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## Statistics on IXPs and data centers

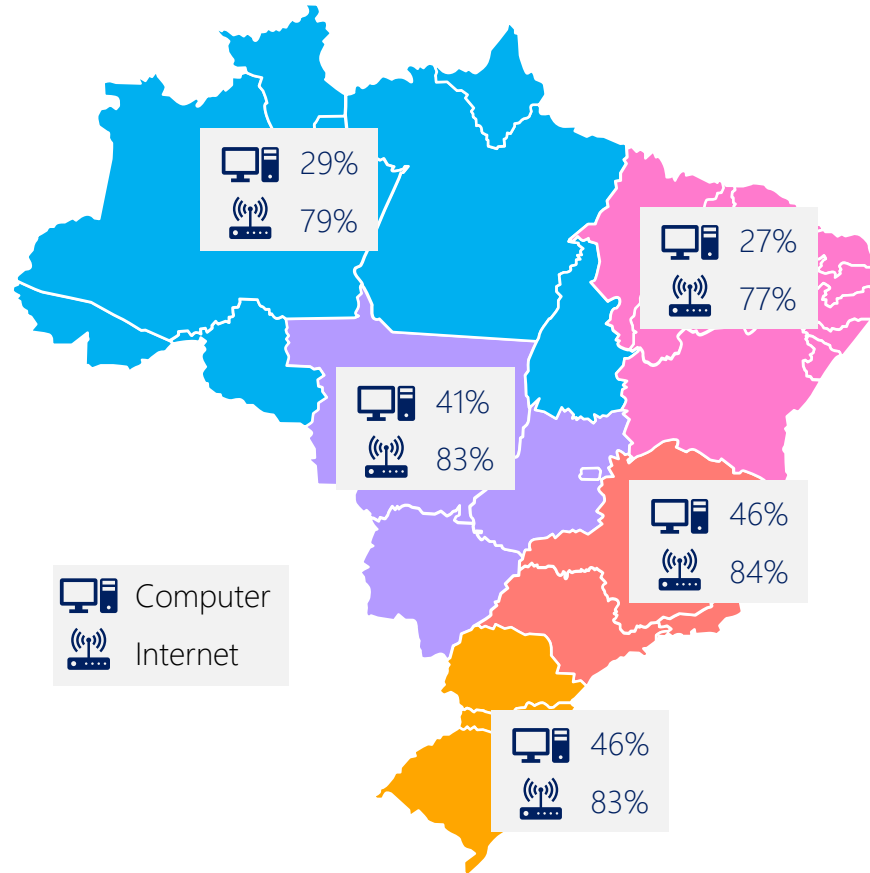
Milton Kaoru Kashiwakura

09/12/2022

# Agenda

- Autonomous System Networks (ASNs)
- Internet Service Providers (ISPs)
- Internet Exchange Points (IXPs)
- Statistics on IXPs
- Content Delivery Networks (CDNs)

# Context of ICTs in Brazilian Households



- 83% of households have Internet access, which represents approximately 61.8 million households
- 148 million Internet users
- 6<sup>th</sup> largest ccTLD: 5 million domain names

Source: CGI.br, ICT Households Survey 2021; Registro.br 2022

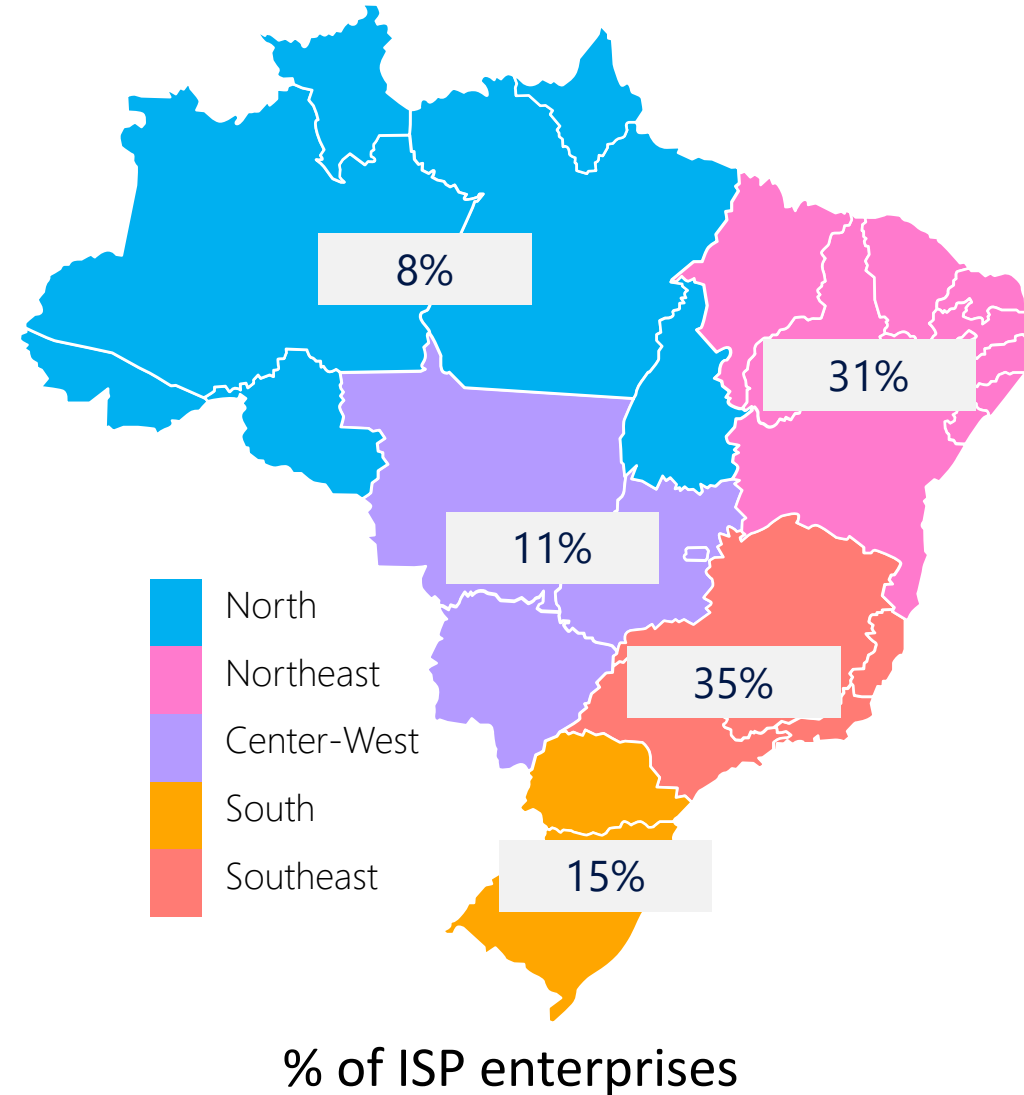
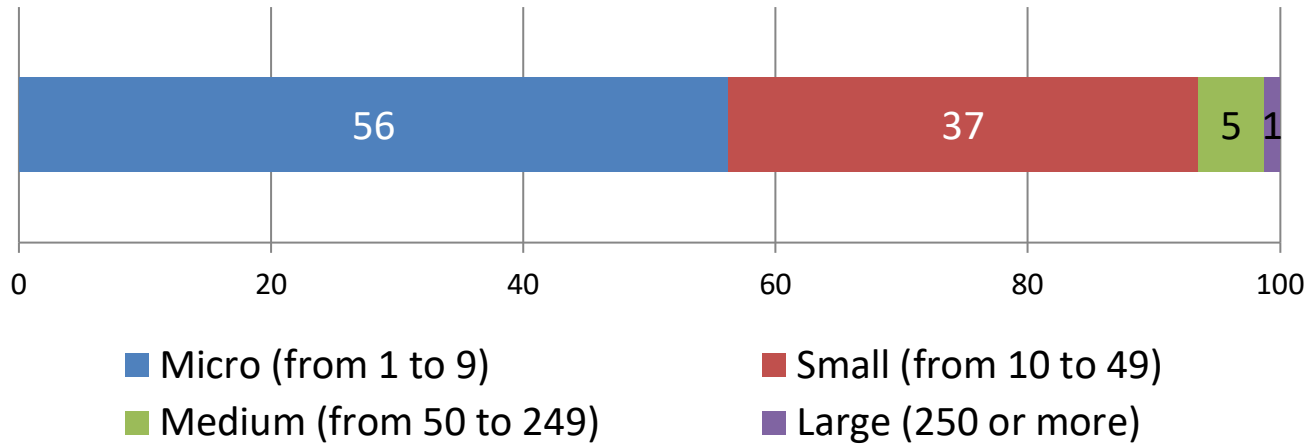
# IX.br improving Internet Quality in Brazil

- Indirect reduction in latency and cost
- Increase ASNs connectivity
- Reduce dependency on large IXPs
- Bring Internet content closer to users
- Promote demand for new data centers in unexplored areas
- Data Center: a big challenge



# Internet Service Providers in Brazil

- ❑ 35% of the ISP are in the Southeast region of Brazil
- ❑ 93% of the ISP in Brazil are micro or small companies (1 to 49 persons employed)

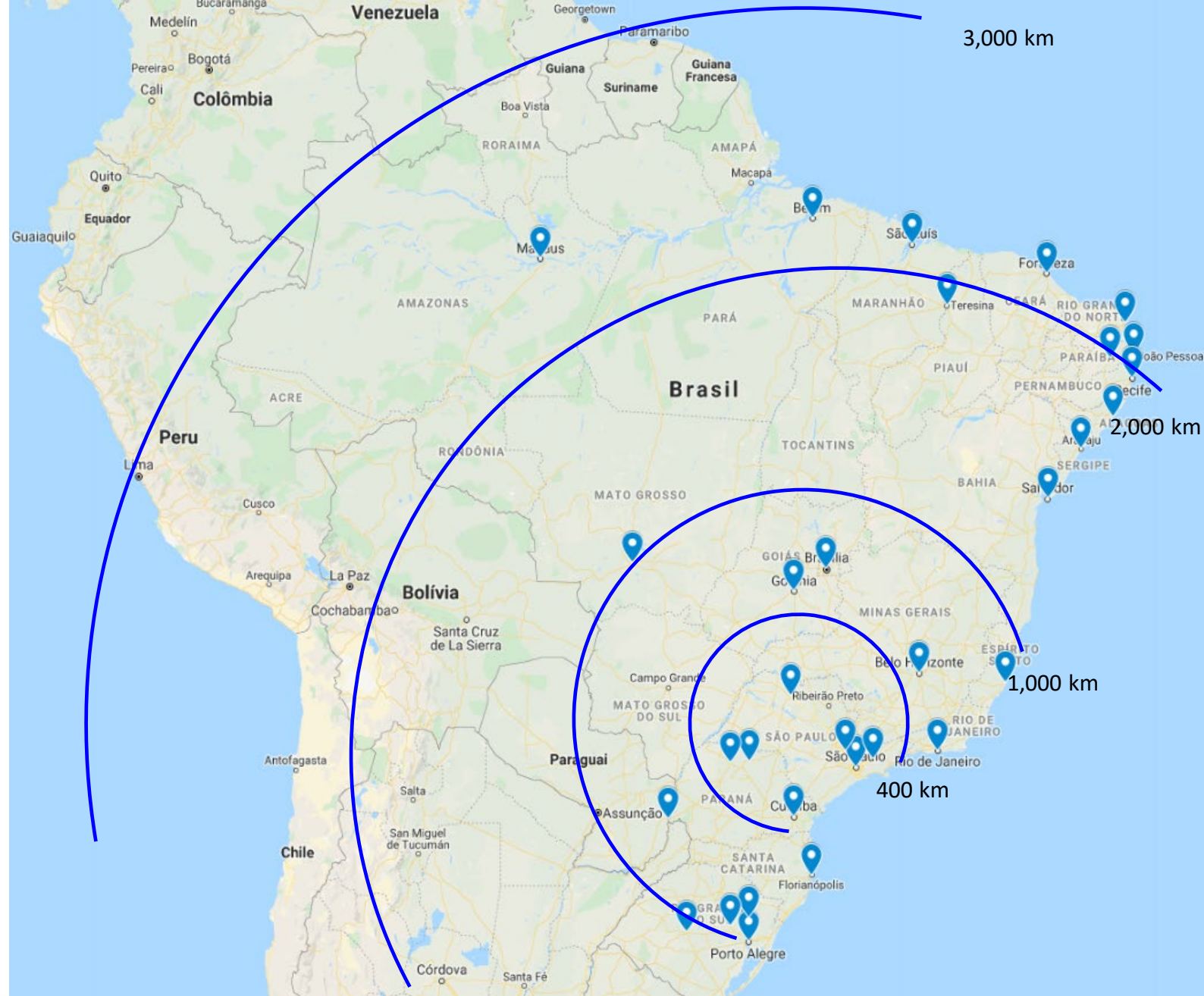


Source: CGI.br, ICT Internet Service Providers Survey 2020 (2021)

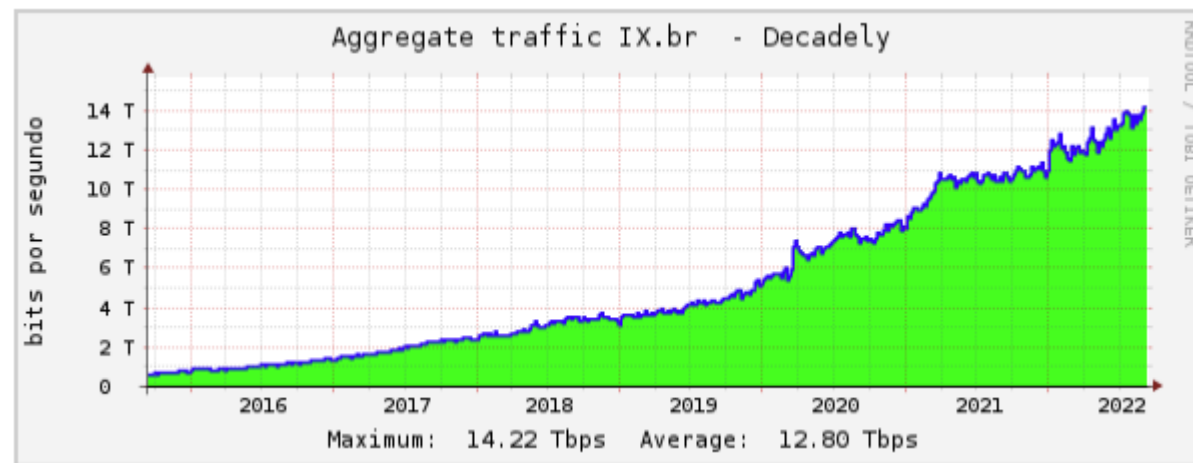
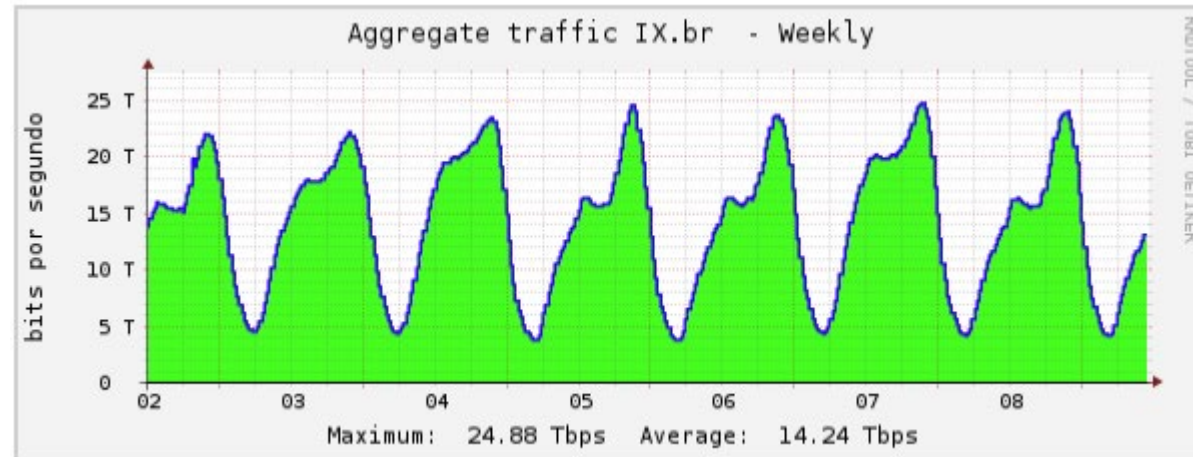
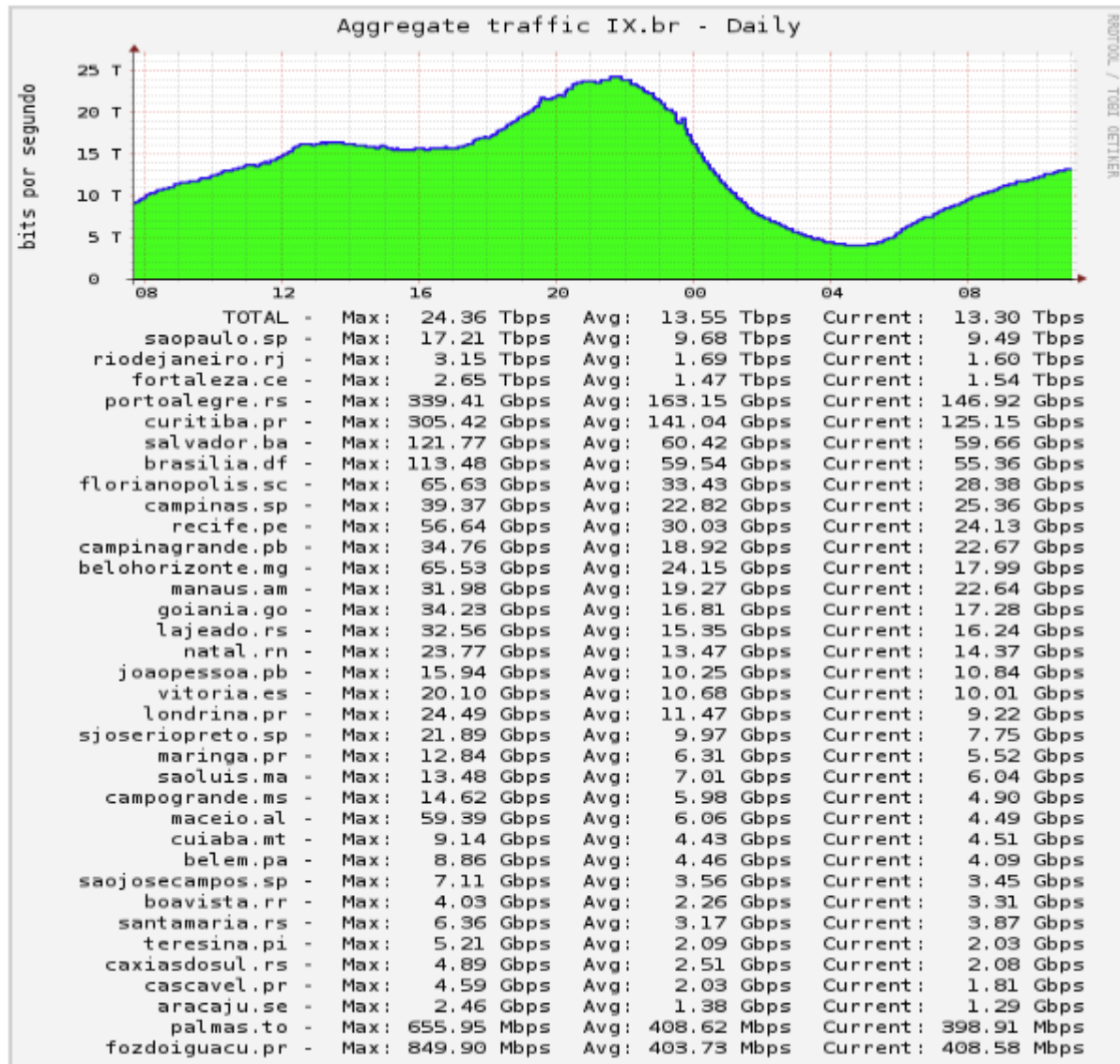


# Internet Exchange Points in Brazil

- 35 INTERNET EXCHANGE POINTS
- NOT INTERCONNECTED
- TOTAL AGGREGATE TRAFFIC ~ 25 Tbits/s
- NO OBLIGATION TO EXCHANGE TRAFFIC WITH ALL OTHER ASNs.  
Ex., large telco participate to exchange traffic with AS14026 (SIMET) for quality measurement.
- IX.br São Paulo
  - # OF ASN = 2413
  - Peak traffic ~18Tbit/s



# Internet Exchange Points Statistics



Statistics available at:  
<https://ix.br/agregado/>



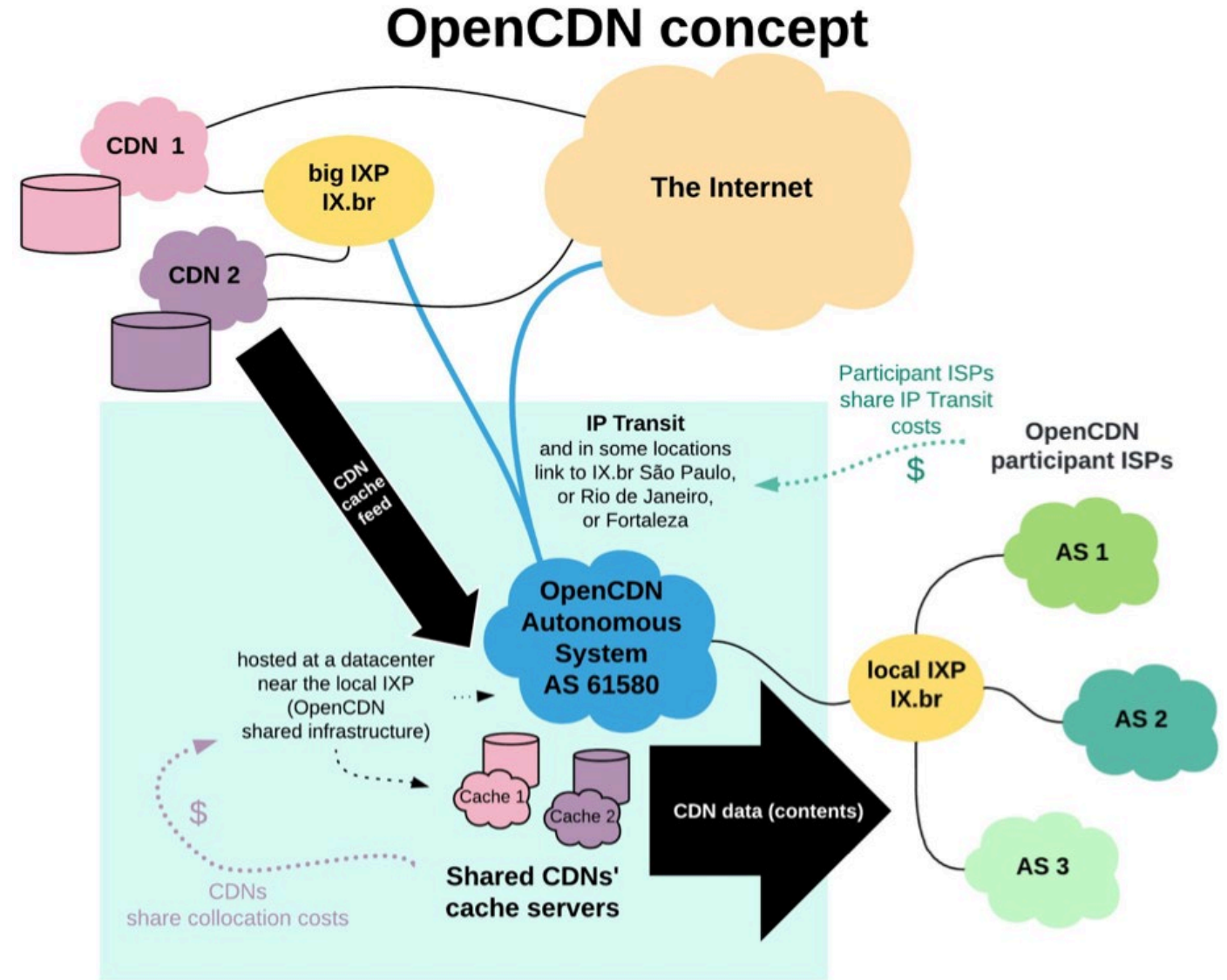
# History of the presence of CDNs/Content Providers on IX.br São Paulo

ASN	CDN	Activation year	Traffic peak IX-SP	# Participants IX-SP	PeeringDB – CDN Capacity – 2022
10310	Yahoo!	2006			80G
15169	Google	2008	4.65Gbps	43	2.5T
28604	Globo.com	2010	26Gbps	110	800G
2906	Netflix	2011	42Gbps	248	2.4T
16509	Amazon	2012	-----	-----	1.2T
32934	Facebook	2012	-----	-----	3.2T
8075	Microsoft	2013	147Gbps	392	400G
15133	Edgecast	2014	408Gbps	503	600G
13335	Cloudflare	2014	-----	-----	700G
20940	Akamai	2015	1Tbps	757	2.5T
54113	Fastly	2015	-----	-----	900G
52580	Azion	2017	2.69Tbps	1469	300G
46489	Twitch	2017	-----	-----	1.2T
33438	StackPath	2018	4.2Tbps	1729	600G
396986	ByteDance	2021	13Tbps	2291	300G
714	Apple	2022	15Tbps	2310	200G

Source: IX.br

# CDNs and its implications for statistics

- Many content providers use Content Delivery Networks (CDNs) connected to the big IXPs, like São Paulo.
- This affects the calculation of the total volume of traffic, since the sum of traffic volume of the peers is larger than the total at the IXP, mainly because there are a considerable number of ISPs with CDN caching within their networks.



# CDNs in Brazil

- OpenCDN project
  - Salvador
  - Manaus
  - Brasilia

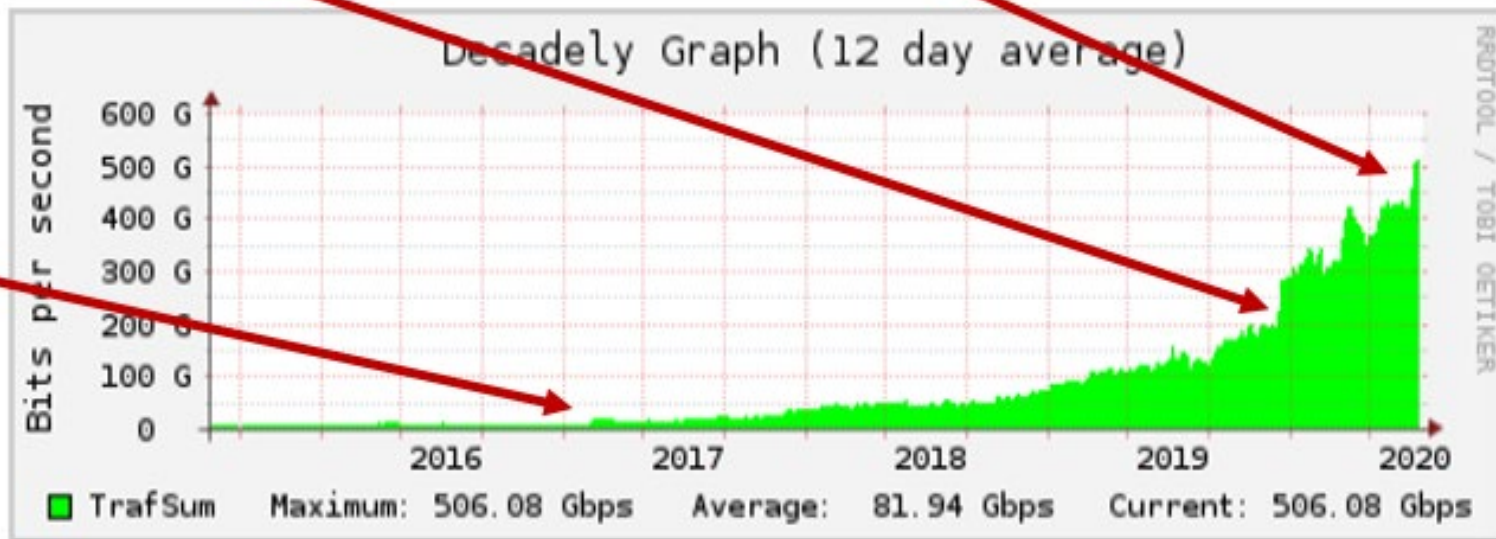
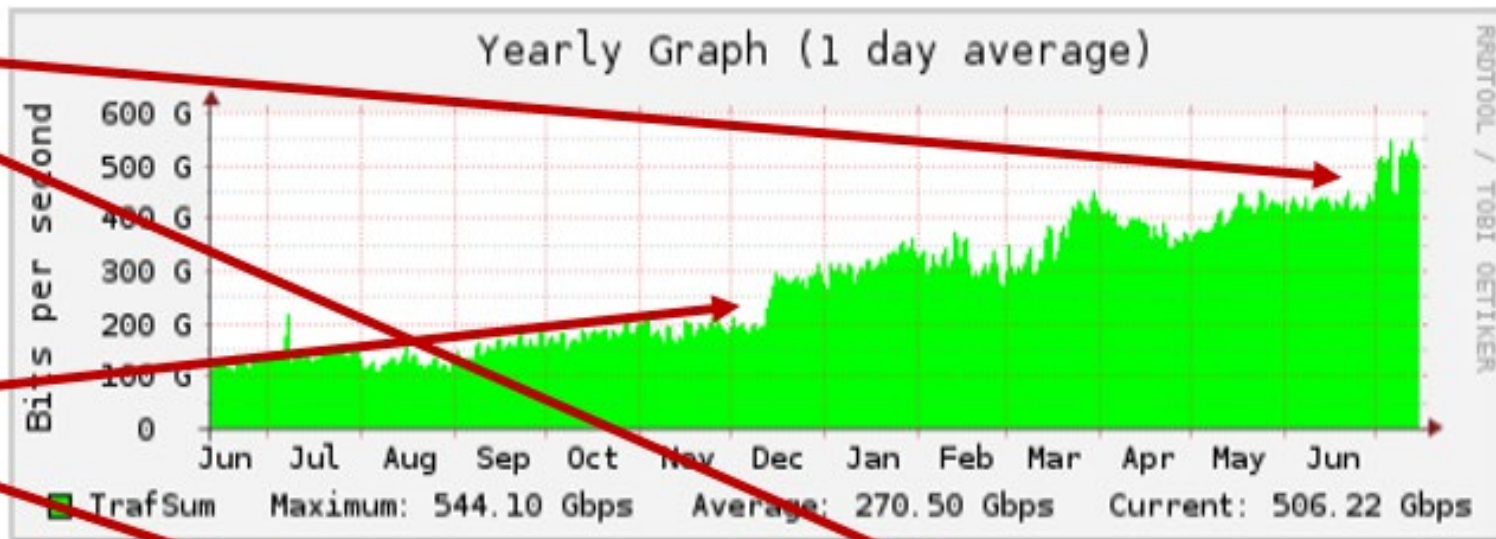
São Paulo/SP	Rio de Janeiro/RJ	Fortaleza/CE	Porto Alegre/RS	Curitiba/PR	Salvador/BA	Manaus/AM	Brasilia/DF	Recife/PE	João Pessoa/PB
Google	Google	Google			OpenCDN	OpenCDN	**		
Netflix	Netflix	Netflix	Netflix		OpenCDN	OpenCDN	OpenCDN		
Facebook	Facebook	Facebook							
Akamai	Akamai	Akamai	Akamai	Akamai	OpenCDN	**	Akamai		
Microsoft	Microsoft								
<u>Globo.com</u>	<u>Globo.com</u>	<u>Globo.com</u>	<u>Globo.com</u>	<u>Globo.com</u>	OpenCDN	OpenCDN	<u>Globo.com</u>	<u>Globo.com</u>	
Amazon	Amazon								
Azion	Azion	Azion			OpenCDN	**			
CacheFly									
CDNetworks									
CentralServer									
Cloudflare	Cloudflare	Cloudflare	Cloudflare	Cloudflare	Cloudflare	**	**		
Edgecast	Edgecast	Edgecast							
Fastly	Fastly	Fastly		Fastly					
GoCache	GoCache	GoCache		GoCache			GoCache		
RiotGames									
SingularCDN	SingularCDN	SingularCDN	SingularCDN			SingularCDN		SingularCDN	SingularCDN
Softlayer									
Twitch	Twitch	Twitch	Twitch				Twitch		
Twitter									
UPX	UPX	UPX			UPX		UPX		
Yahoo	Yahoo	Yahoo							
Edgeuno	Edgeuno	Edgeuno	Edgeuno	Edgeuno	Edgeuno		Edgeuno		
Alibaba_Cloud_CDN_	Alibaba_Cloud_CDN_								
CDNetworks									
CDN77									
28	18	15	7	6	3	1	6	2	1

# IX.br Fortaleza/CE

Facebook upgrade  
(07/2020)

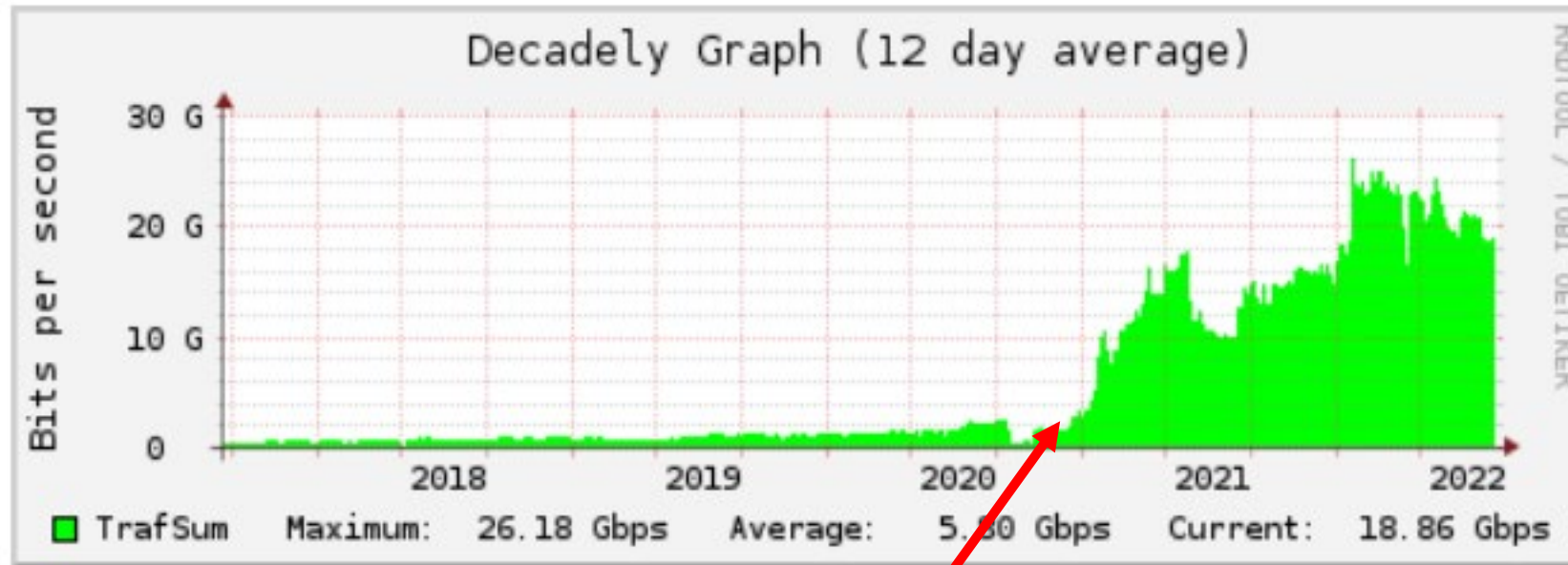
Facebook  
(12/2019)

Netflix  
(2017)



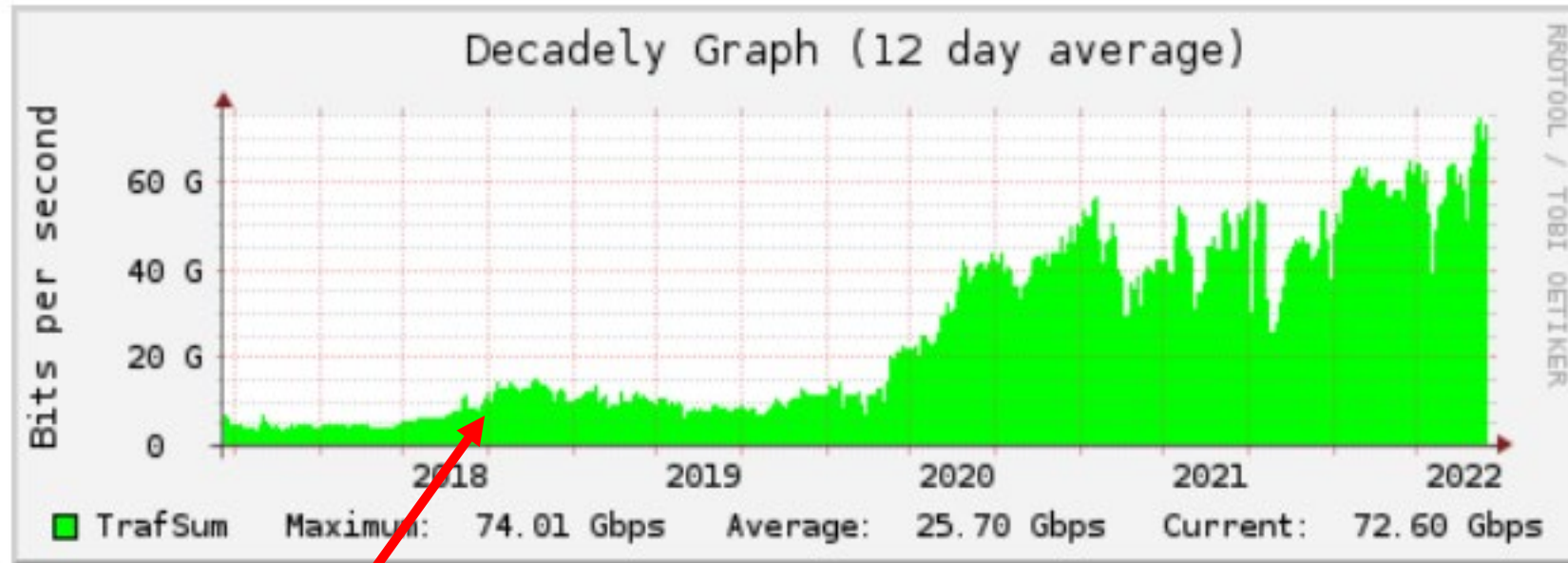


# IX.br Manaus/AM



OpenCDN (2020)

# IX.br Salvador/BA



OpenCDN (2018)

# Thanks !

<https://www.ix.br>

<https://www.opencdn.nic.br>

August 15th, 2022

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