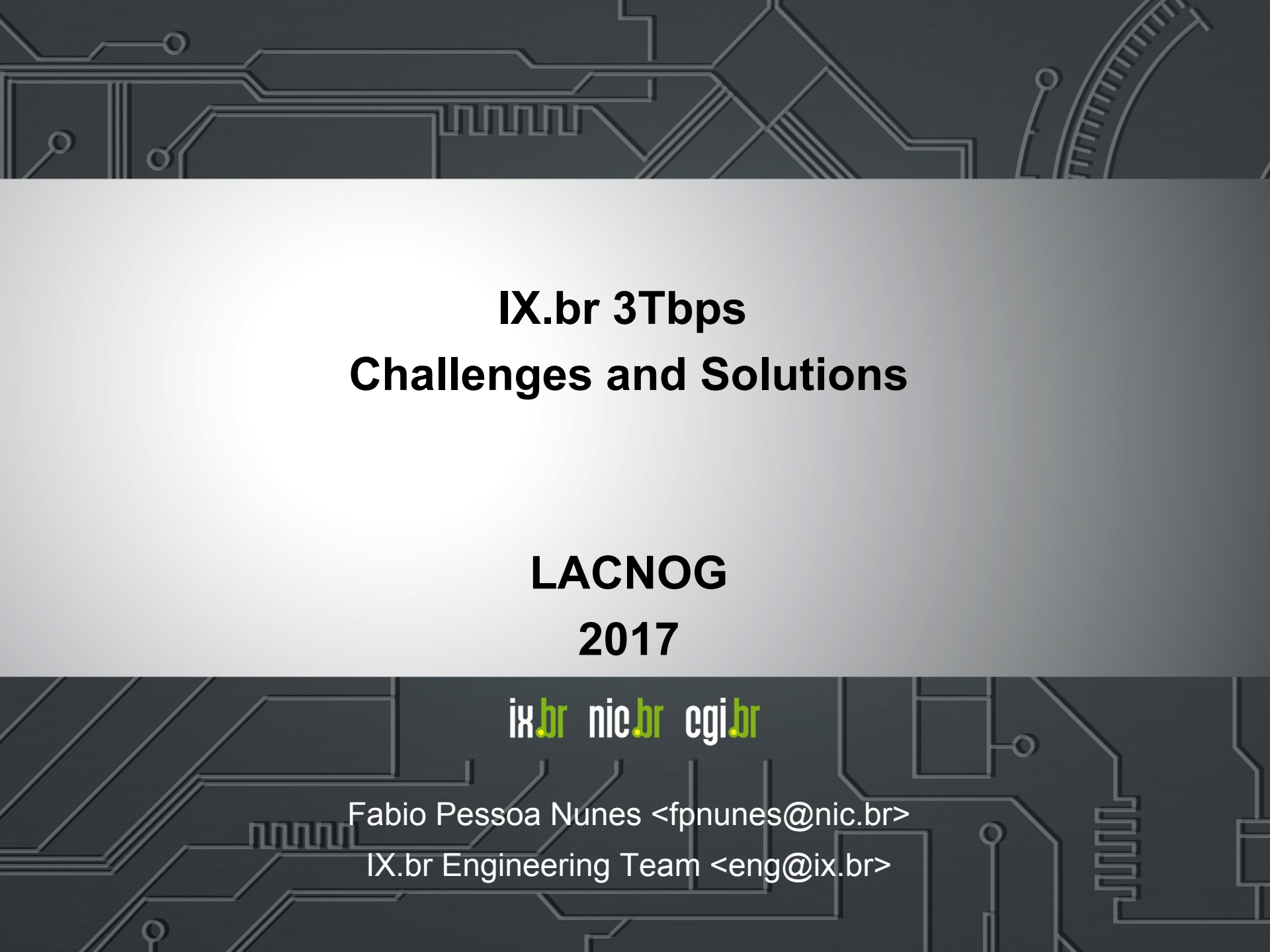


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Montevideo, Uruguay

September 20th, 2017



IX.br 3Tbps Challenges and Solutions

LACNOG
2017

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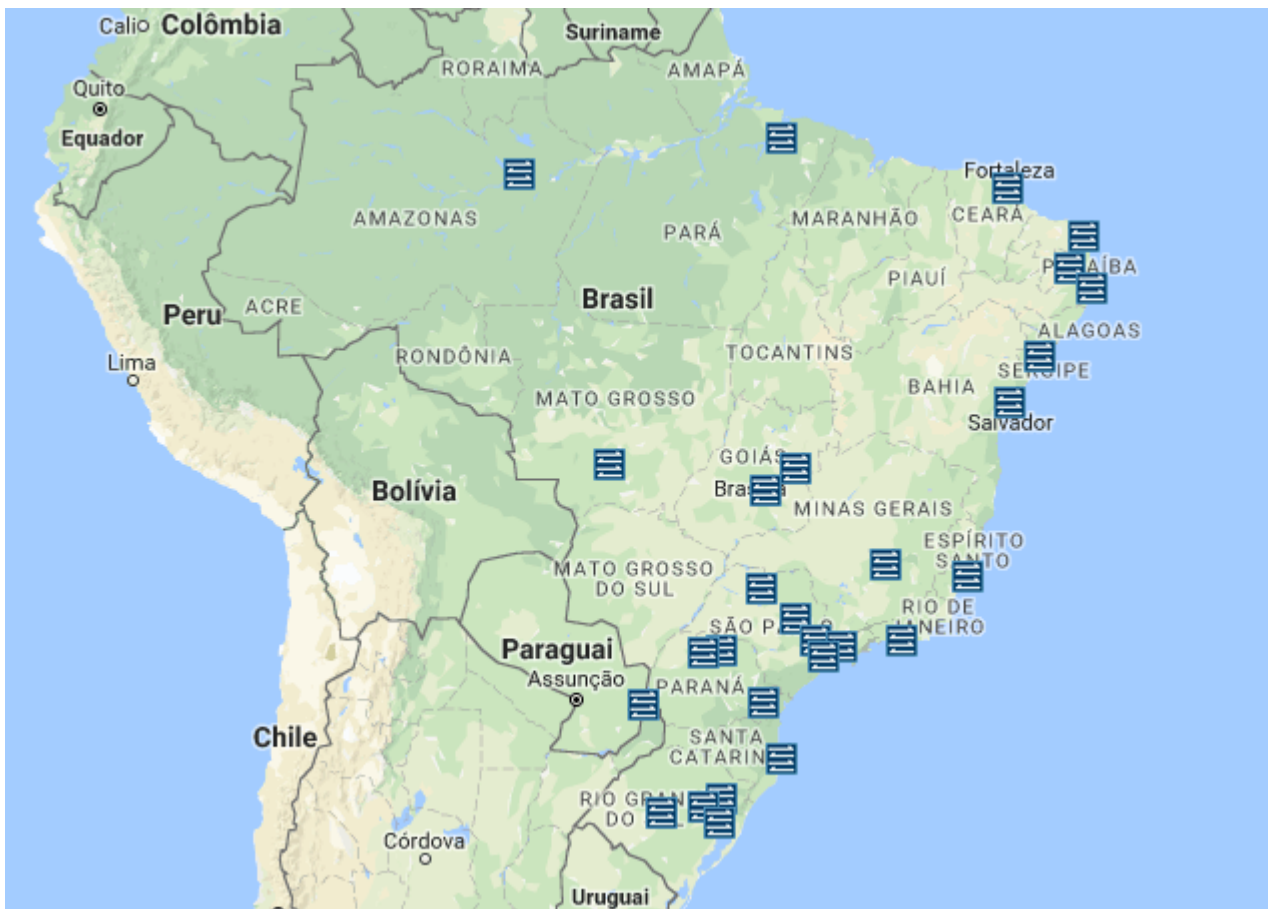
IX.br Engineering Team <eng@ix.br>

Goals

- Recently IX.br has reached 3 Tbps peak traffic/day on the sum of all 28 locations and the traffic is increasing quickly
- More than 80% of this traffic is from IX.br São Paulo
- The rapid network growth brings challenges to keep providing good quality service to the IXP's participants
- This presentation should show some of these challenges we're facing and the solutions we're using

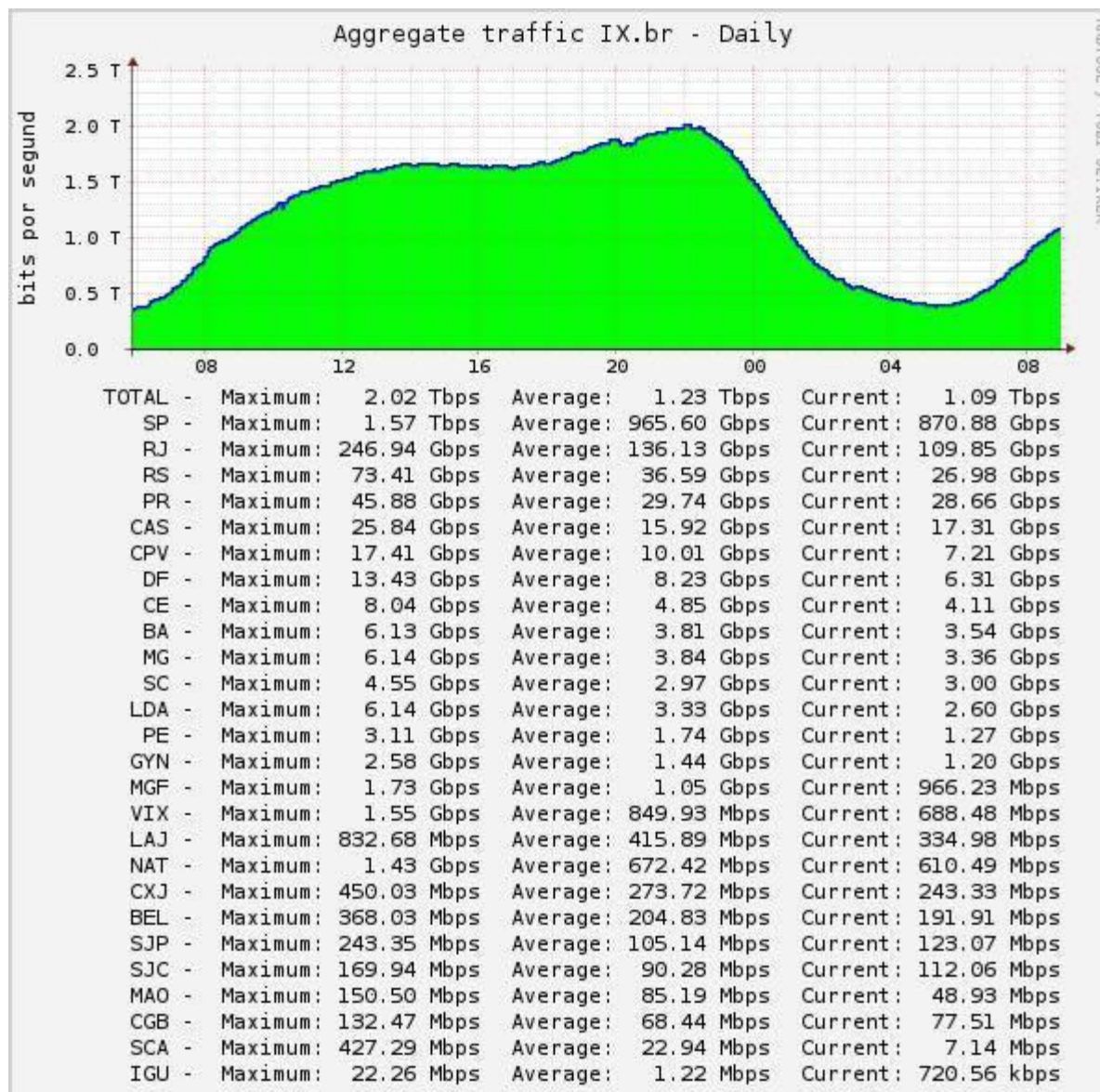


IX.br – Locations

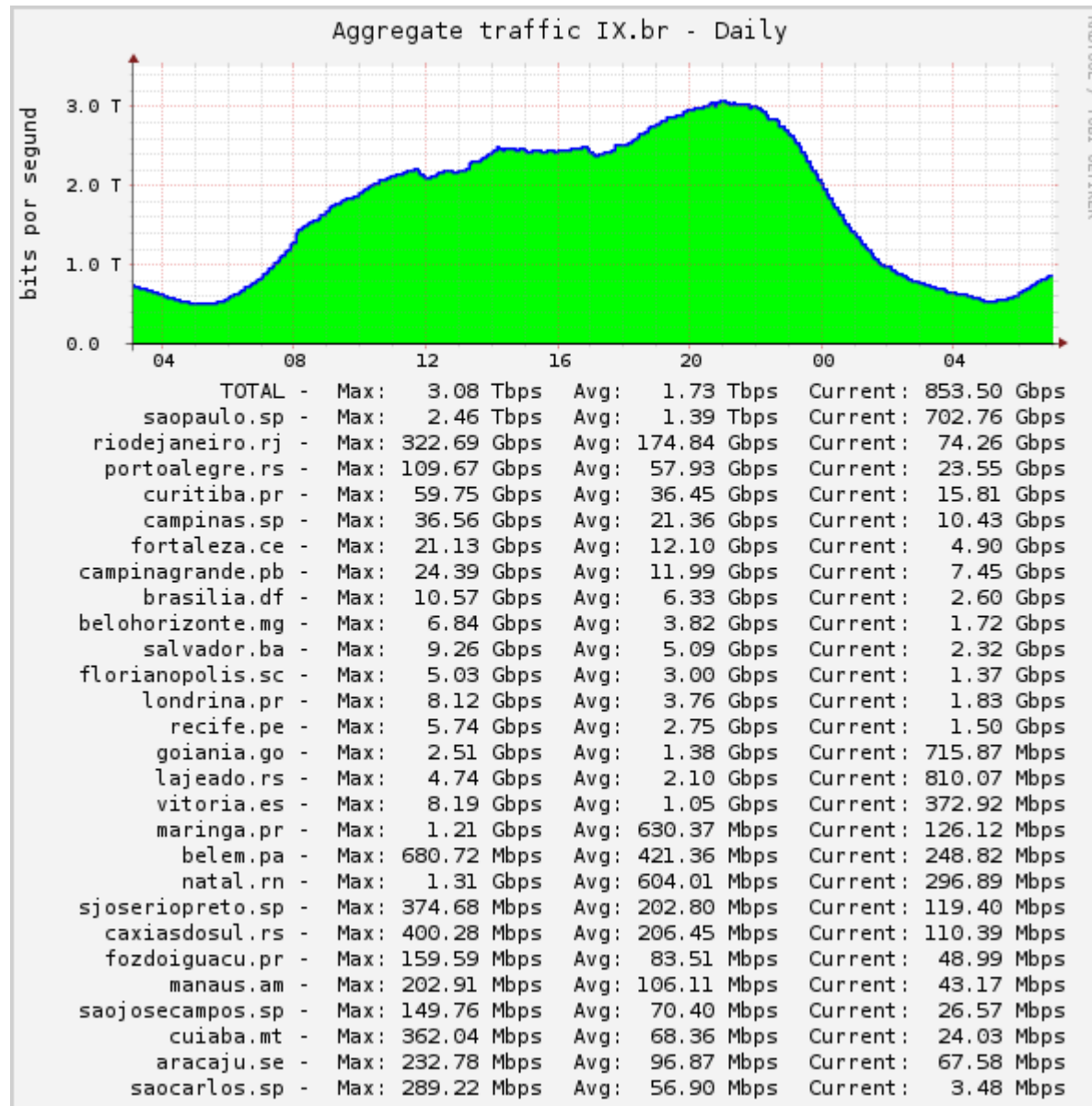


#	IX.br Location
1	Aracajú
2	Belém
3	Belo Horizonte
4	Brasília
5	Campina Grande
6	Campinas
7	Caxias
8	Cuiabá
9	Curitiba
10	Florianópolis
11	Fortaleza
12	Foz do Iguaçu
13	Goiânia
14	Lajeado
15	Londrina
16	Manaus
17	Maringá
18	Natal
19	Porto Alegre
20	Recife
21	Rio de Janeiro
22	Salvador
23	Santa Maria
24	São Carlos
25	São José do Rio Preto
26	São José dos Campos
27	São Paulo
28	Vitória

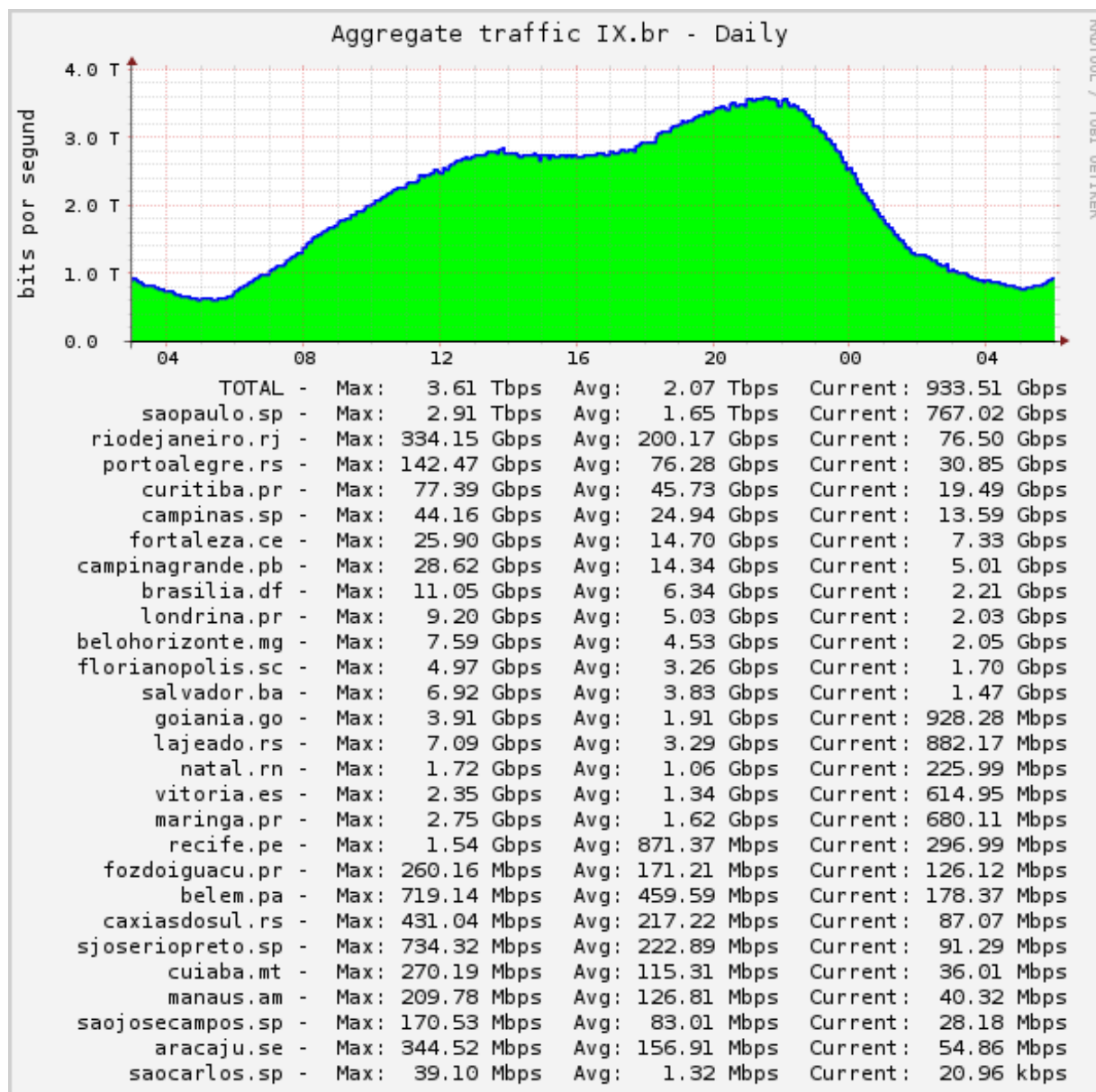
2,02 Tbps peak on Nov 3 2016



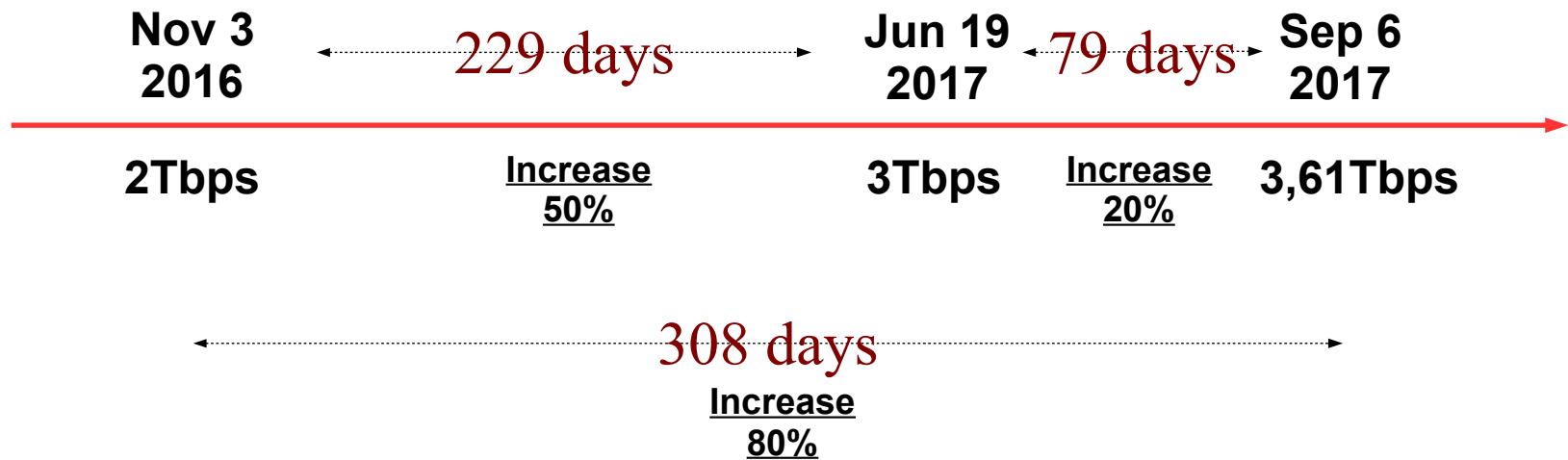
3,08 Tbps peak on Jun 19 2017



3,61 Tbps peak on Sep 6 2017



Traffic Growth Rate



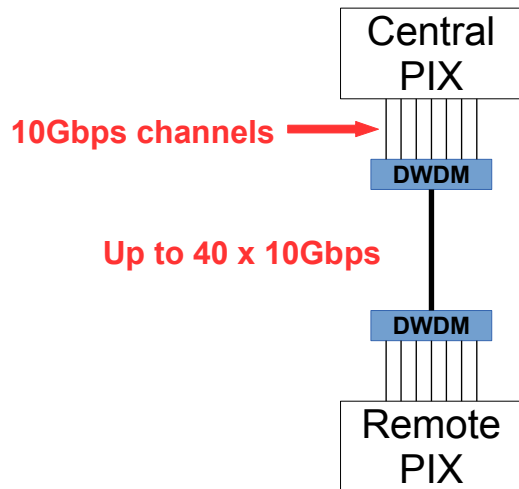
Challenges

- Most of the challenges are faced first on IX.br São Paulo because it's the biggest IXP
- A lot of new participants connections or capacity expansion every month
 - Provide new interfaces to activate participants
 - Increase IXP uplinks capacity
- Use of 40x10Gb DWDM systems and increase of 100Gb participants
 - Flows higher than 10Gbps
 - Can't grow over 400Gbps in each PIX
 - Network equipments with low 100G ports density
- BUM (Broadcast, Unkown-unicast and Multicast) traffic
 - More Participants, More ARP and Neighbor Discovery Requests
 - Bad behaved participants' devices sending traffic to destination MAC not present on IXP
- Layer 2 paths
 - Some access switchs exclusively layer 2

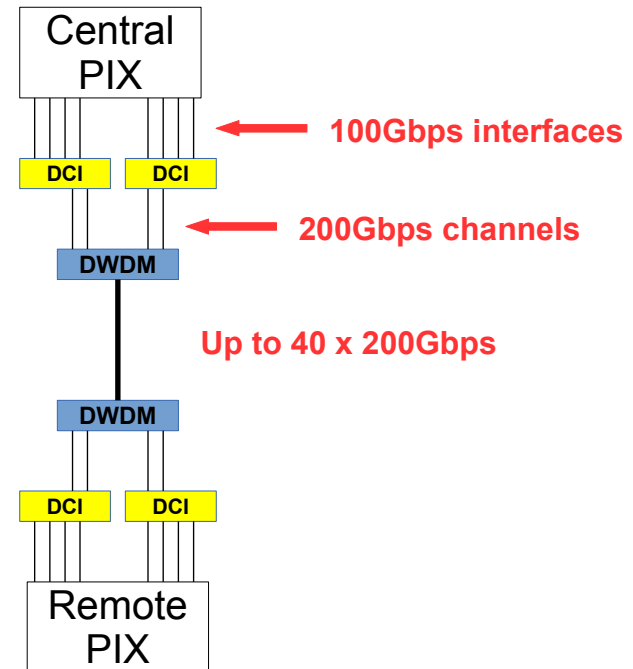
New Network and Optical devices

- New network devices with high 100G interface density on Core and on Remote PIXs
- Upgrade the connections between Central PIX and Remote PIX to use DCI devices to transport 200Gbps on each channel of the current DWDM system. Each DWDM can transport up to 40x200Gbps using DCIs
- More 100G participants connected to PIXs

Old scenario



New scenario



Benefits of 100G interfaces on IX.br SP

- On 2016, IX.br São Paulo had 28 100G interfaces connected to uplinks and participants
- Until September 2017, there are 180 100G interfaces installed
- Capacity upgrade has more effect and avoid recurring upgrades on same point
- Permit flows larger than 10Gbps
- Higher capacity to access switches
- Decrease the number of physical connections between network devices

Network Protections and Reliability

- Broadcast (ARP) and Multicast (ND) will increase on network with more participants:
 - BUM Rate-limit on destinations routers can increase this issue (source will ask again if destination drop a valid request)
 - Testing solutions to reduce this kind of traffic: ARP Sponge, EVPN, static MACs
- Due issues, some routers will send frames destined to MAC not present on the IXP:
 - Since MAC are static on participant VLAN, we can forward to participants only frames destined to that MAC and block the unknown.
 - The unknown-unicast flood will still remaining on IXP core
 - Testing EVPN to reduce this kind of traffic too
- Move the VPLS network closer to participant's port, reducing the number of exclusively layer 2 access switches.

Conclusions

- Internet Traffic Exchange on all IX.br locations is increasing, providing better experience to Brazilian Internet
- More traffic requires a better network control and efficiency on IXP solutions
- To allow this constant traffic growth, IX.br had to update the network to increase scalability and avoid future issues
- Frequently new issues appears due the evolution on this shared network, but we must be prepared to try minimize the effects and solve the problems
- Also, we should create a smarter network, reducing operational tasks and increasing resources efficiency



Thank you

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September 20th, 2017

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