Internet Society
Pulse

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

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Internet Society lacnic

December 11th 2024

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Traffic delivery performance and resilience are fundamental aspects of Internet operations

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Increasing traffic volumes

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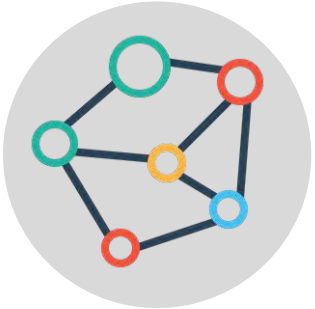
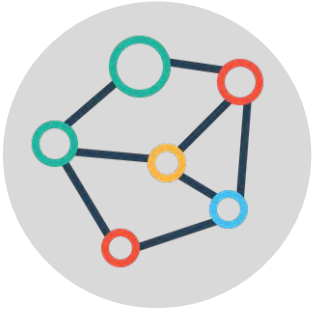
Increasing traffic volumes



Application requirements

Traffic delivery performance and resilience are fundamental aspects of Internet operations

Increasing traffic volumes



Application requirements

Routing and interconnection

IXPs are essential elements in this process…

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… and each one offers different opportunities to improve routing and traffic delivery

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

Estimating these benefits is a non-trivial task

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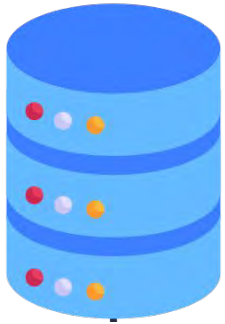
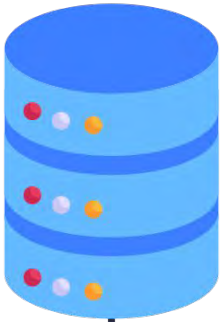


Multiple datasets

Estimating these benefits is a non-trivial task



Multiple datasets

Different granularities

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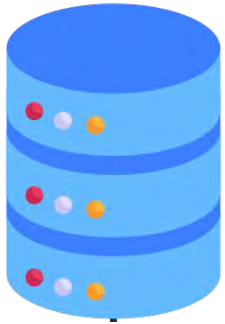

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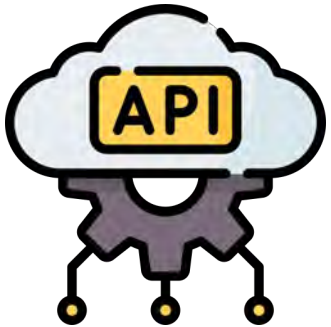

Various APIs

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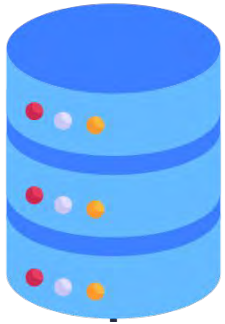

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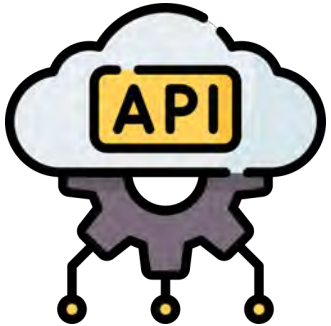
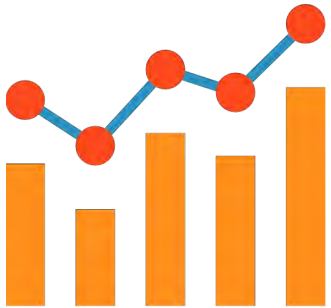


Various APIs



Insightful information

IXPert: a platform to analyze IXP data and offer interconnection insights

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Potential users

IXPert: a platform to analyze IXP data and offer interconnection insights

Potential users

Network operators

Potential users

Network operators

IXP managers

Potential users

Network operators

IXP managers

RIRs

Possible use cases

Use case #1

An AS needs to find better connectivity to a given AS or prefix

IXPert

- Region (RIR)
- Country
- IXP
- AS
- Prefixes
- MAP
- IXP Comparator
- RIB Comparator

Type an ASN: 1916

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Type an ASN: 1916

IXP Name	Member or Reachable	Cone Ases	Originated Prefixes	Cone Prefixes	Originated Address space(/24)	Cone Address space(/24)
IX.br São Paulo	both	72	86	397	2810	8107
IX.br Fortaleza	both	72	85	430	2806	8593
IX.br Salvador	both	84	85	508	2806	9002
IX.br Curitiba	both	73	85	421	2806	7916
IX.br Florianópolis	both	67	169	557	2048	5244
IX.br Boa Vista	both	85	86	511	2045	5955
IX.br Maceió	both	85	86	511	2045	5955
IX.br São Luís	both	84	86	510	2045	5954
IX.br Campo Grande	both	84	86	508	2045	5908
IX.br Rio de Janeiro	both	83	166	485	2043	5448

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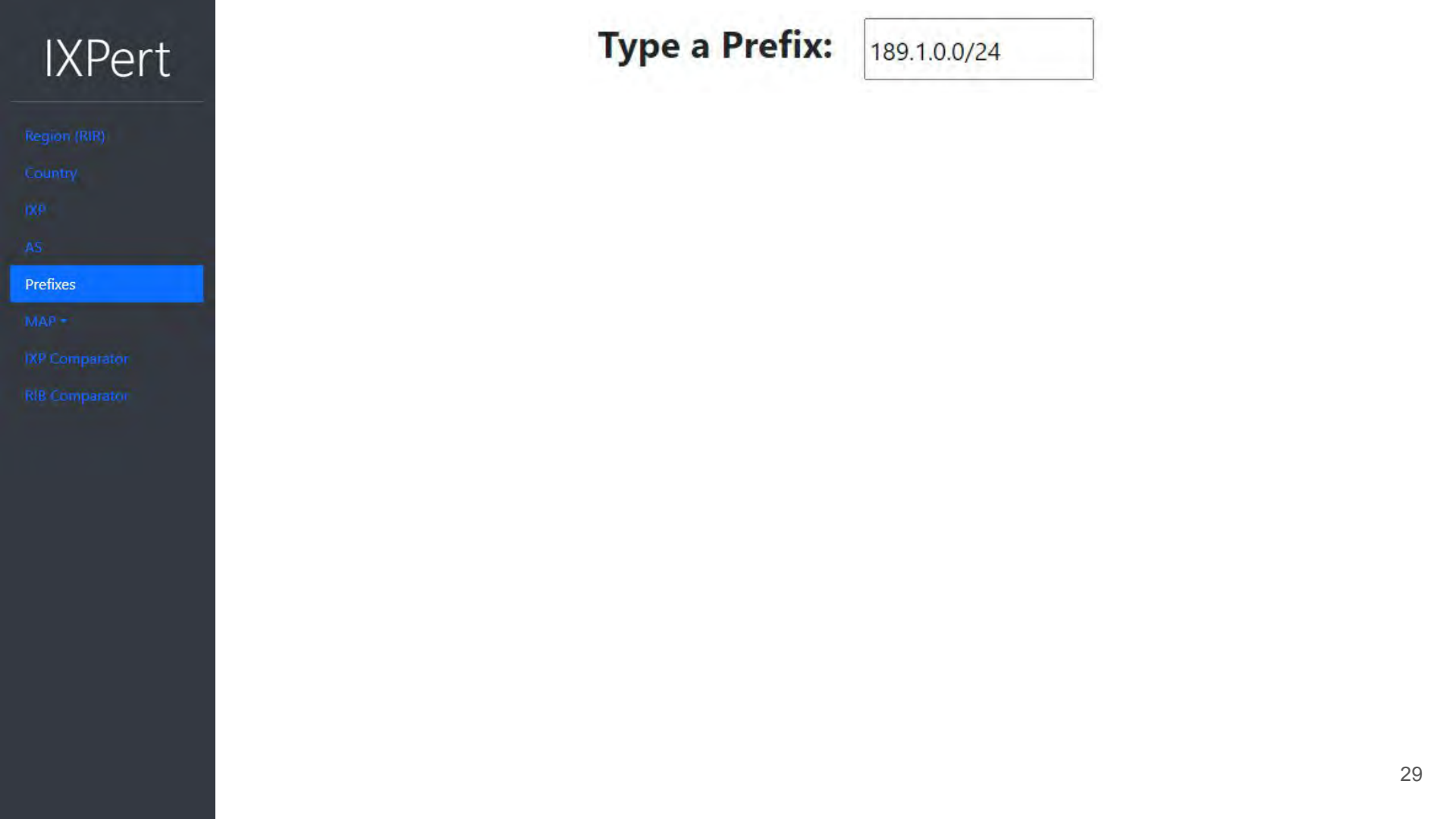
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Type a Prefix:
189.1.0.0/24

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IXP Name	ASN	AS Path	AS Path Length
IX.br Recife	28661	28661	1
IX.br Rio de Janeiro	14840	14840,28661	2
IX.br Aracaju	14840	14840,28661	2
IX.br Caxias do Sul	14840	14840,28661	2
IX.br Brasília	14840	14840,28661	2
IX.br Maceió	61568	61568,28661	2
IX.br Belo Horizonte	14840	14840,28661	2
IX.br Curitiba	14840	14840,28661	2
IX.br Porto Alegre	14840	14840,28661	2
IX.br Salvador	14840	14840,28661	2
IX.br Campo Grande	14840	14840,28661	2
IX.br Campina Grande	61568	61568,28661	2
IX.br Goiânia	14840	14840,28661	2
IX.br Florianópolis	14840	14840,28661	2
IX.br São Paulo	14840	14840,28661	2
IX.br Fortaleza	1031	1031,61568,28661	3


IXPert
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Type a Prefix:
189.1.0.0/24
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IX.br Recife 28661 28661 1
IX.br Rio de Janeiro 14840 14840,28661 2
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IX.br Caxias do Sul 14840 14840,28661 2
IX.br Brasília 14840 14840,28661 2
IX.br Maceió 61568 61568,28661 2
IX.br Belo Horizonte 14840 14840,28661 2
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IX.br Salvador 14840 14840,28661 2
IX.br Campo Grande 14840 14840,28661 2
IX.br Campina Grande 61568 61568,28661 2
IX.br Goiânia 14840 14840,28661 2
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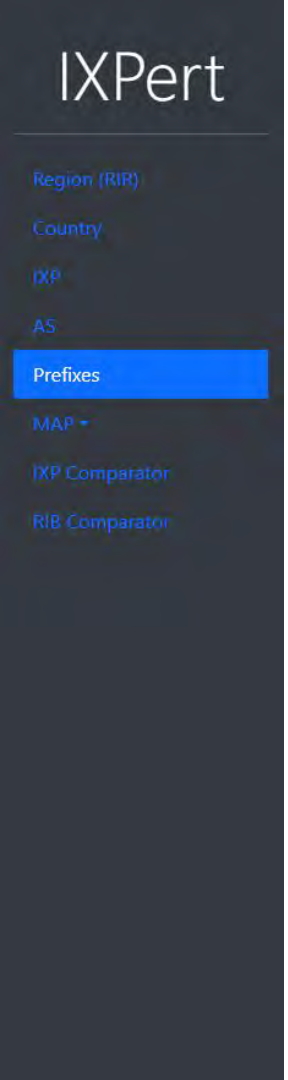
IX.br São Paulo 14840 14840,28661 2
IX.br Fortaleza 1031 1031,61568,28661 3



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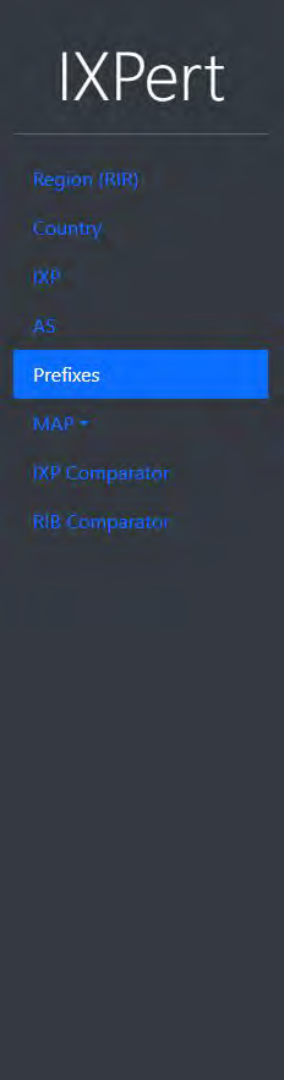

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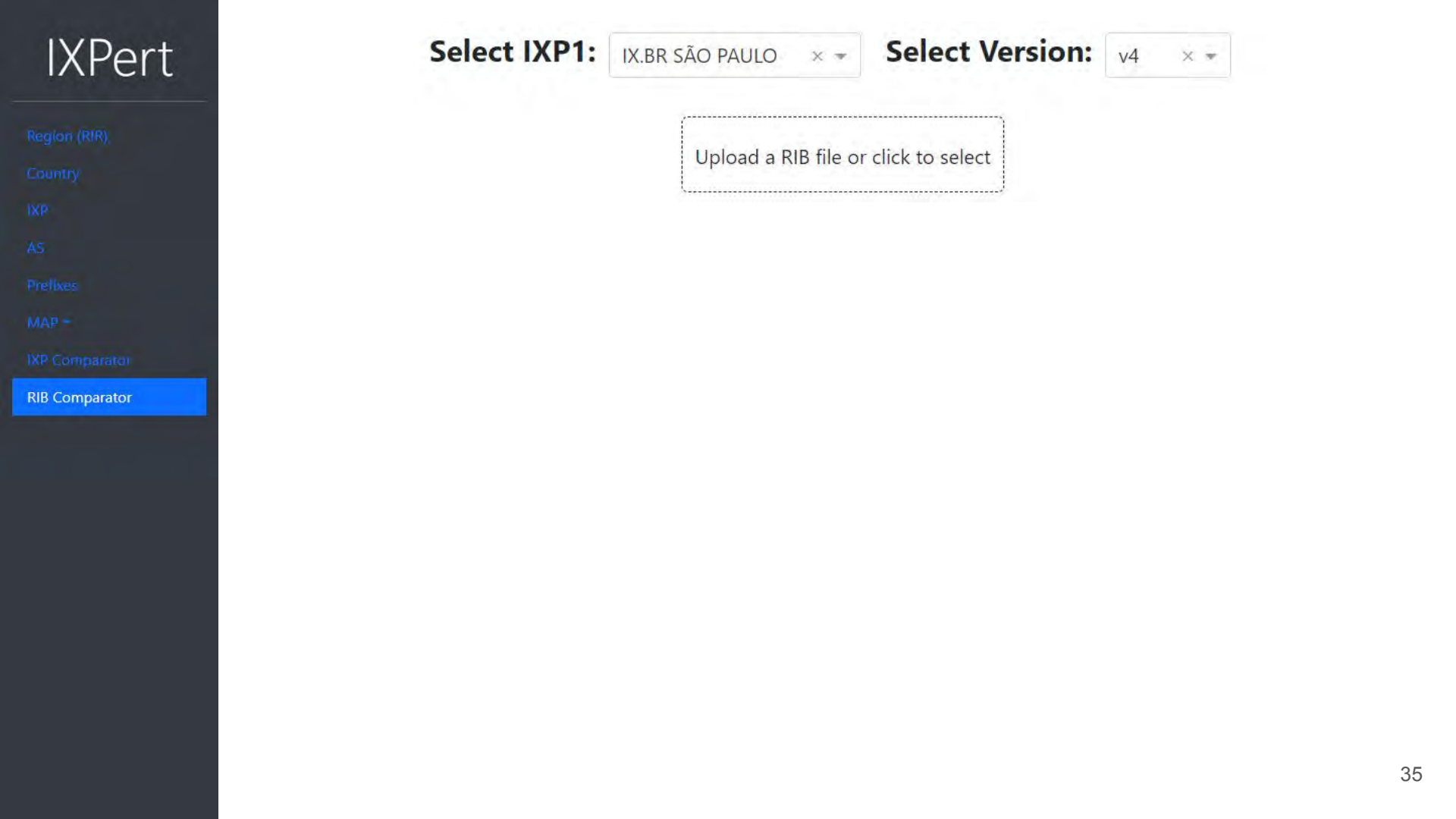
Use case #2

An AS needs to understand if it is worth or not to connect to a new IXP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Select IXP1:
IX.BR SÃO PAULO
Select Version:
v4
Upload a RIB file or click to select

Select IXP1: IX.BR SÃO PAULO × ▾ **Select Version:** v4 × ▾

Upload a RIB file or click to select

Metric	IXP	RIB	Intersection	IXP Exclusive	RIB Exclusive
# ASes	24349	15795	5970 (24.52% IXP, 37.80% RIB)	18379 (75.48%)	9825 (62.20%)
# Prefixes	179989	105225	28585 (15.88% IXP, 27.17% RIB)	151404 (84.12%)	76640 (72.83%)
# Prefixes announced /24	851446	800388	167890 (19.72% IXP, 20.98% RIB)	683556 (80.28%)	632498 (79.02%)

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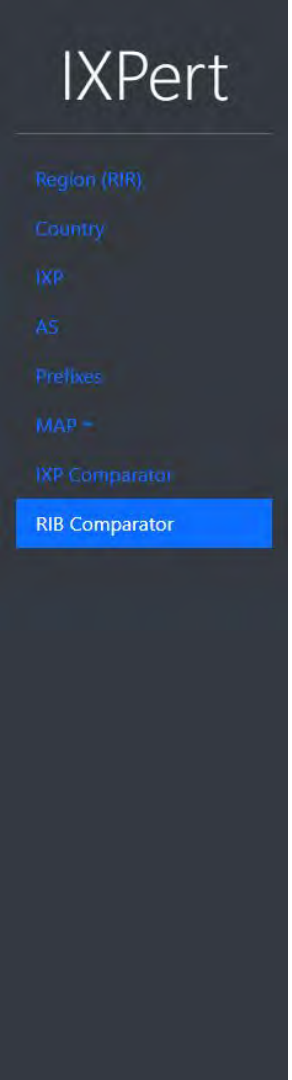
ASes - Address space

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

# of Same ASes	# of ASes Announcing Same Address Space	# of ASes Announcing More Address Space on IXP	# of ASes Announcing More Address Space on RIB
5970	3017	1171	1782



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5970	3017	1171	1782

Prefixes - Aspath

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

# Same Prefixes	# Shortest Path IXP	# Shortest Path RIB	# Same Path size
28585	6574	13749	8262

Prefixes - Aspath

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

# Same Prefixes	# Shortest Path IXP	# Shortest Path RIB	# Same Path size
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- IXP
- AS
- Prefixes
- MAP
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Prefixes - Aspath

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

# Same Prefixes	# Shortest Path IXP	# Shortest Path RIB	# Same Path size
28585	6574	13749	8262

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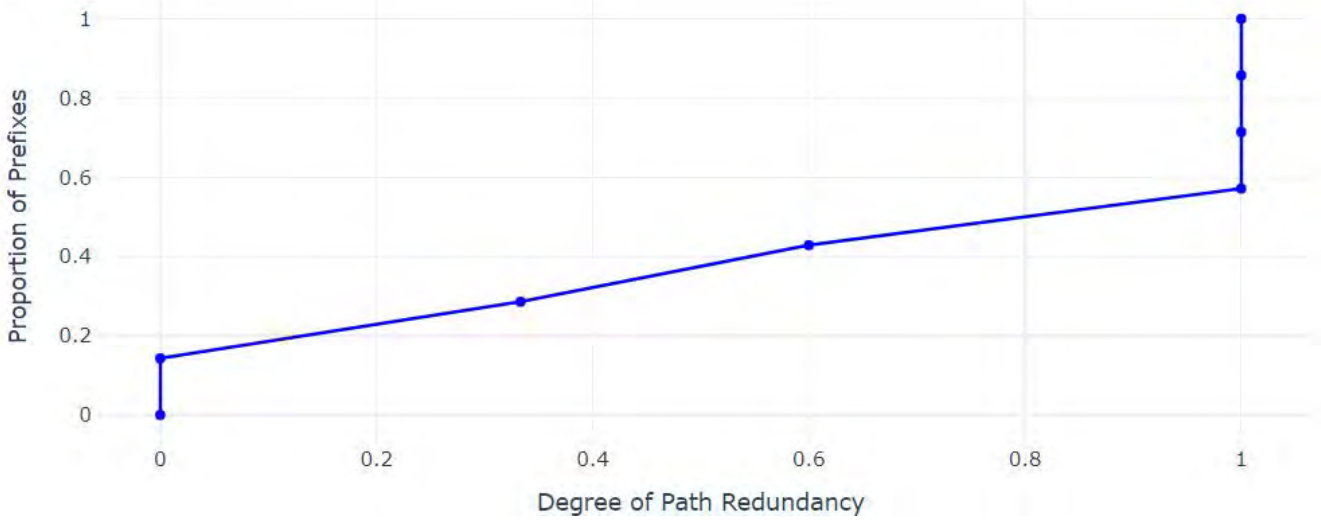
Prefixes - Path Redundancy

This CDF graph shows the redundancy in paths for prefixes common to both the RIB and IXP. It illustrates how frequently multiple paths exist for the same prefix, where higher redundancy suggests better network resilience.



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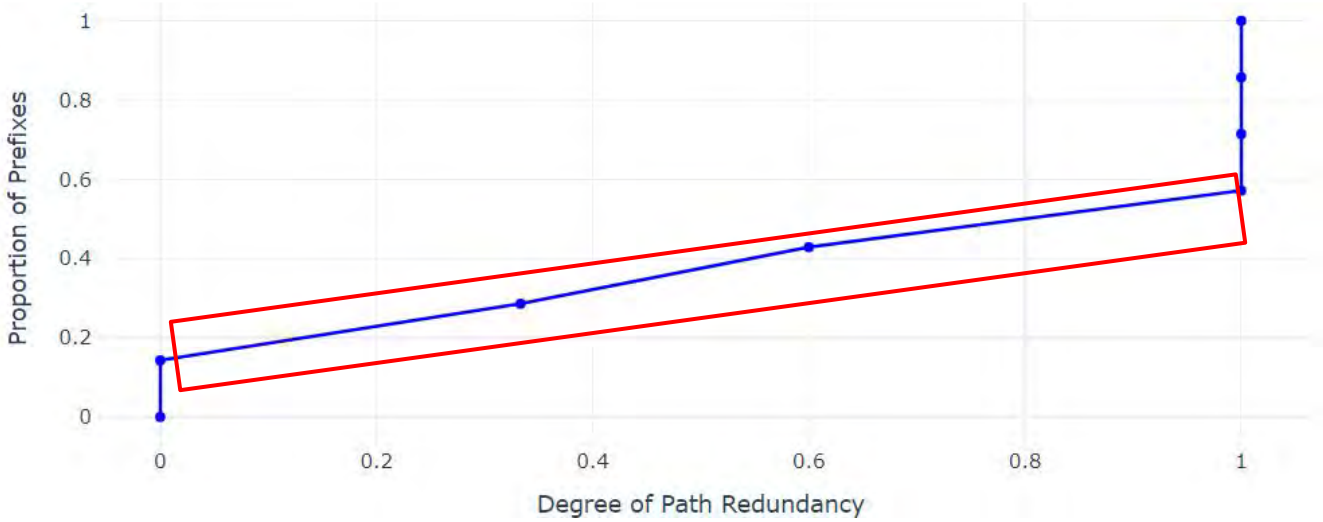
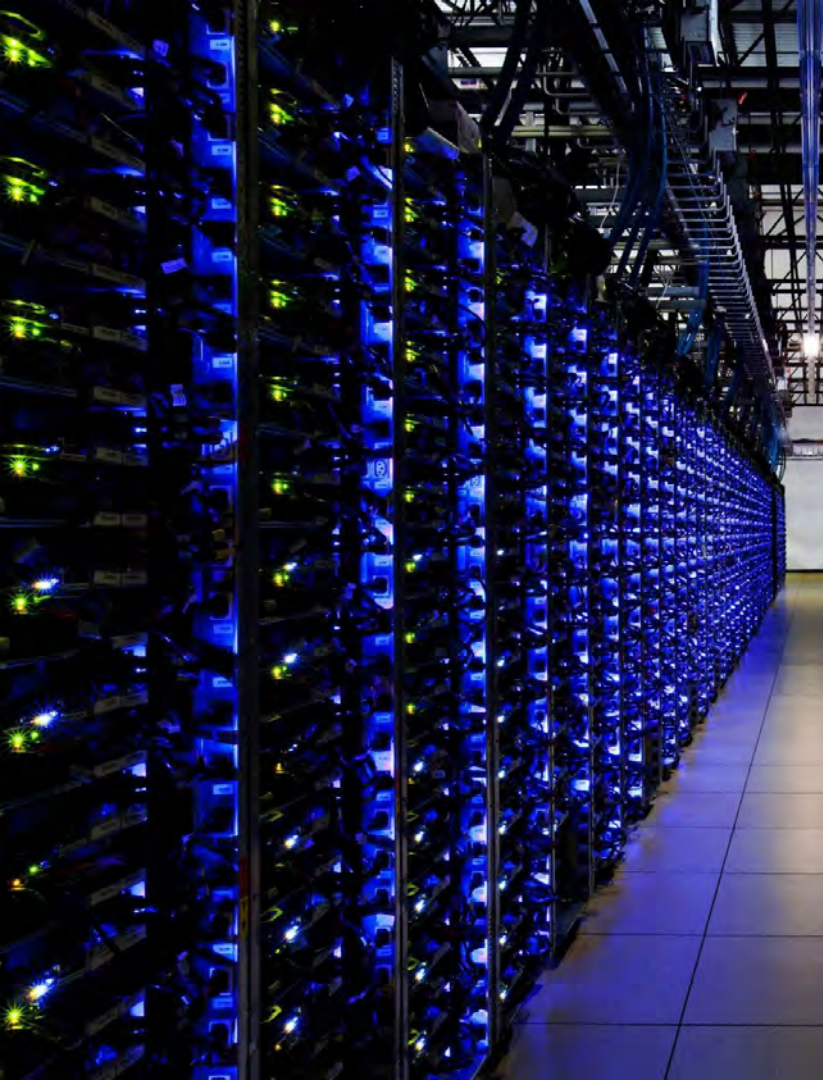
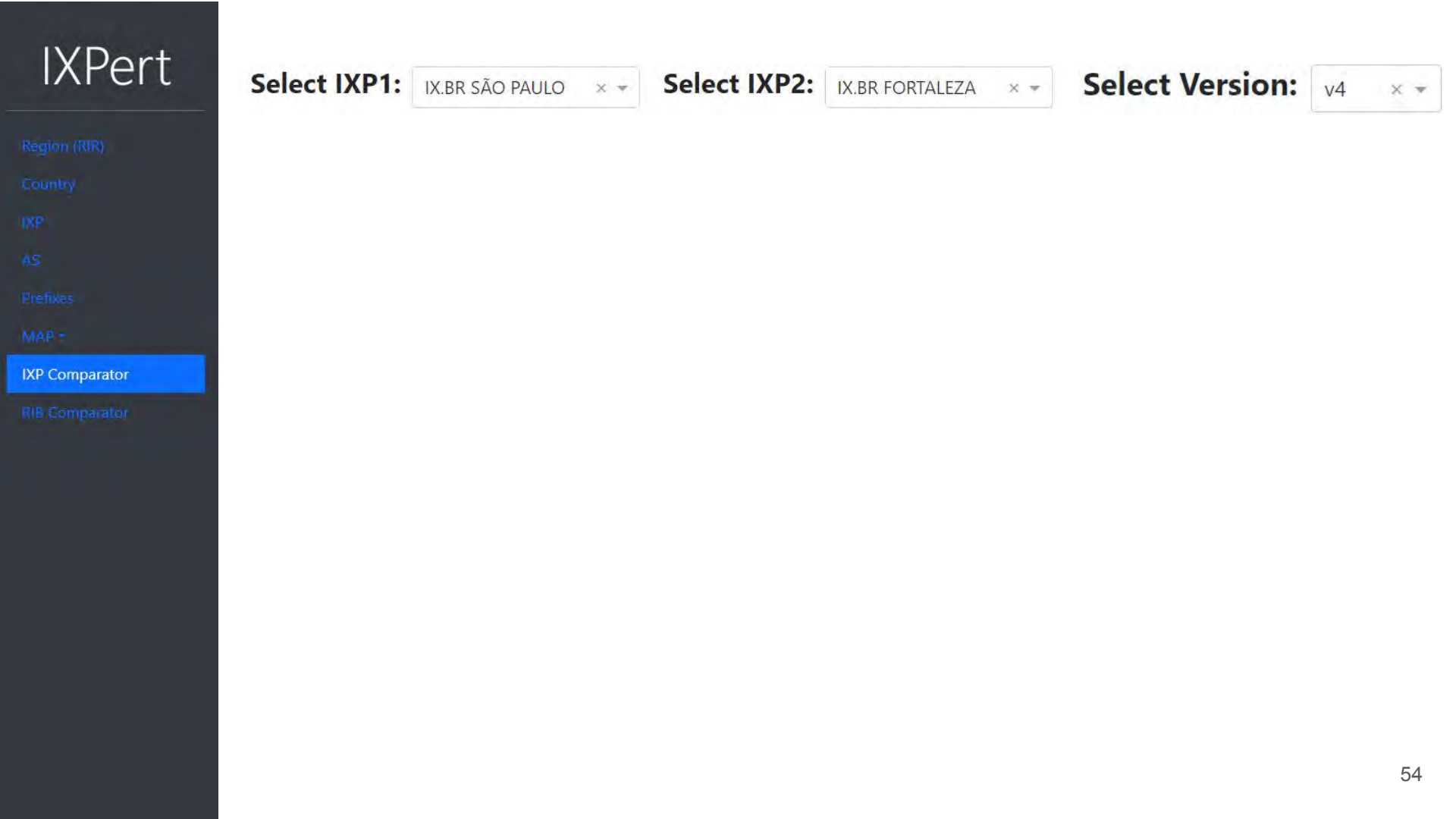




Use case #3

You are a network operator or IXP manager and wants to compare the benefits of two IXPs


IXPert
Region (RIR)
Country
IXP
AS
Prefixes
MAP
IXP Comparator
RIB Comparator
Select IXP1:
IX.BR SÃO PAULO
Select IXP2:
IX.BR FORTALEZA
Select Version:
v4

IXPert

- Region (RIR)
- Country
- IXP
- AS
- Prefixes
- MAP
- IXP Comparator
- RIB Comparator

Select IXP1: IX.BR SÃO PAULO × **Select IXP2:** IX.BR FORTALEZA × **Select Version:** v4 ×

Metric	IX.br São Paulo	IX.br Fortaleza	Intersection	IXP1 Exclusive	IXP2 Exclusive
# ASes member	2048	624	418	1630	206
# ASes reachable	24173	21937	21789	2384	148
# Prefixes announced	179989	146752	143772	36217	2980
# Prefixes announced /24	851446	703533	696622	154824	6911
% of country allocated ASes member at the ixp	21.4	6.56			
% of country allocated ASes Reachable at the ixp	83.34	79.08			
% of country allocated address space reachable through IXPs	37.72	34.03			

IXPert

- Region (RIR)
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- IXP
- AS
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- RIB Comparator

Select IXP1: IX.BR SÃO PAULO **Select IXP2:** IX.BR FORTALEZA **Select Version:** v4

Metric	IX.br São Paulo	IX.br Fortaleza	Intersection	IXP1 Exclusive	IXP2 Exclusive
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# Same Prefixes	# Shortest Path IX.br São Paulo	# Shortest Path IX.br Fortaleza	# Same Path size
143772	3842	18278	121652

IXPert

- Region (RIR)
- Country
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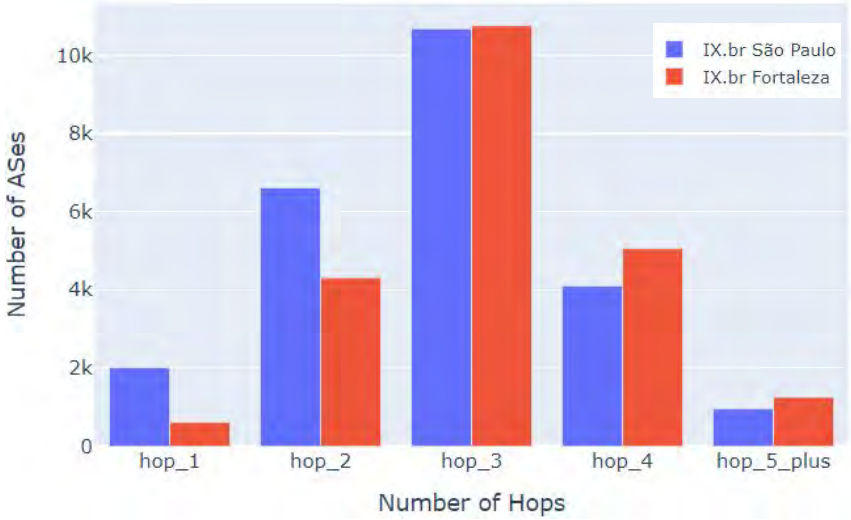

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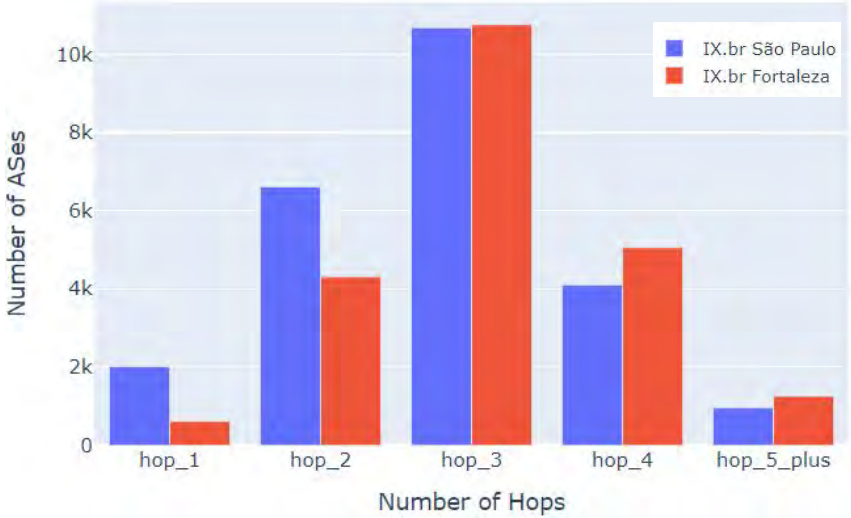

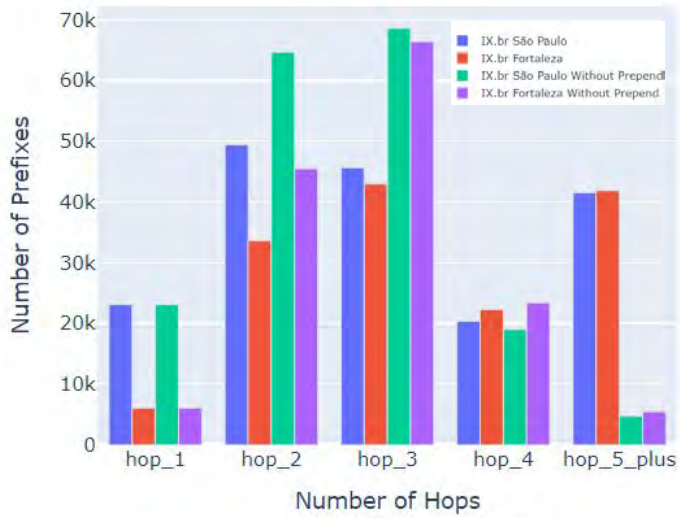


What's Next?

We are continuously adding new features

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Data plane measurements
for performance analyses,
including remote peering

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Data plane measurements for performance analyses, including remote peering

Longitudinal analysis of our data to understand changes at the different levels (i.e., IXPs, ASes)

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pbmarcos@furg.br