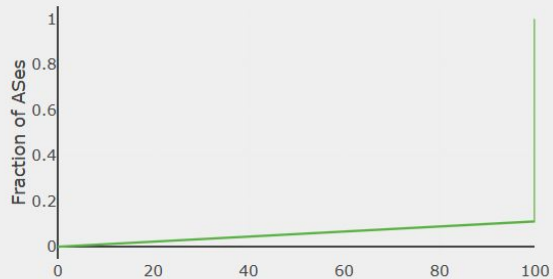
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11097	hosting	EMPRESA BRASILEIRA DE PESQUISA AGROPECUARIA	IX.br Campinas
11802	government	Centro de Informatica e Automacao do Estado de SC	IX.br Florianópolis
19611	hosting	Associação Antônio Vieira - Unisinos	IX.br Porto Alegre
28165	isp	Wireless Comm Services LTDA	IX.br Porto Alegre, IX.br Goiânia



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All of our data is available through a
well-documented API, facilitating
integration with other tools and fostering
research about IXPs

We are continuously adding features and IXPs

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Investigate the impacts of
peering and **depeering** on the
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Analyze **IXP resilience** and estimate the **impacts of outages** to Internet users

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Questions?

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<https://pedrobmarcos.github.io>