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Panama City, Panama

May 02th, 2018

IX.br(PTT.br) – Technical aspects to ports and transport sharing

LACNIC Technical Forum (FTL) 2018

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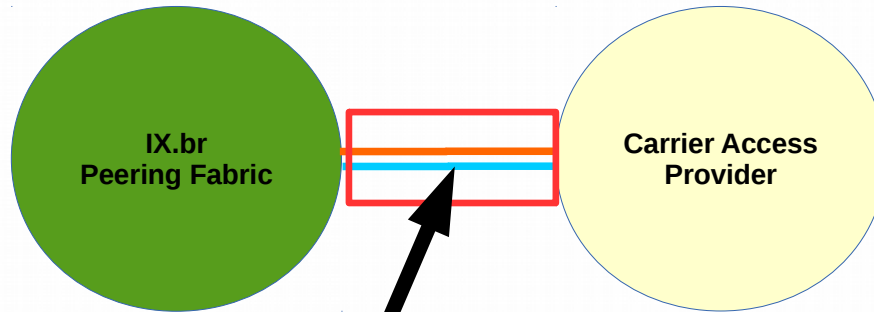
IX.br Engineering Team <eng@ix.br>

Goals

- This presentation intend to approach some technical aspects to IX.br participants sharing ports and transport;
- The main idea is speech about CIXEs, L2 networks limitations and types of transports that must be avoided when ASNs sharing resources;
- Other relevants topics like types of transport problems and some statistics will be addressed in summary.



Goals



The subject covered in this presentation will be the structure outside the IX.br

IX.br – Brasil Internet Exchange

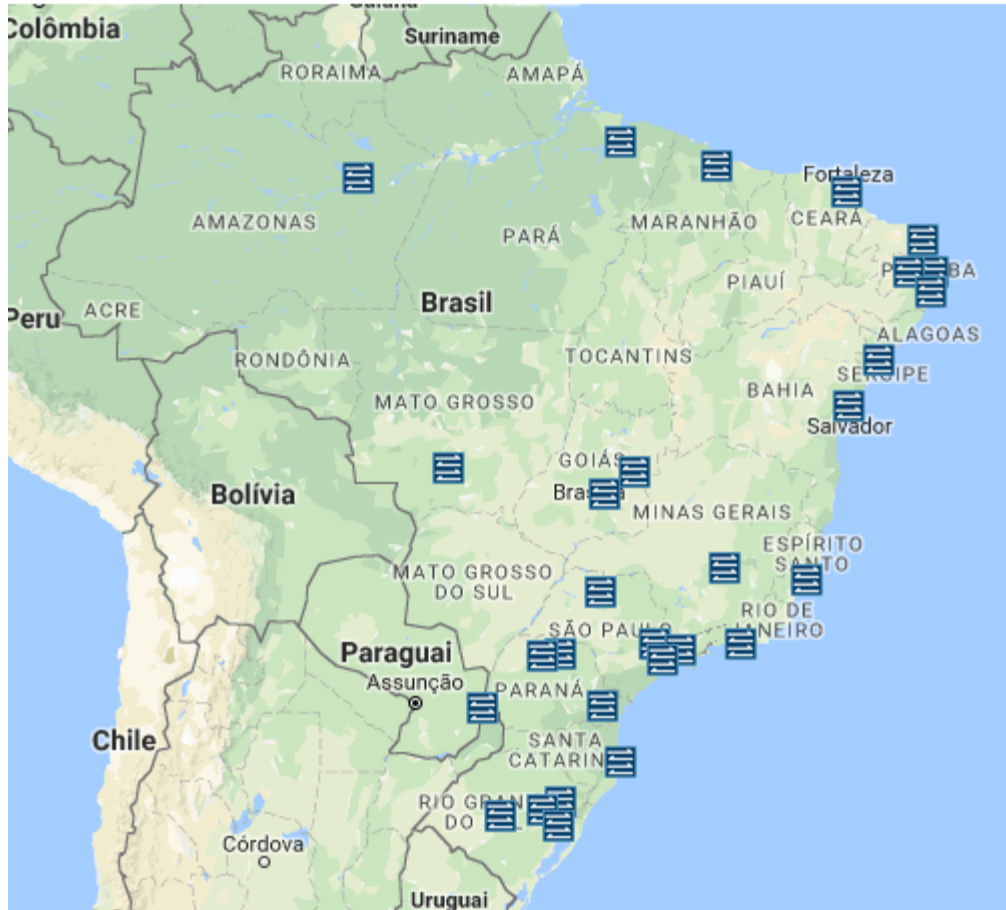
IX.br is the name given to the Internet Steering Committee project in Brazil (CGI.br) which promotes and creates the necessary infrastructure (Internet Exchange Point / IXP) for direct interconnection between networks ("Autonomous Systems" - ASNs) that make up the Brazilian Internet.

The performance of IX.br is focused on metropolitan areas in the country that have great interest of Internet traffic exchange.

The project had its name changed in 2015 from PTT.br to IX.br for an internationalization process.

IX.br – Locations – current cities

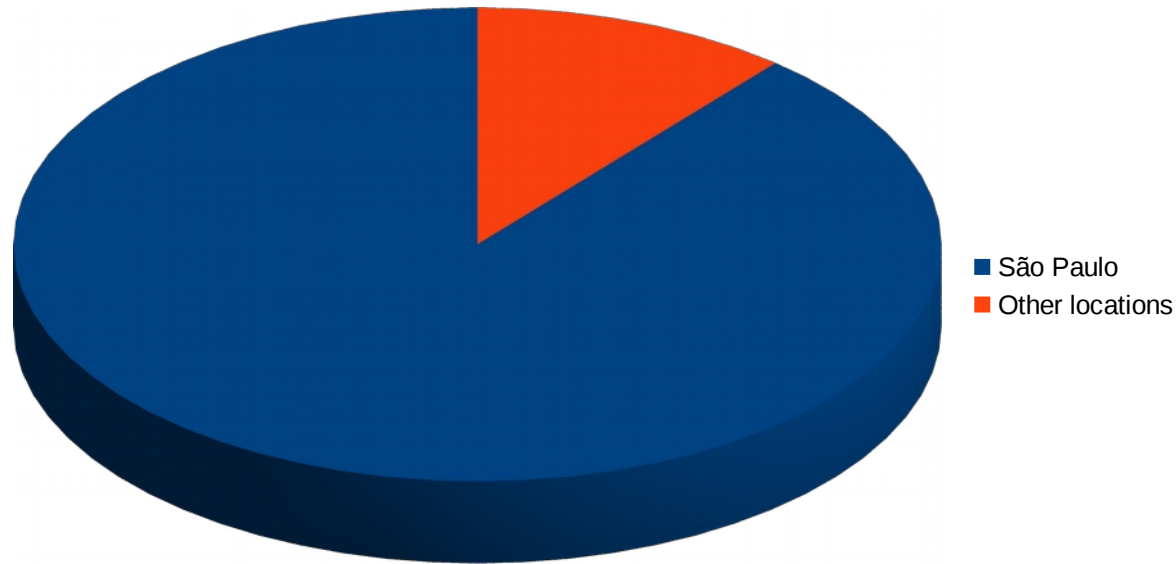
Currently IX.br is present in 30 cities



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

Each location is an unique Internet Exchange and there are no connection between each of them

IX.br – Participants distribution by location



Unique ASNs: 1755

São Paulo participants: 1560

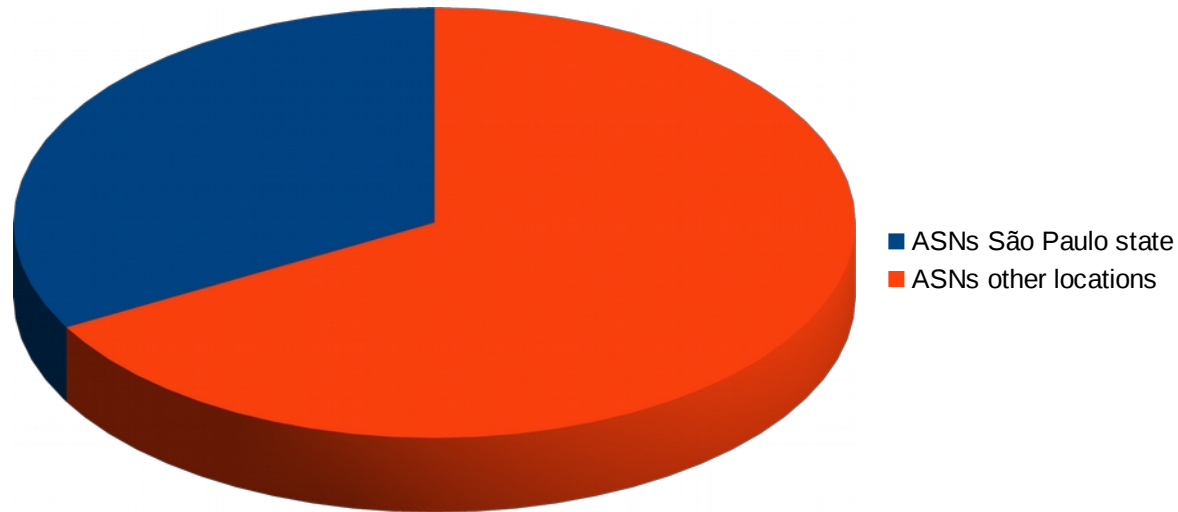
88% unique participants are connected in IX.br São Paulo

IX.br - ASN distribution by City

Quantidade	Cidade	Estado
501	São Paulo	SP
169	Rio de Janeiro	RJ
96	Brasília	DF
84	Belo Horizonte	MG
57	Fortaleza	CE
55	Salvador	BA
54	Porto Alegre	RS
48	Curitiba	PR
44	Recife	PE
40	Campinas	SP
35	Florianópolis	SC
34	Barueri	SP
33	Manaus	AM
33	João Pessoa	PB
28	Goiânia	GO
28	Campo Grande	MS
28	Maringá	PR
27	Teresina	PI
27	Natal	RN
24	Santana de Parnaíba	SP
22	Maceió	AL
22	Belém	PA
22	Guarulhos	SP
21	Jaboatão dos Guararapes	PE
21	Chapecó	SC
20	Anápolis	GO
20	Montes Claros	MG
20	Aracaju	SE

There are 1326 ASNs in the São Paulo state

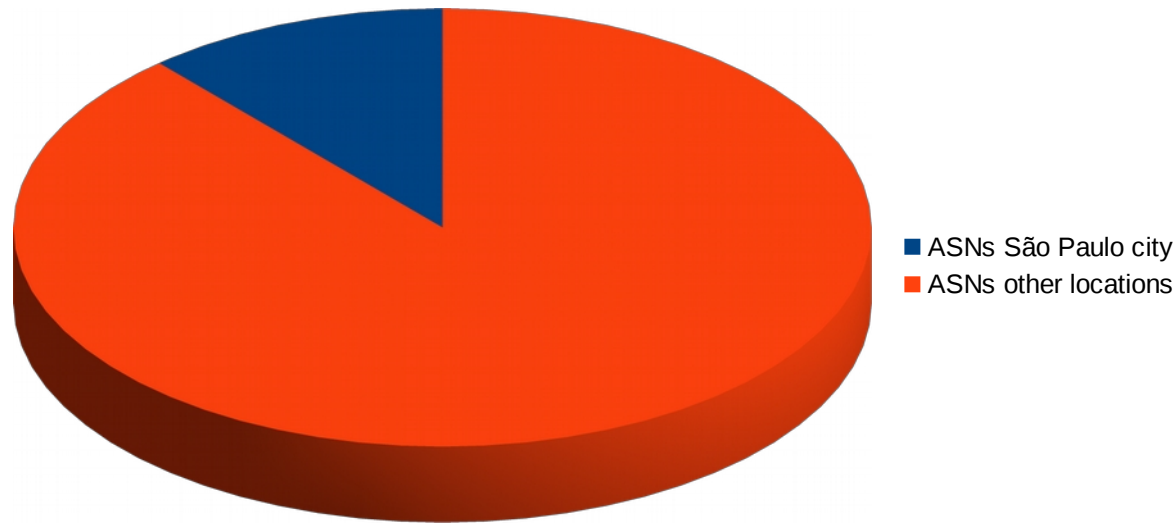
IX.br - Participants distribution – São Paulo



516 ASNs belongs to São Paulo state

1044 ASNs belongs to another Brasil locations and other countries.

IX.br - Participants distribution – São Paulo

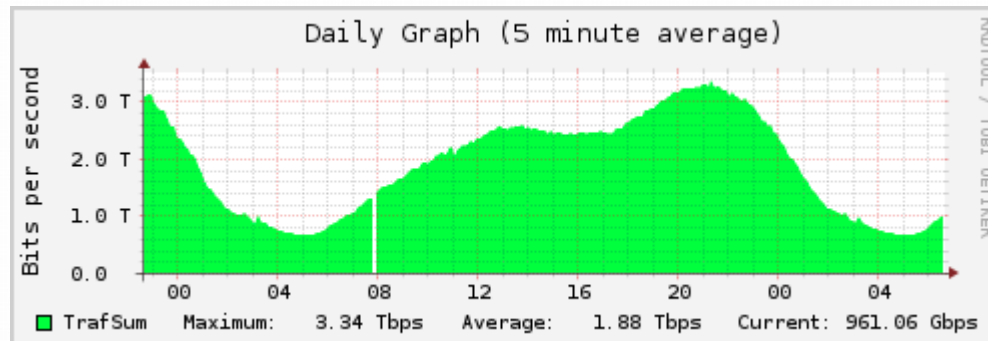


179 ASNs belongs to São Paulo city

1381 ASNs belongs to others Brasil locations and countries.

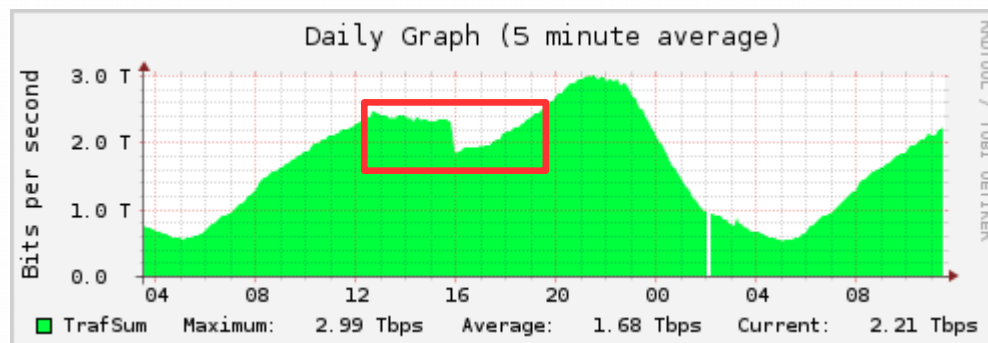
These others ASNs connected at IX.br São Paulo needs some type of transport.

IX.br – São Paulo - Amount traffic exchange



Amount traffic exchanged by big CDNs companies

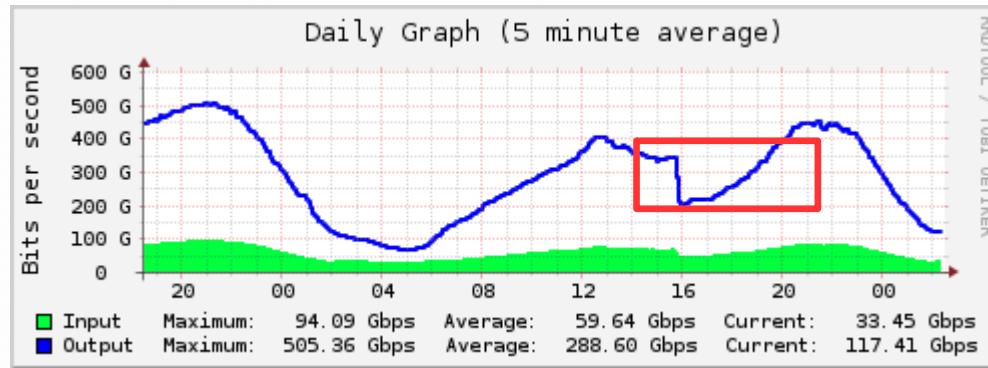
IX.br – Transport – relevance of remote connections



This is a decrease traffic at IX.br São Paulo result from a Blackout in the Northeastern and North region of Brazil in March 21th, 2018

<http://ons.org.br/Paginas/Noticias/20180321-notaaimprensa.aspx>

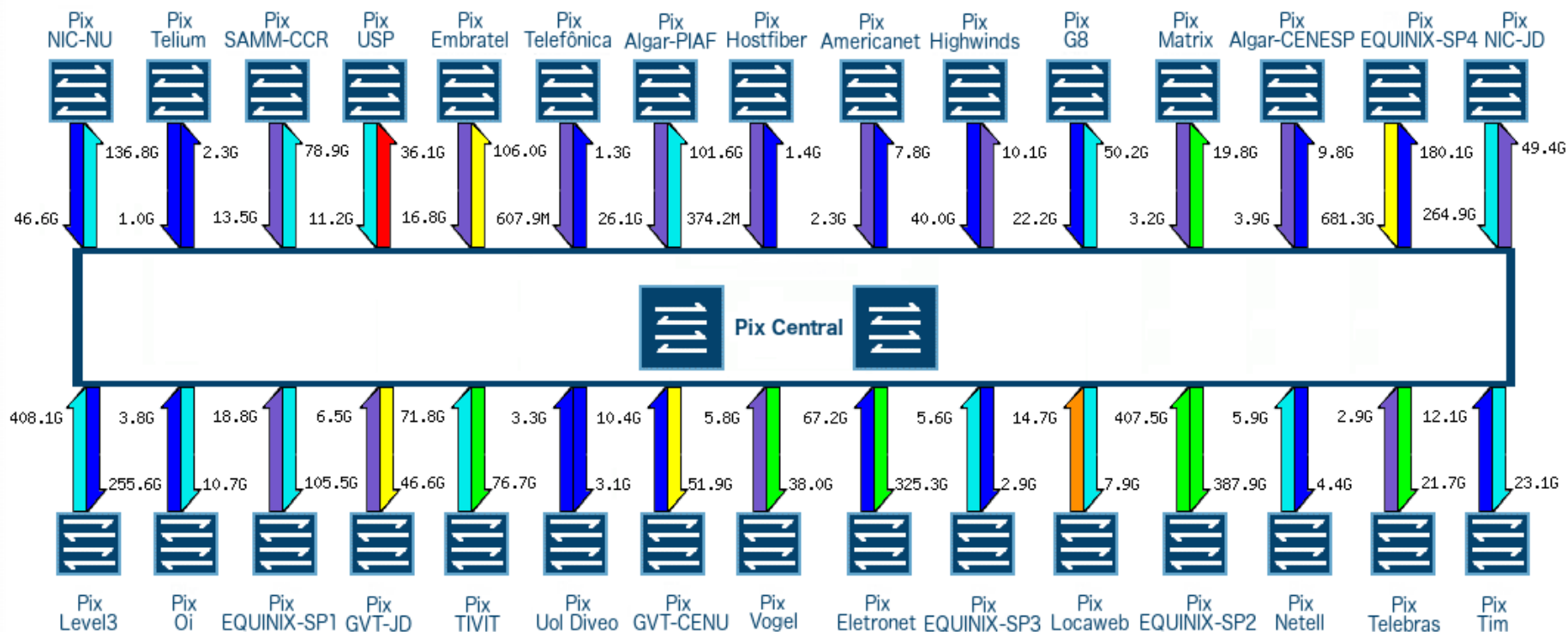
IX.br – Transport – relevance of remote connections



This is a decrease traffic at a PIX on IX.br São Paulo result from a Blackout in the Northeastern and North region of Brazil in March 21th, 2018

<http://ons.org.br/Paginas/Noticias/20180321-notaaimpresa.aspx>

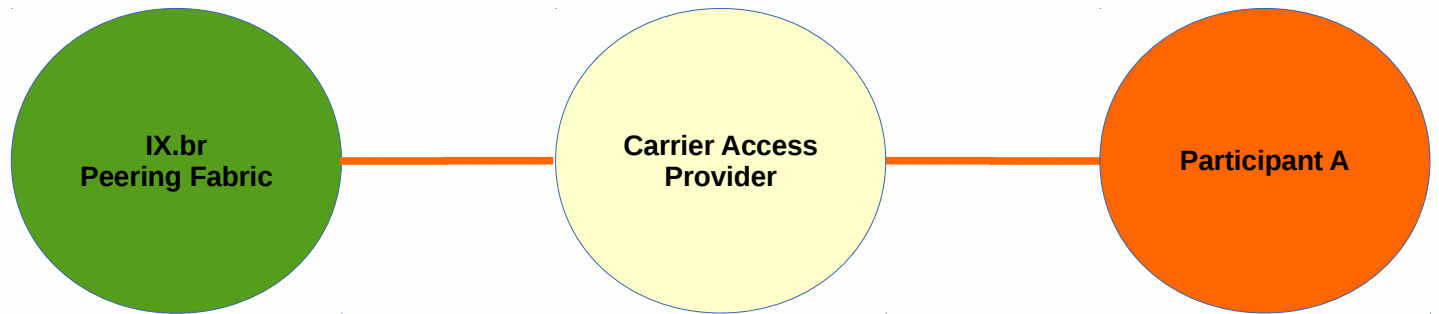
IX.br São Paulo – PIXEs - Business opportunities



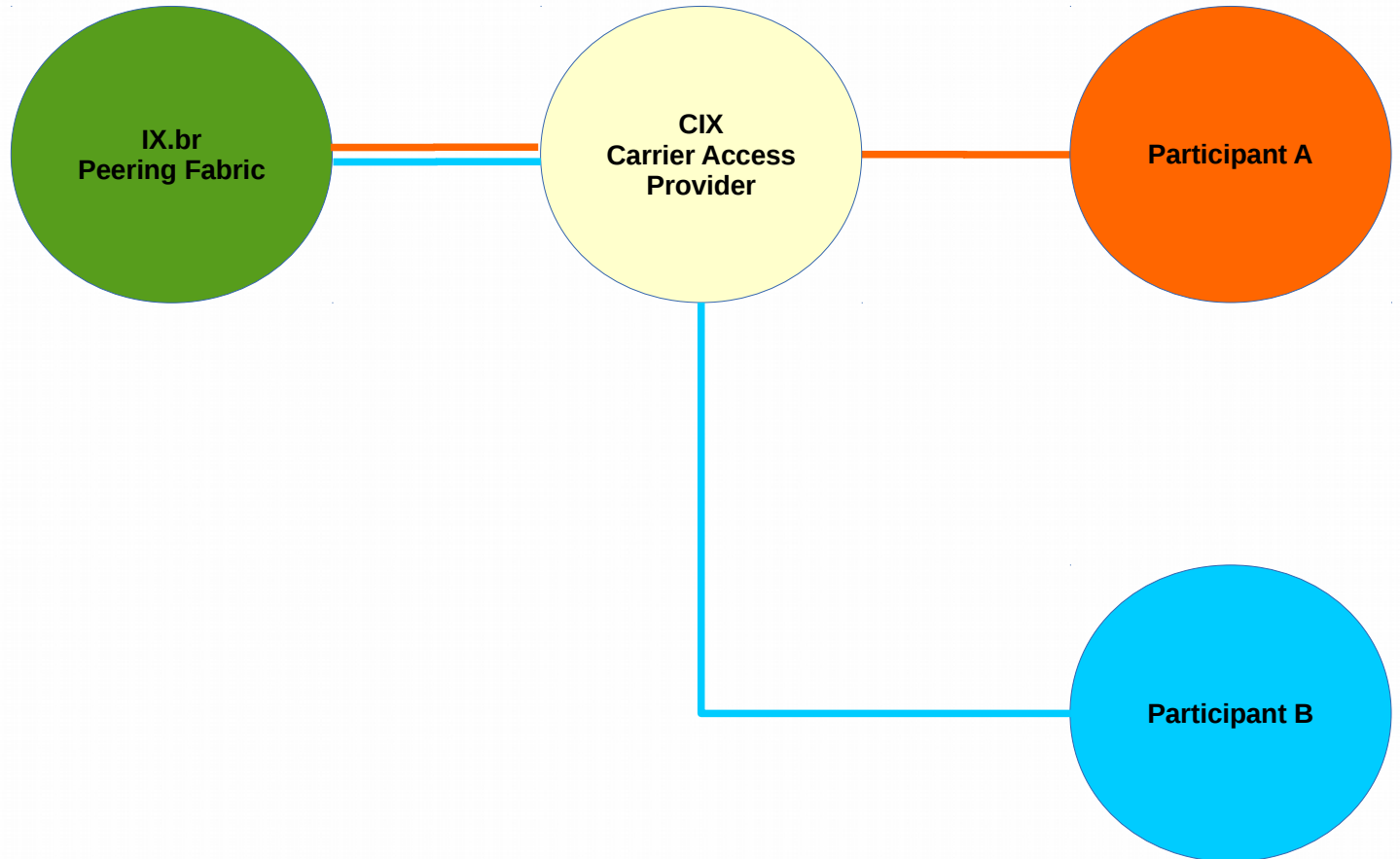
2018-03-16 11:40 (-0300)

Nowadays there are 33 PIXes at IX.br São Paulo, approximately 50% of them are specialist in sell transport capacity to IX.br structure. Some of them has many POPs spread throughout Brazil.

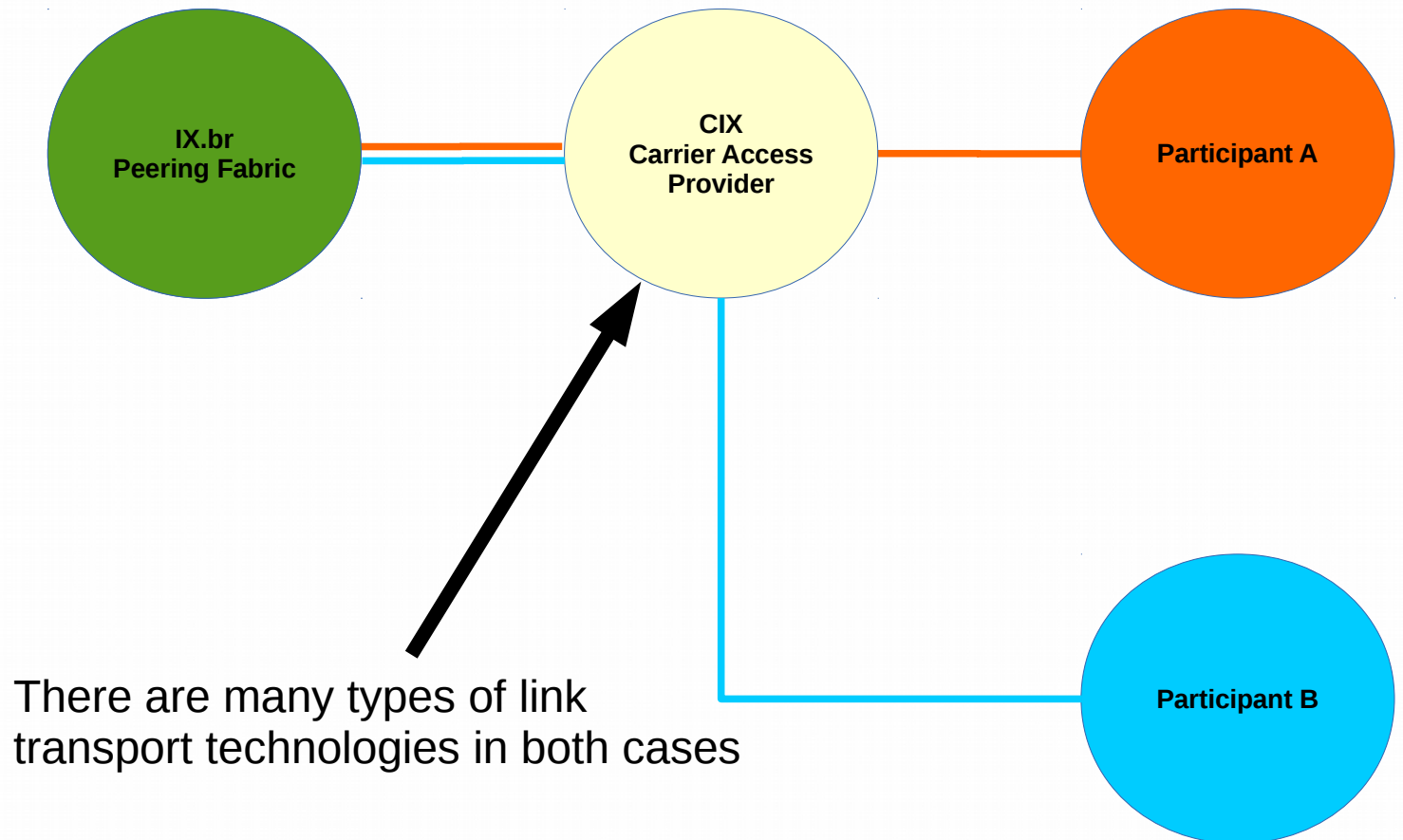
IX.br - Ways to remote connection



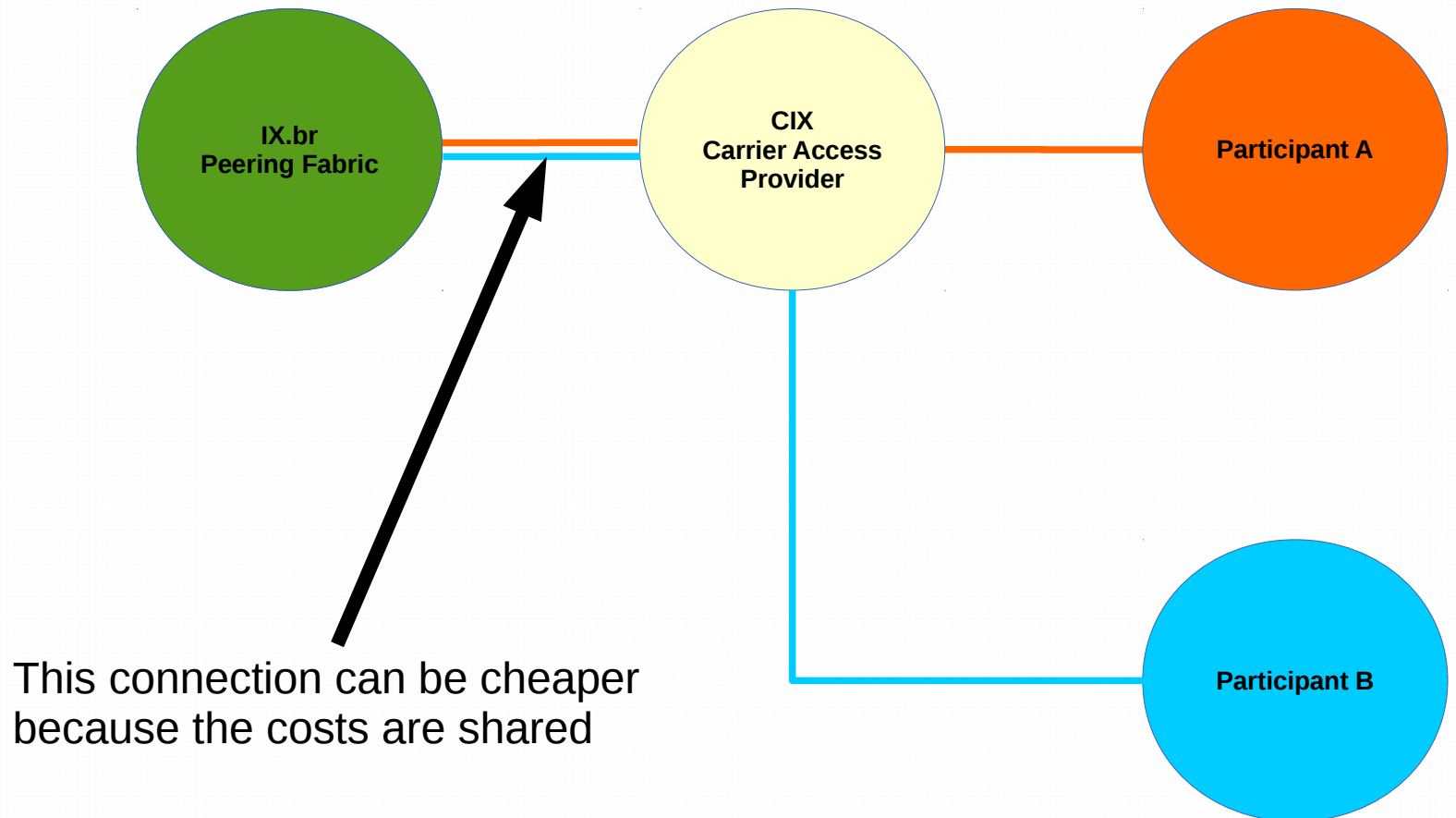
IX.br - Ways to remote connection



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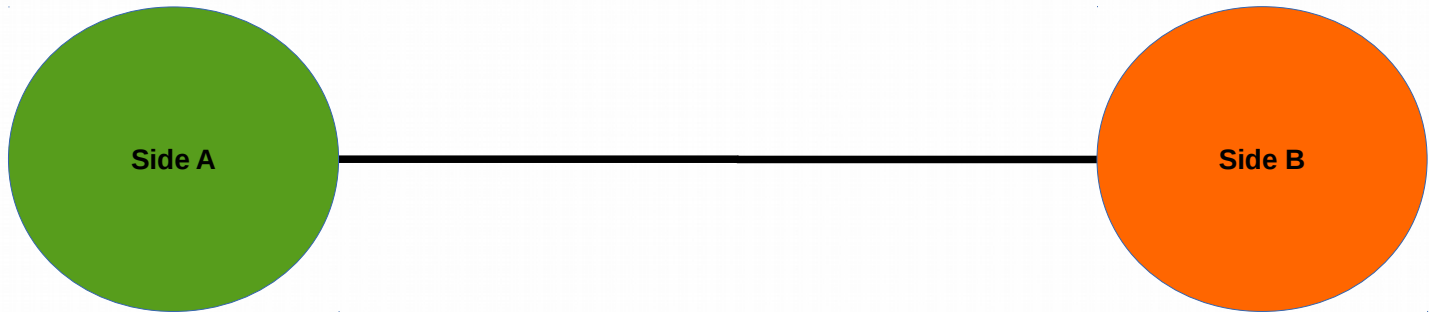
There are many different product names for this connection type:

- Carrier Access;
- E-line;
- Lan-to-Lan;
- Point to point;
- Clear channel;
- Leased line;
- Private circuit;
- Data line

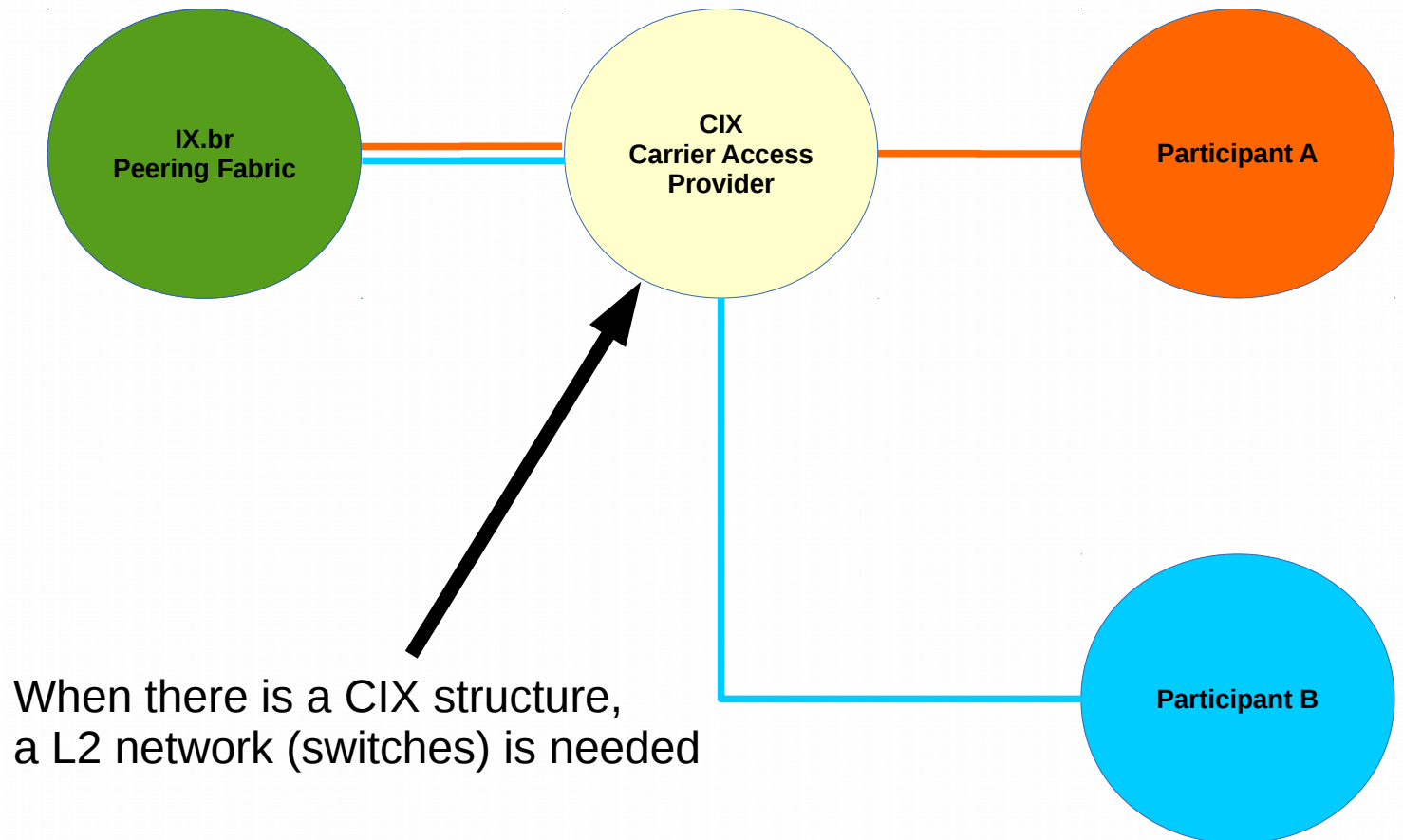
IX.br - Ways to remote connection

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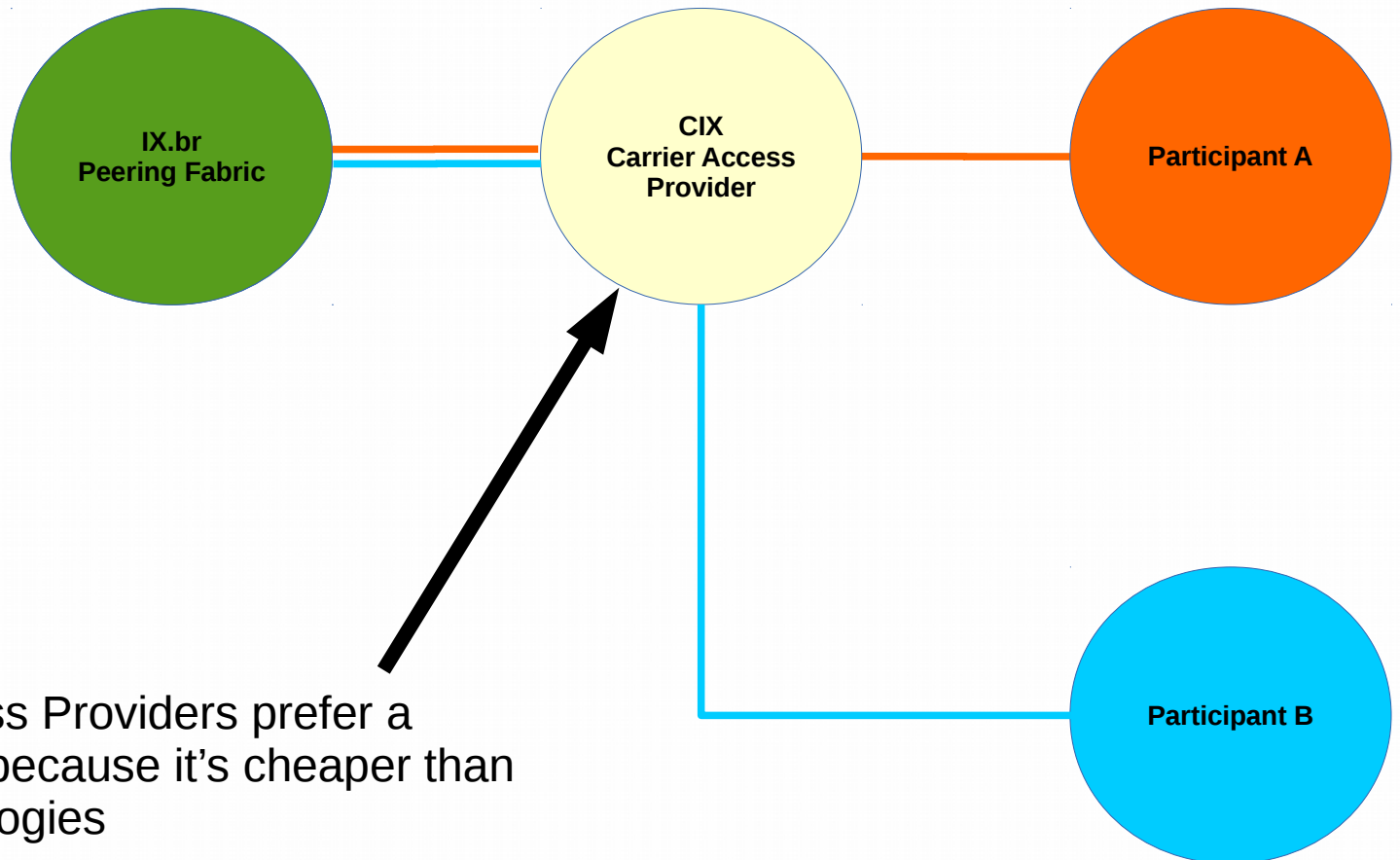
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IX.br - Ways to remote connection

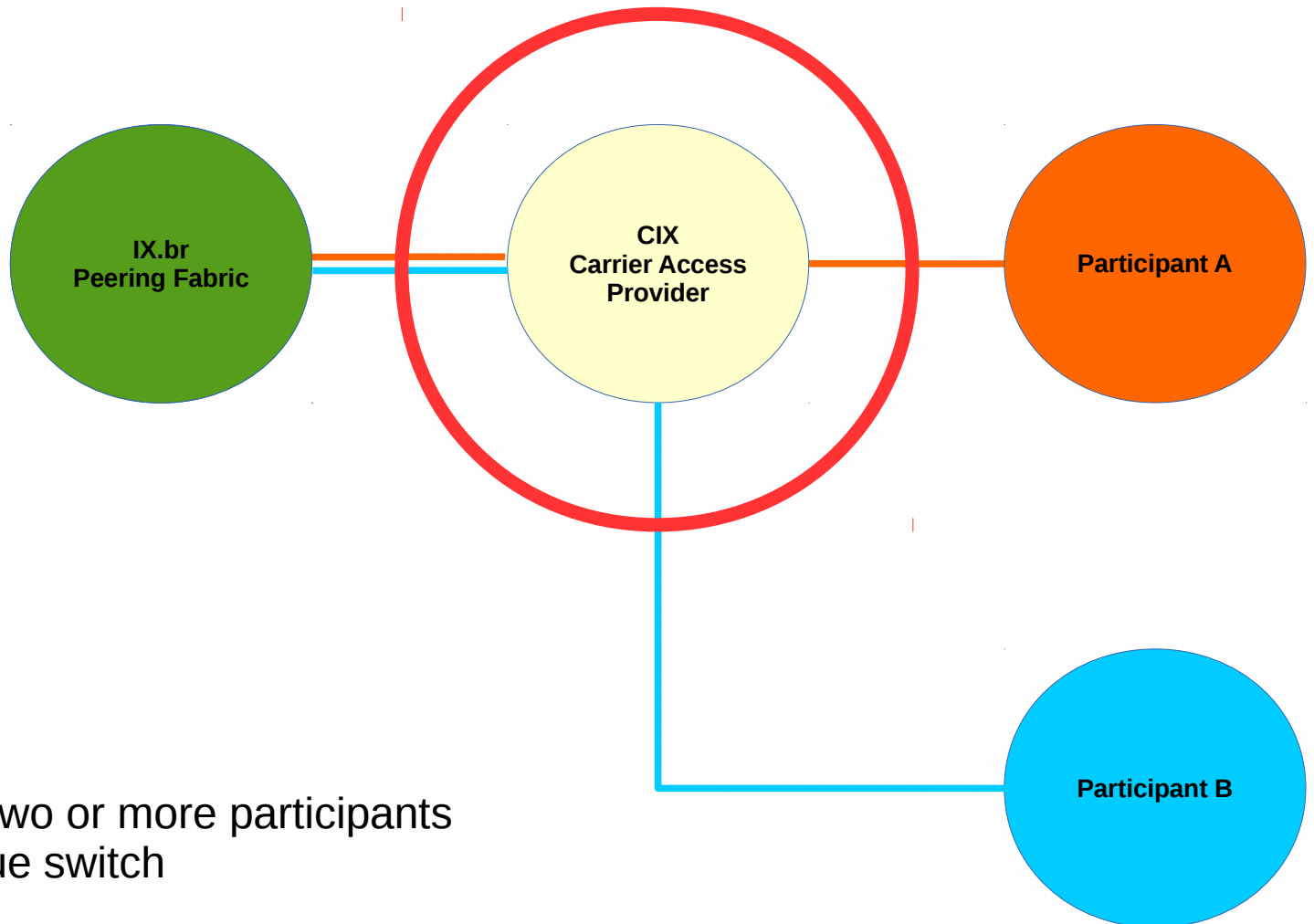


IX.br - Ways to remote connection



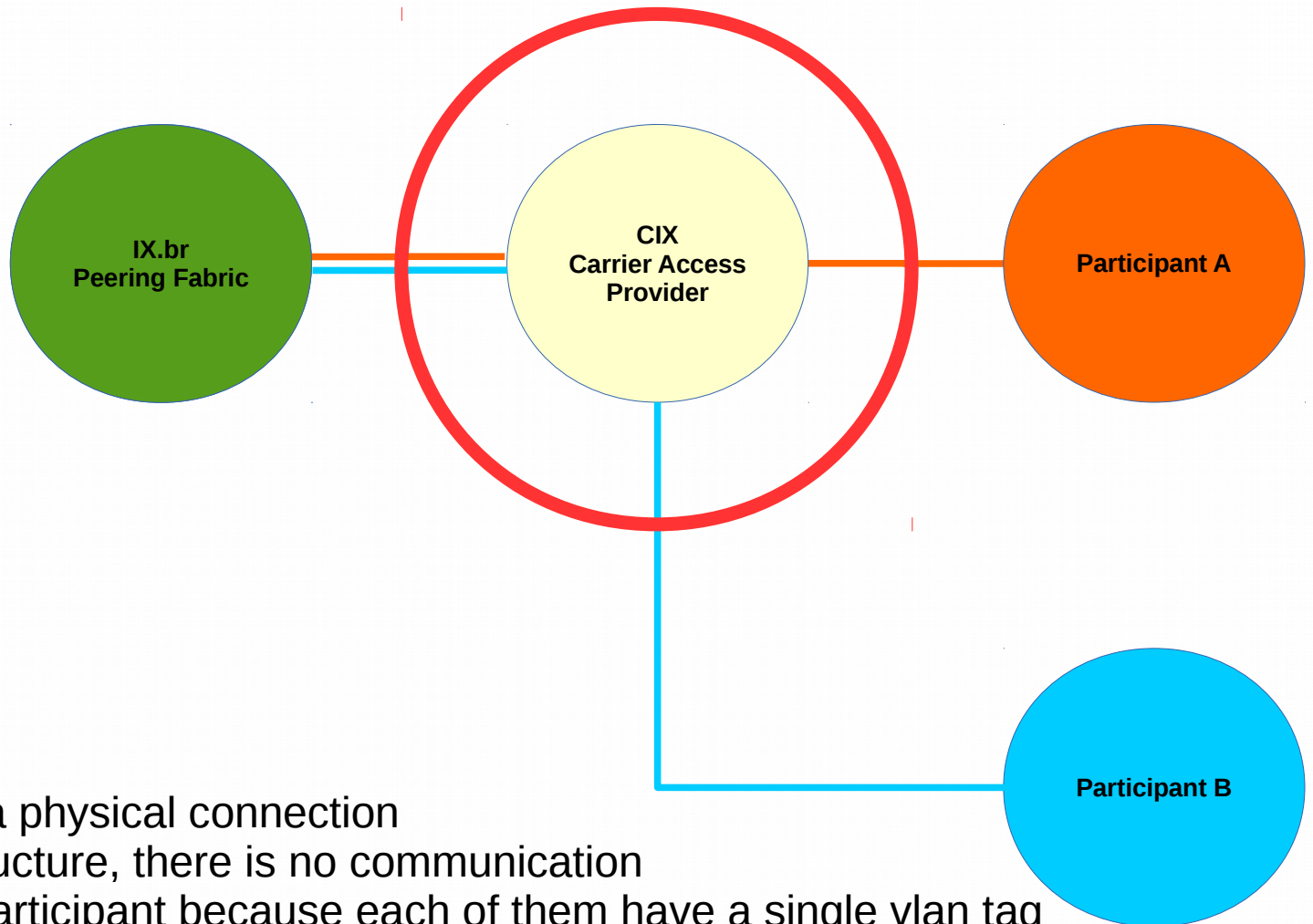
Carrier Access Providers prefer a L2 structure because it's cheaper than other technologies

IX.br - Ways to remote connection



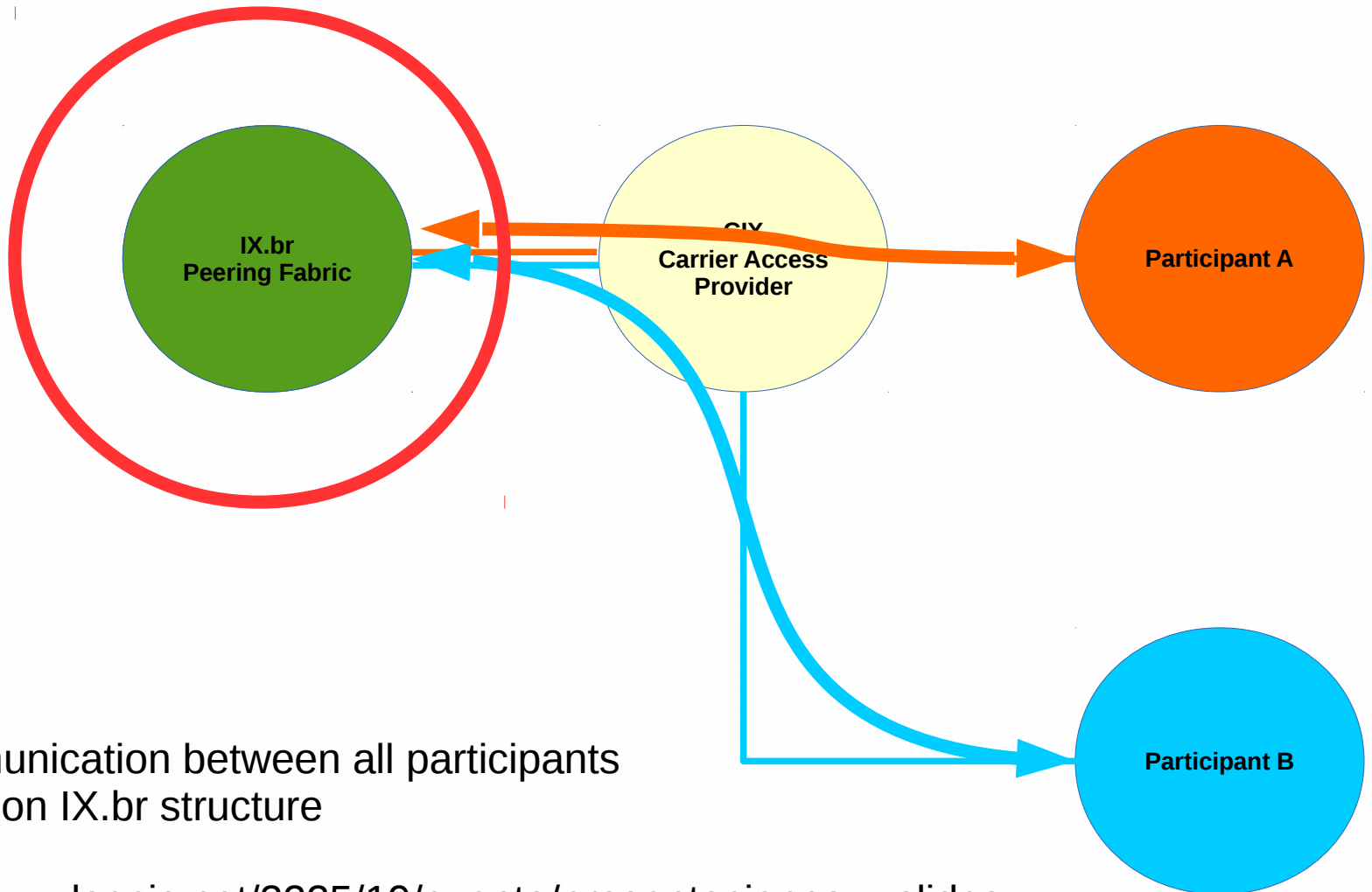
Sometimes, two or more participants share a unique switch

IX.br - Ways to remote connection



Even if there is a physical connection outside IX.br structure, there is no communication between each participant because each of them have a single vlan tag

IX.br - Ways to remote connection



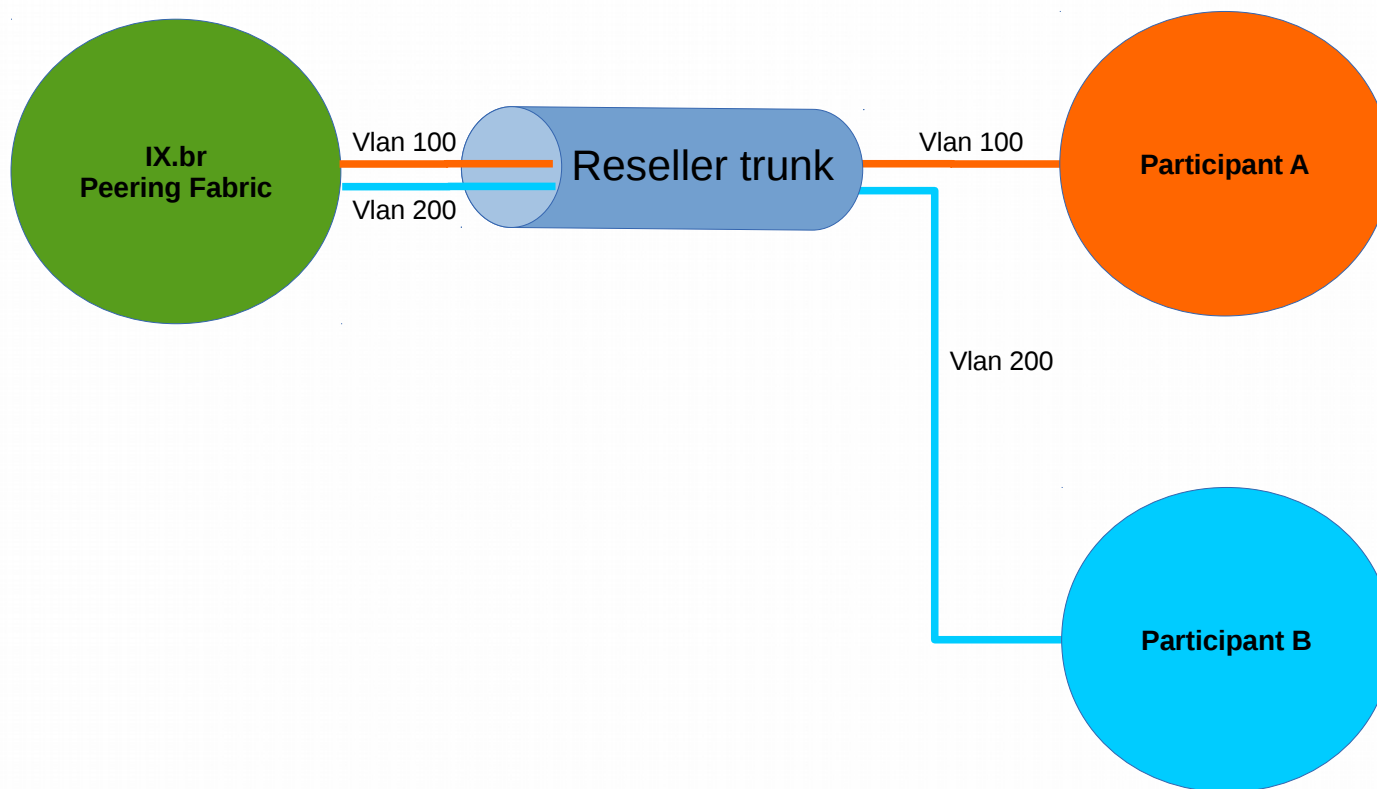
All communication between all participants occurs on IX.br structure

http://www.lacnic.net/2225/19/evento/presentaciones-_-slides

IX.br – Amount Brazilian CIXes

	CIXes
São Paulo	144
Others Locations	76
Total	220

IX.br – What is difference between CIX and Port-Reseller?



IX.br – How become a CIX?

Minimum requirements:

- Physical connection to any IX.br PIX;
- Physical connection and/or carrier access that support vlan tag (802.1Q);
- Physical connection that support LACP (Aggregation protocol);

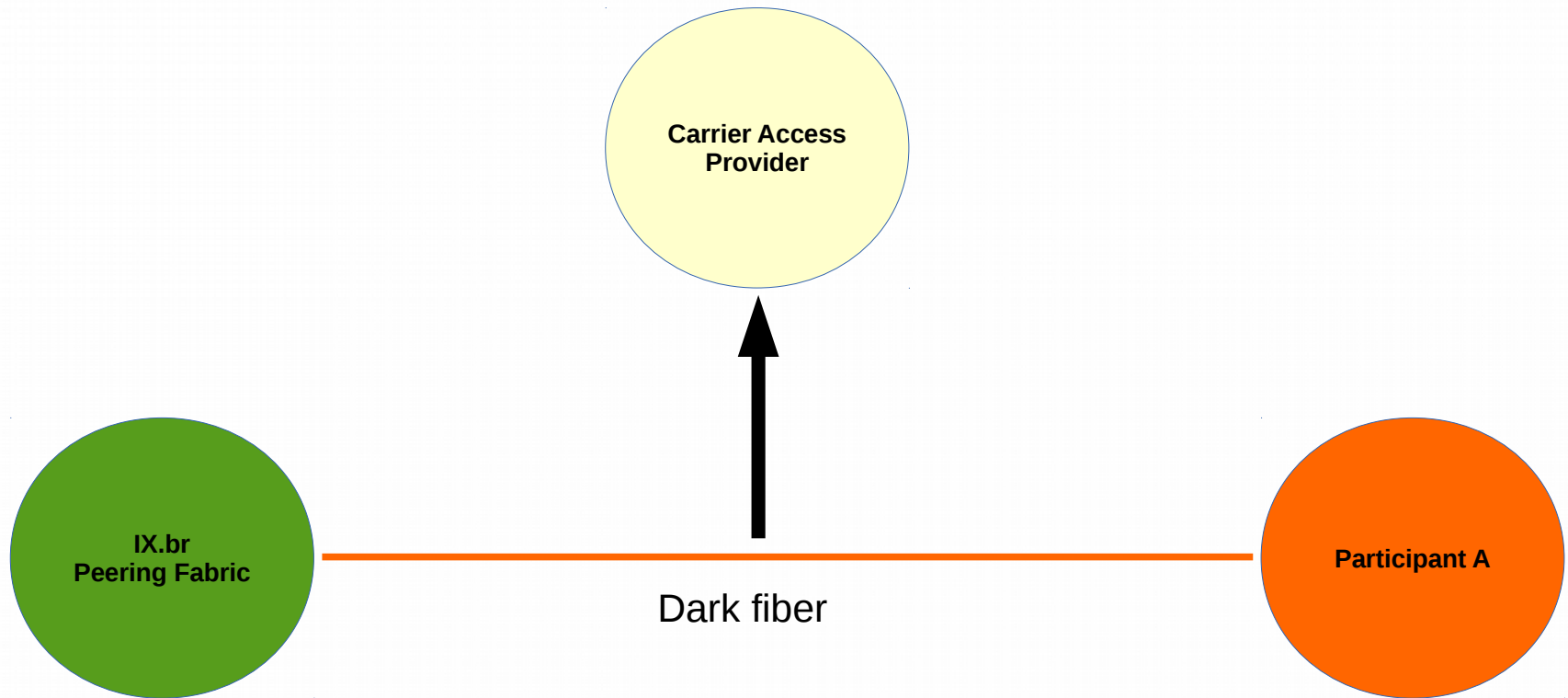
Obs: to become a CIX it is not necessary have an ASN.

A cooperation agreement is signed between NIC.br and the entity responsible for the CIX.

http://ix.br/doc/Formalizacao_CIX.pdf

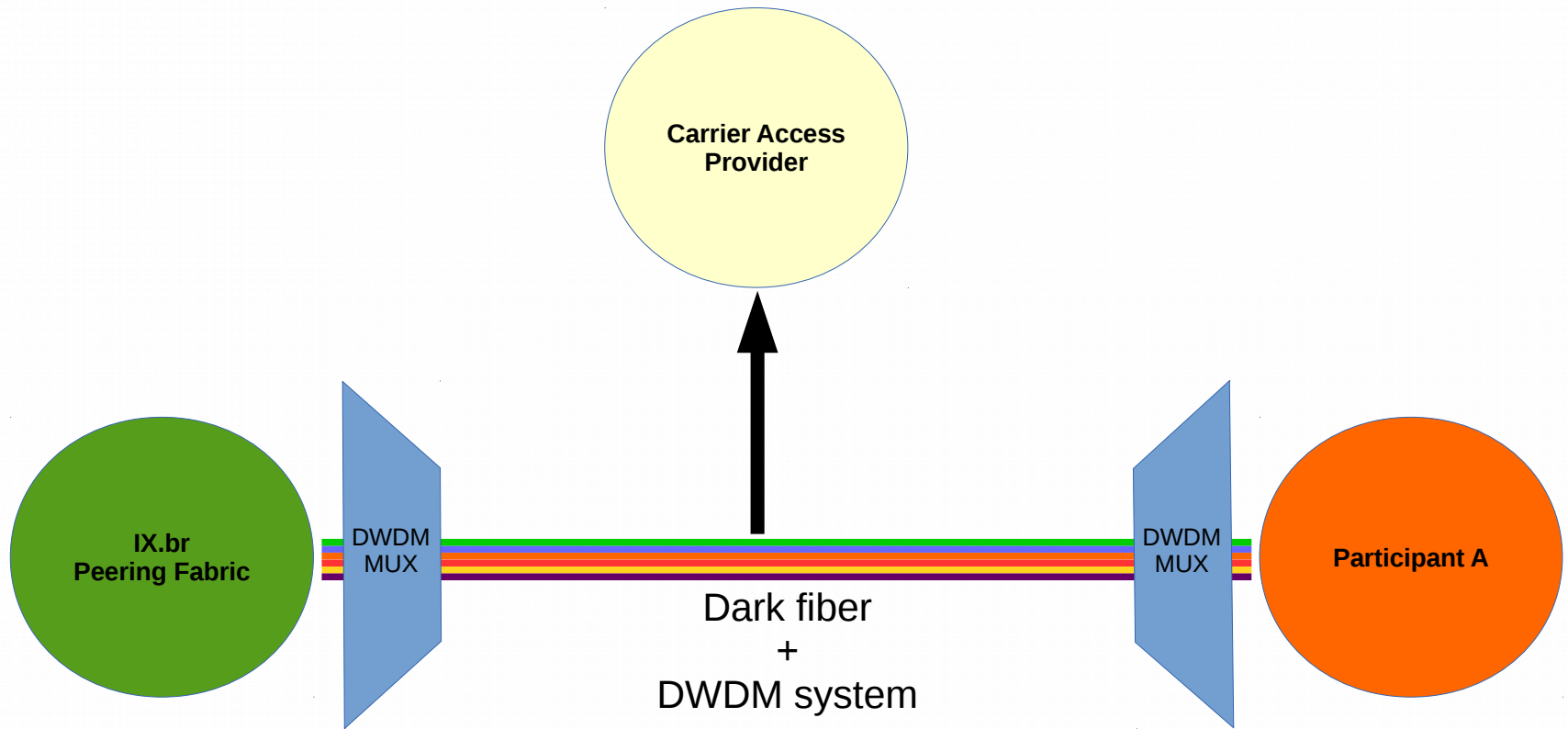
<http://ix.br/doc/PRT%20CIX%20V1.4%2008.03.2016.pdf>

IX.br – Types of enlace

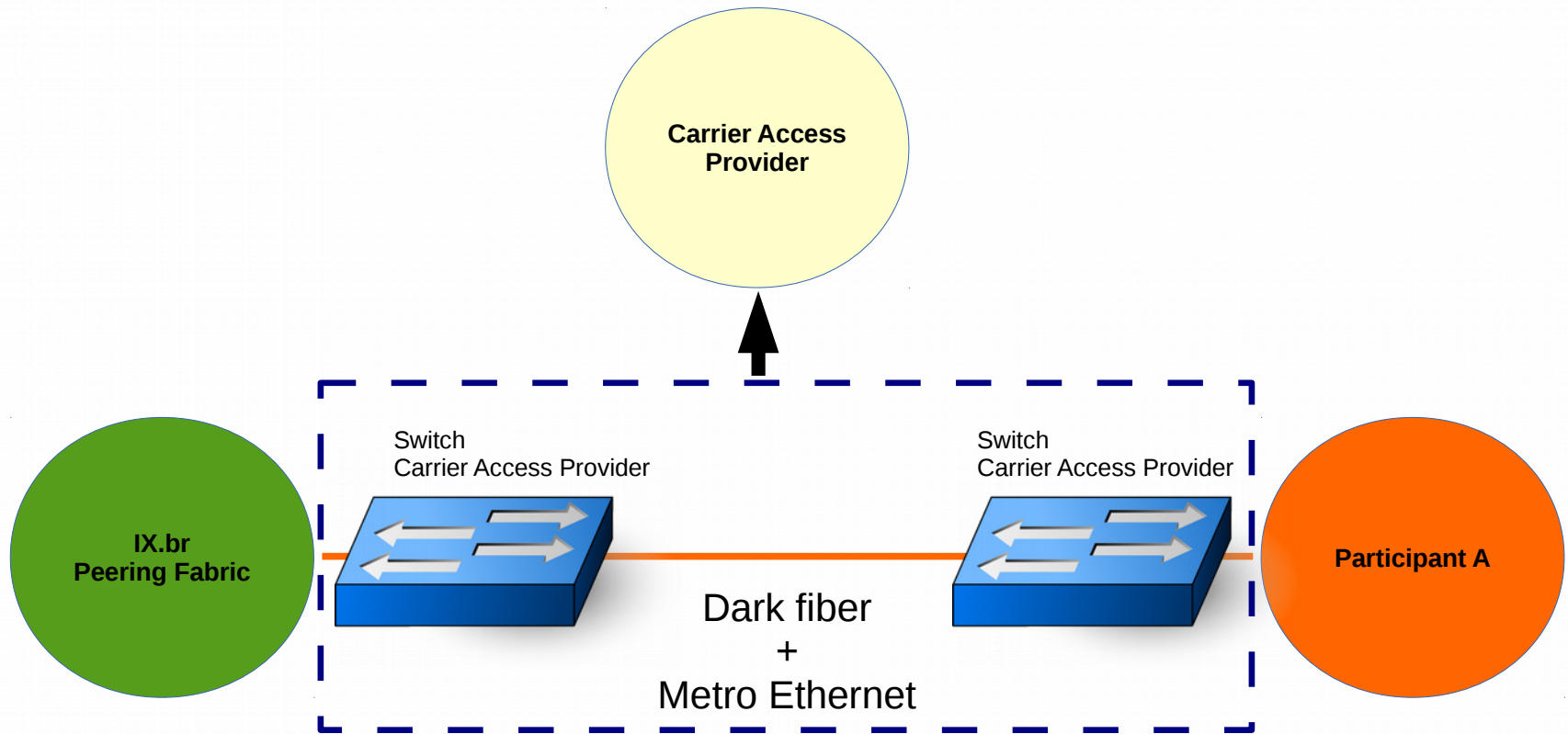


Note: depends on distance and types of interfaces

IX.br – Types of enlace

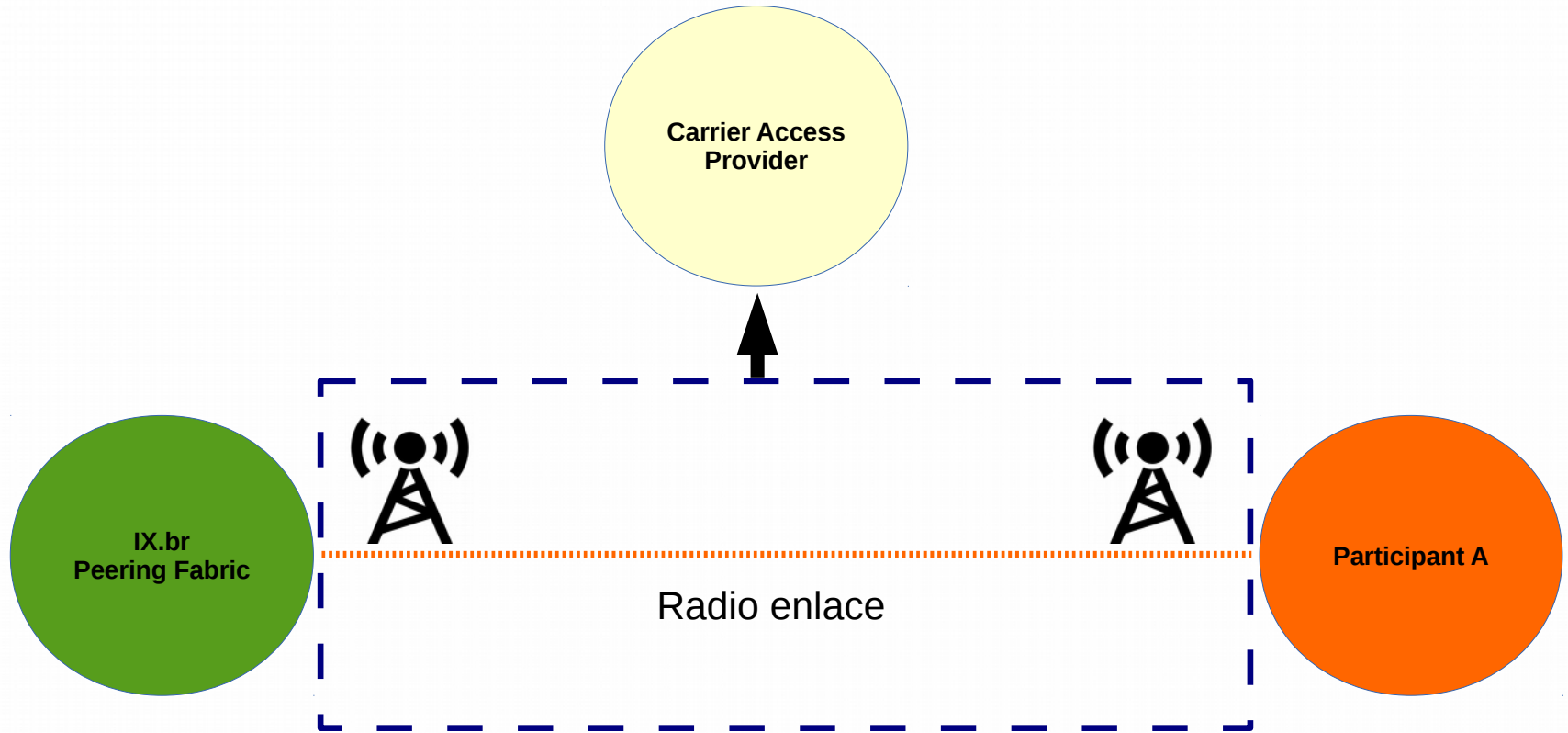


IX.br – Types of enlace

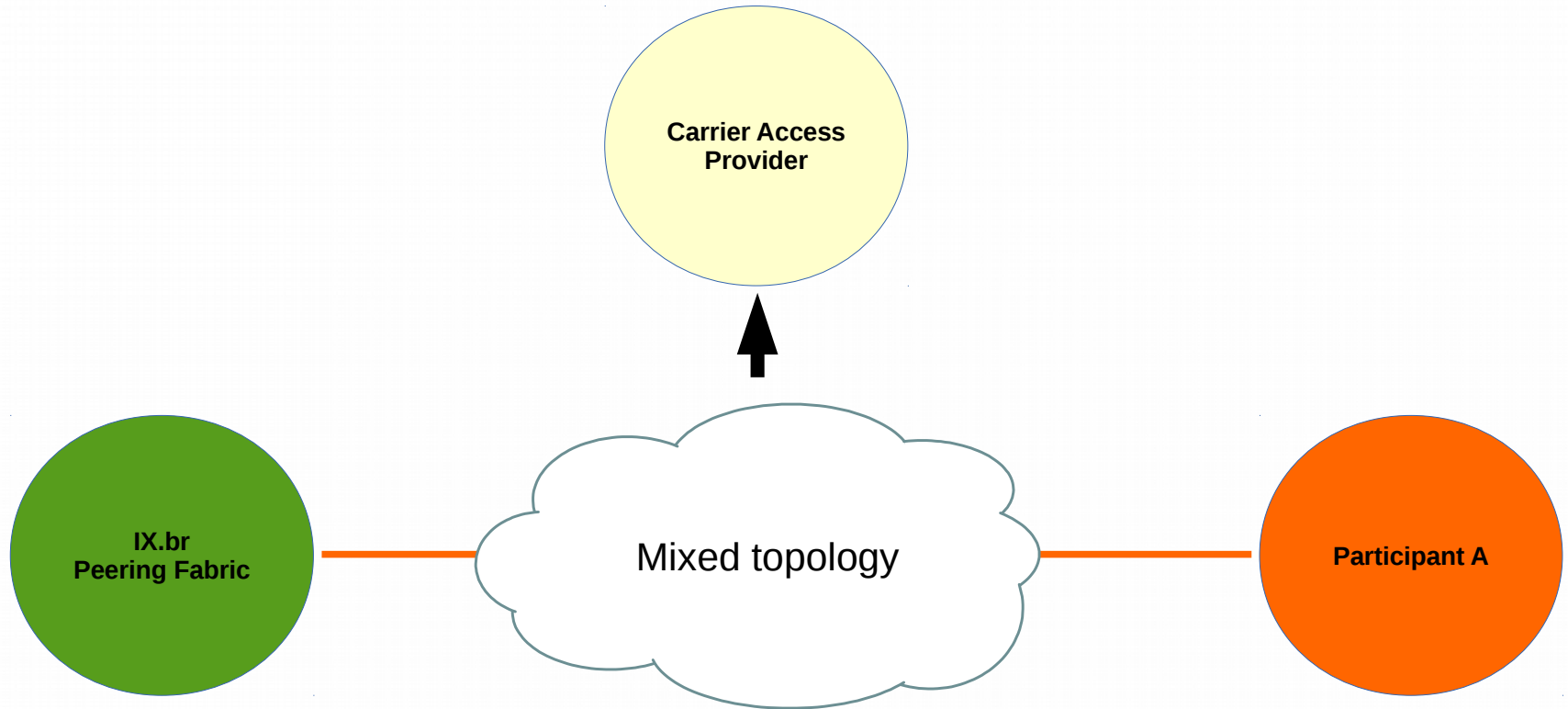






Note: in this case there are may have many L2 devices in the enlace

IX.br – Types of enlace



IX.br – Types of enlace



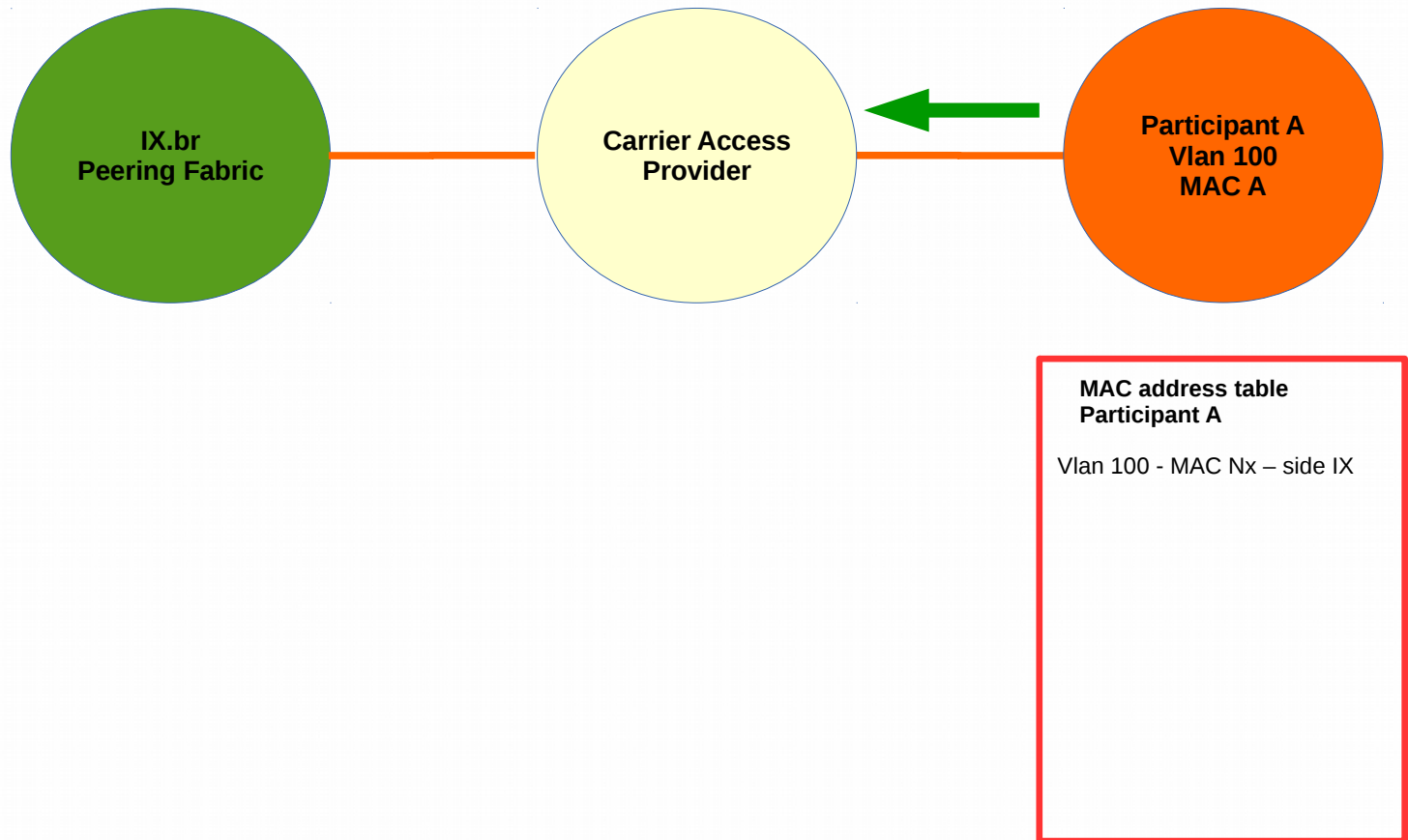
-  Dark Fiber
-  DWDM system
-  Metro Ethernet
-  Radio enlace

IX.br – What type transport do you have?

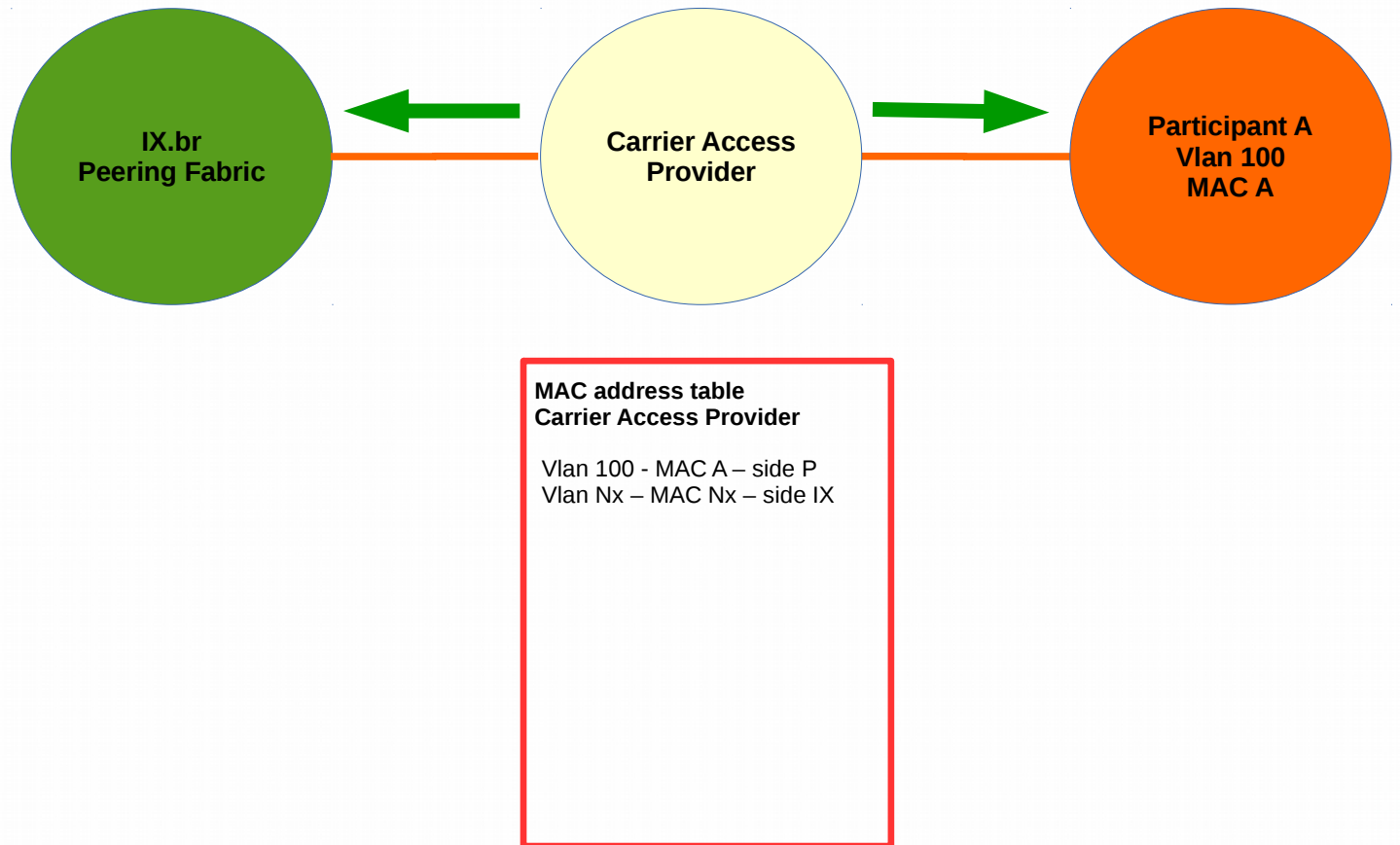


Some times participants don't have money to pay an adequad enlace, but it's important that have functionality.
You need a good transport to have a good traffic exchange.

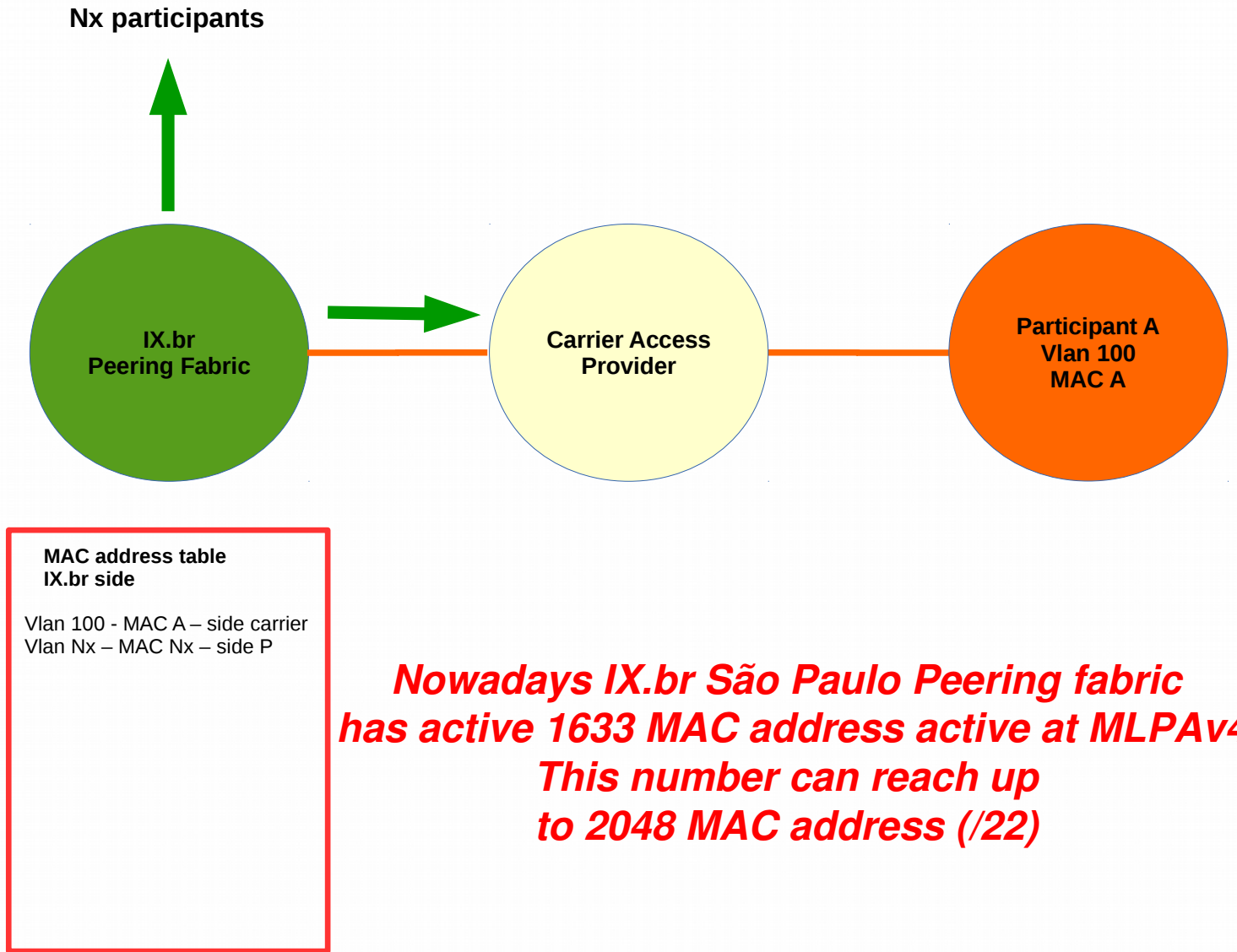
IX.br – Enlace – MAC learning limitation



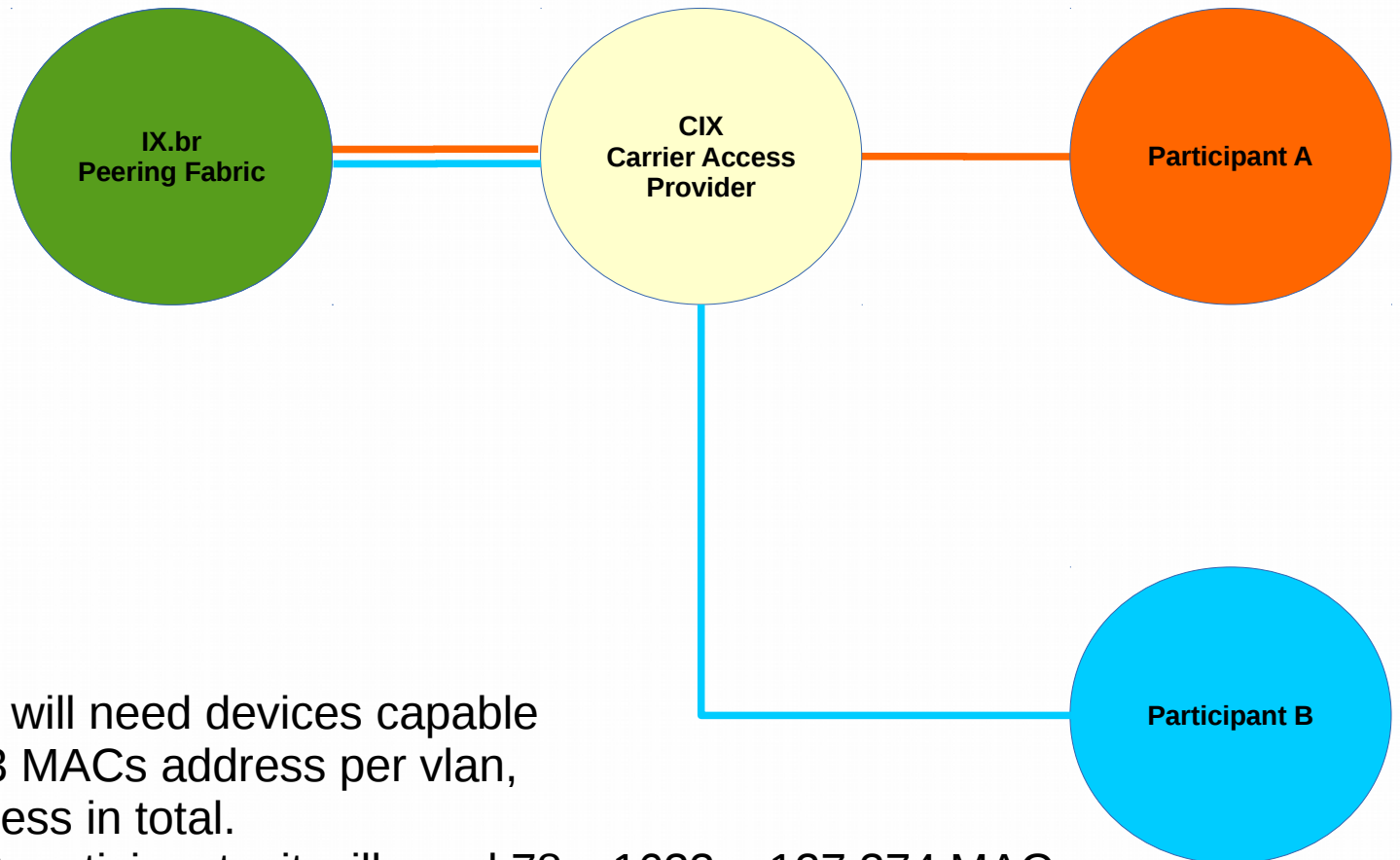
IX.br – Enlace – MAC learning limitation



IX.br – Enlace – MAC learning limitation



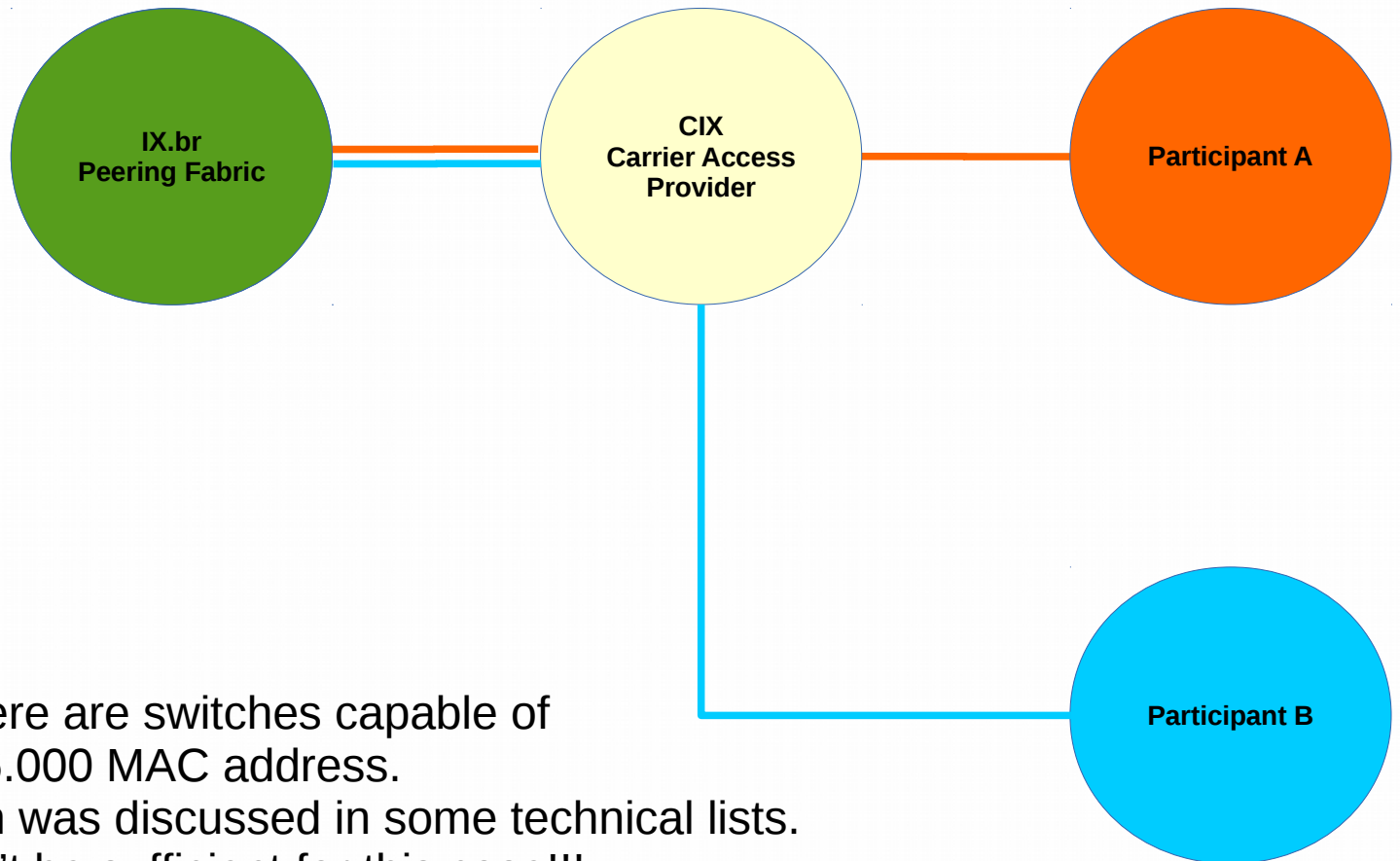
IX.br – CIX – MAC learning limitation



In this case you will need devices capable of learning 1633 MACs address per vlan, 3266 MAC address in total.

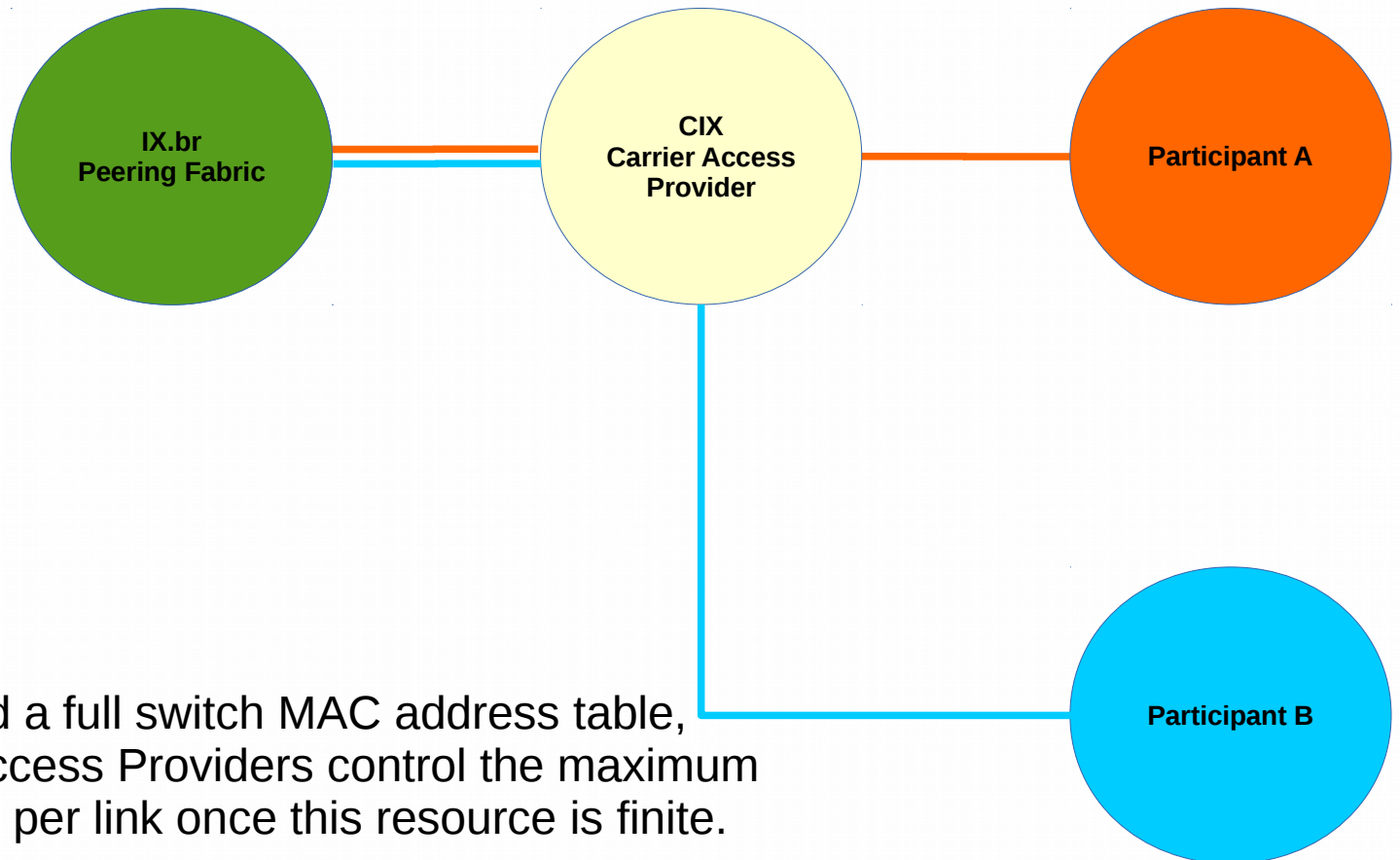
In a CIX with 78 participants, it will need $78 \times 1633 = 127.374$ MACs

IX.br – CIX – MAC learning limitation



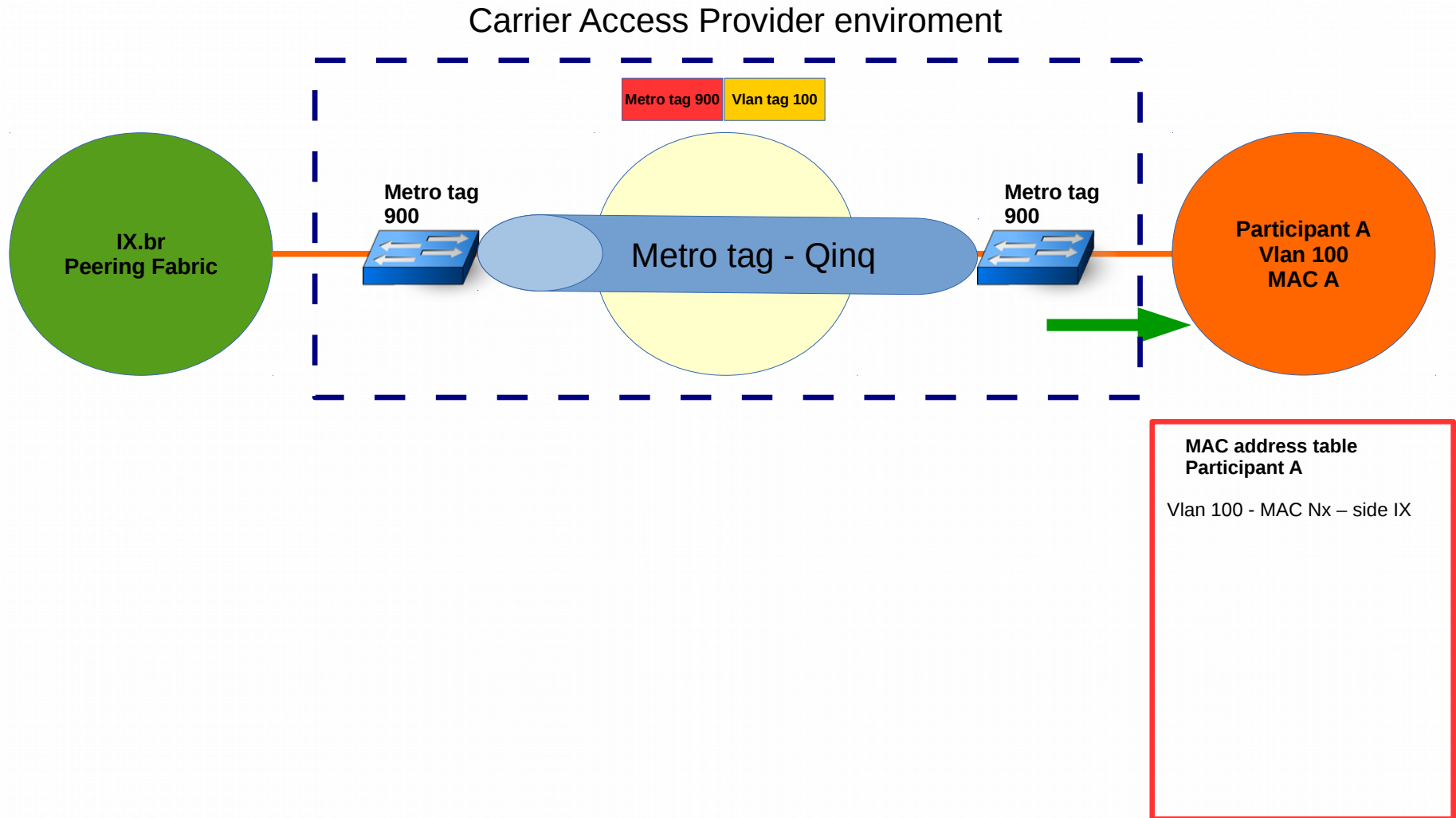
Some cases there are switches capable of learning only 16.000 MAC address.
This information was discussed in some technical lists.
Note that it won't be sufficient for this case!!!

IX.br – CIX – MAC learning limitation

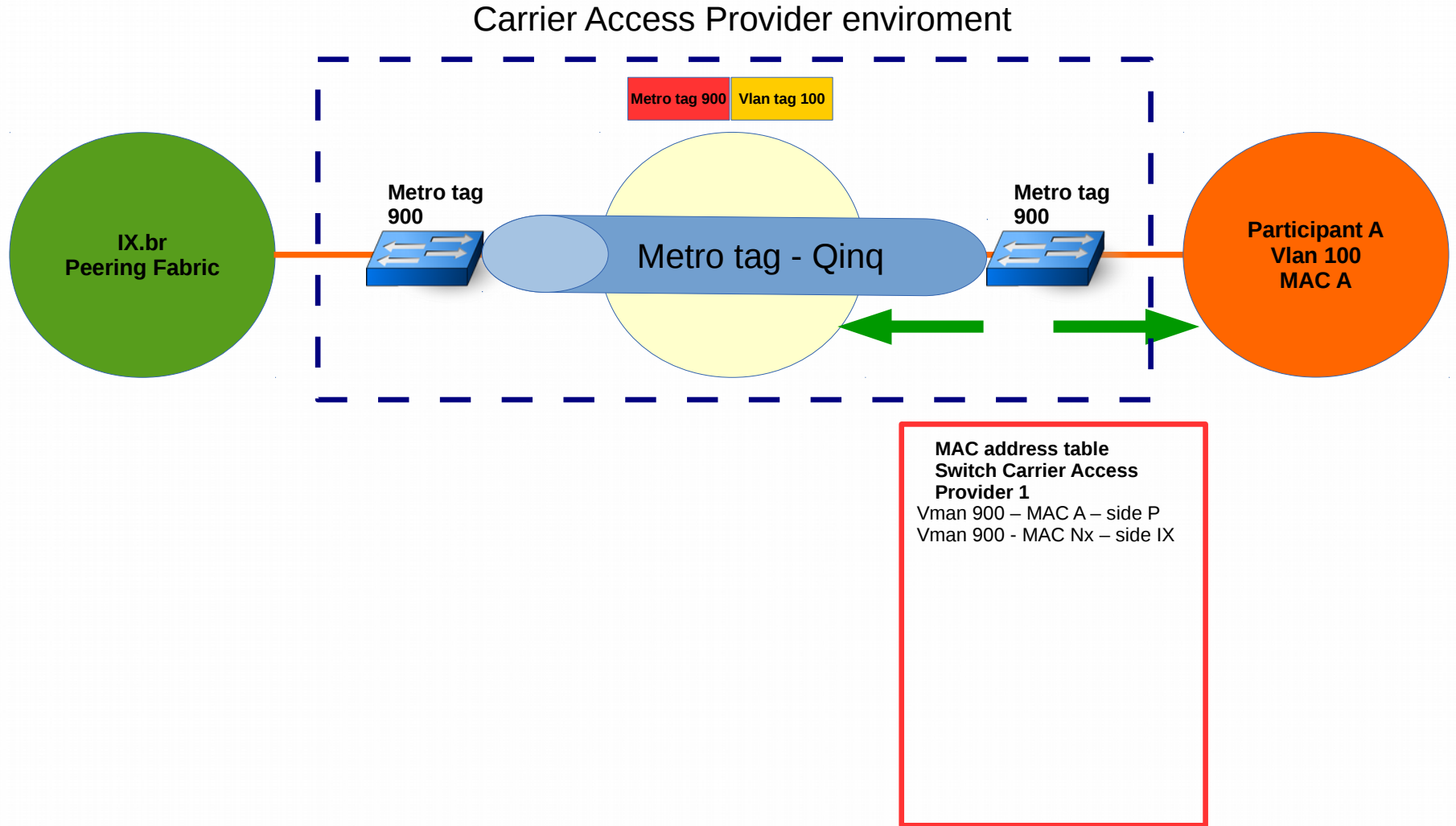


In order to avoid a full switch MAC address table, some Carrier Access Providers control the maximum amount allowed per link once this resource is finite.

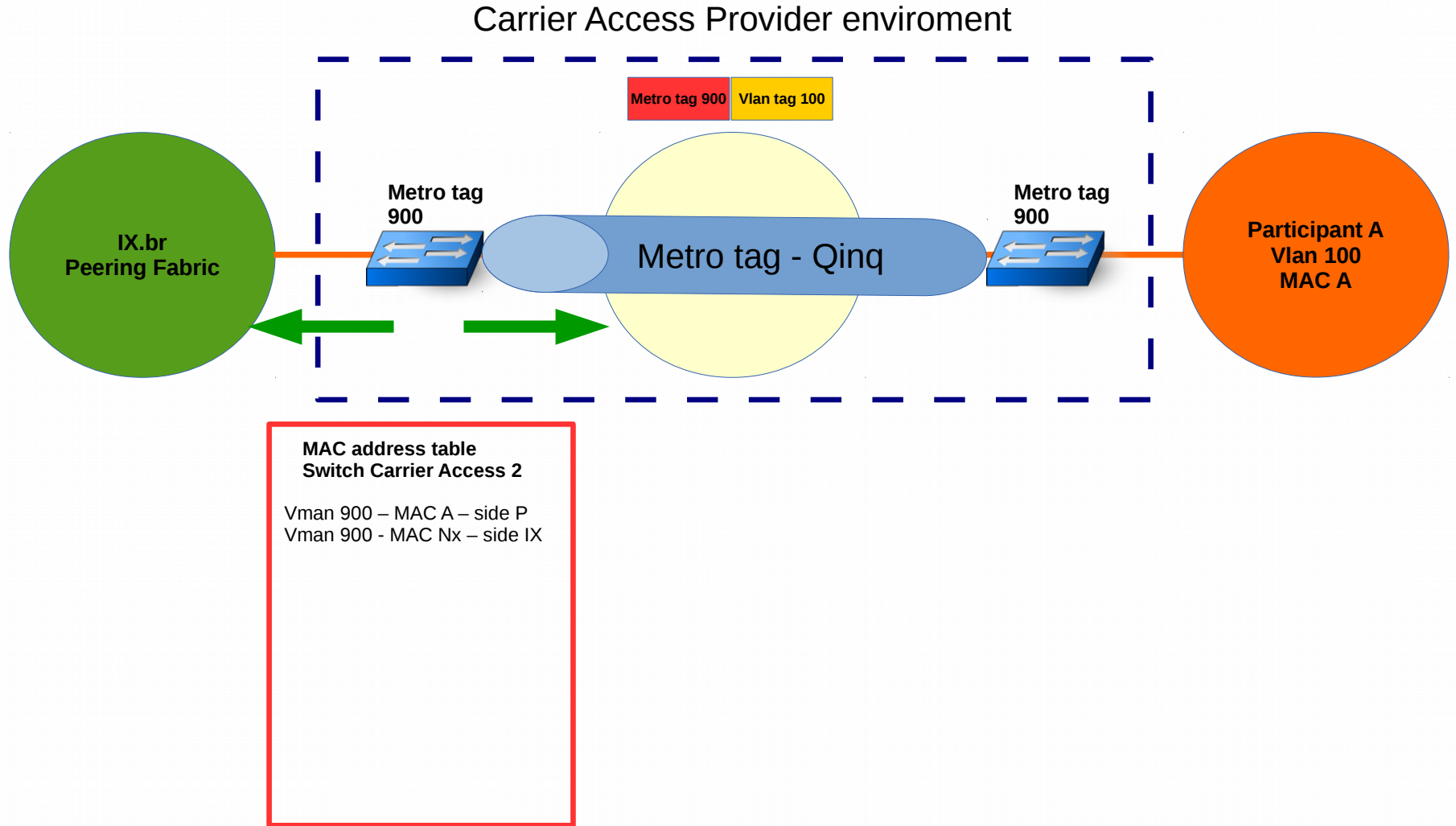
IX.br – Enlace – MAC flapping



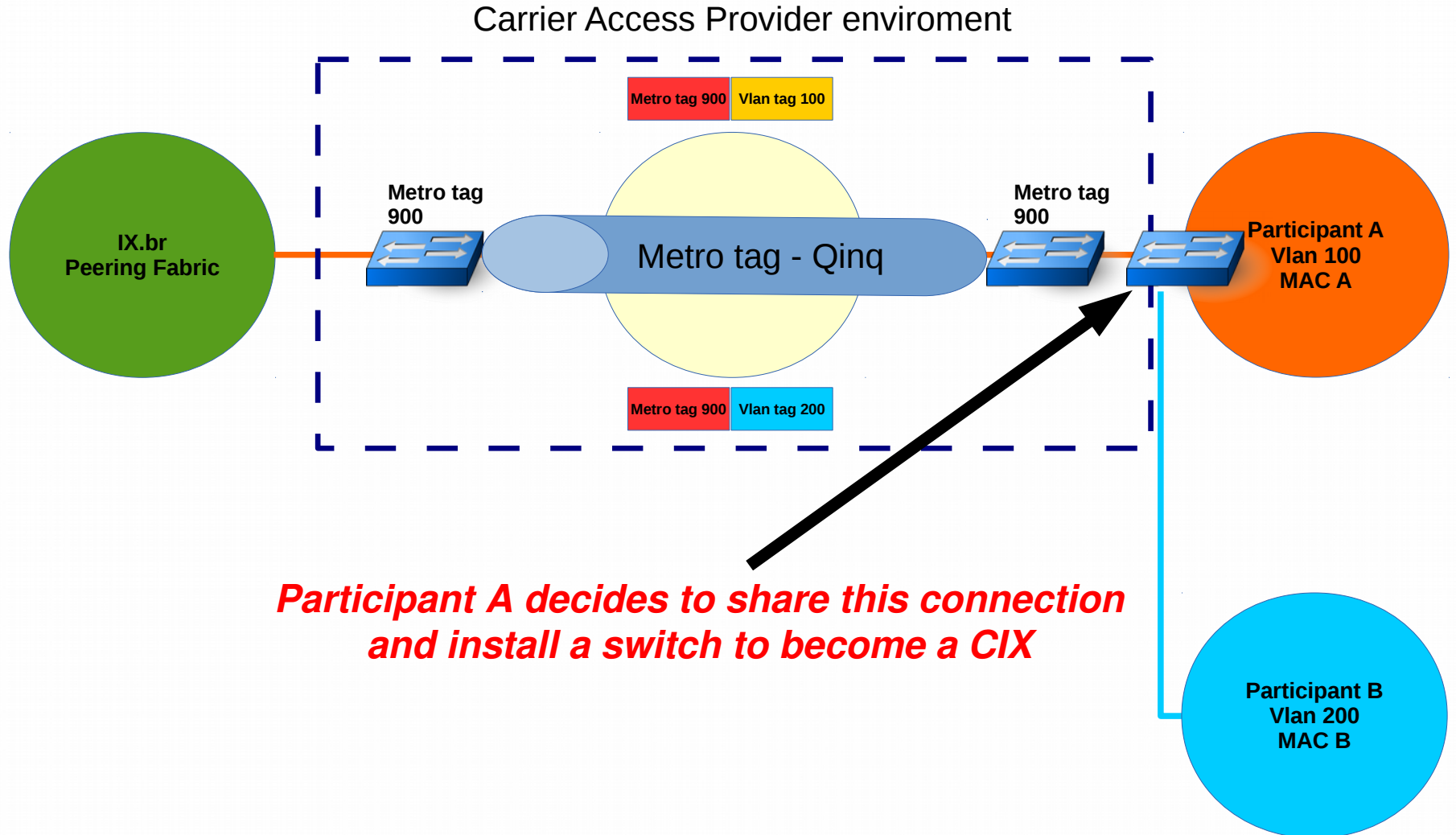
IX.br – Enlace – MAC flapping



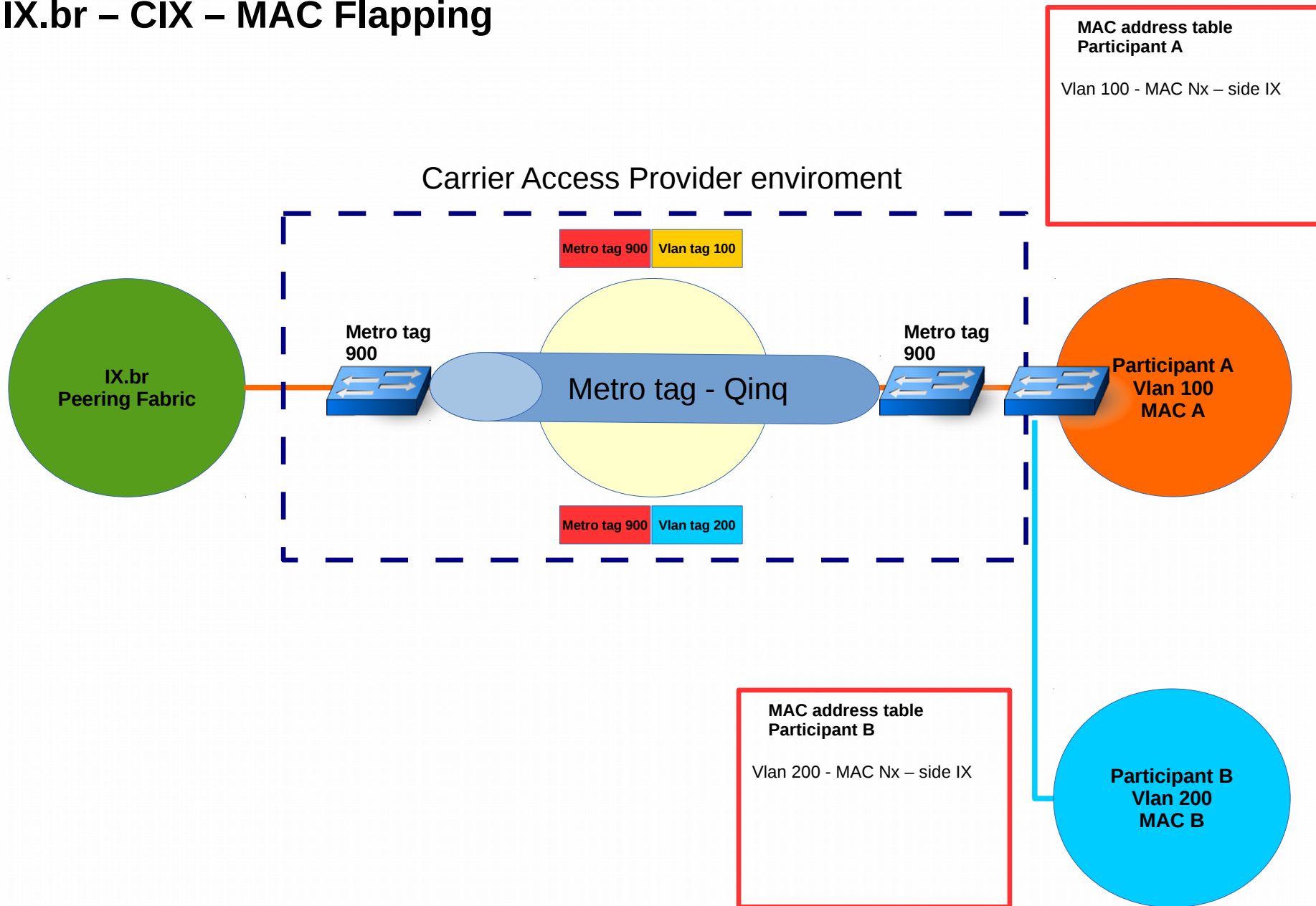
IX.br – Enlace – MAC flapping



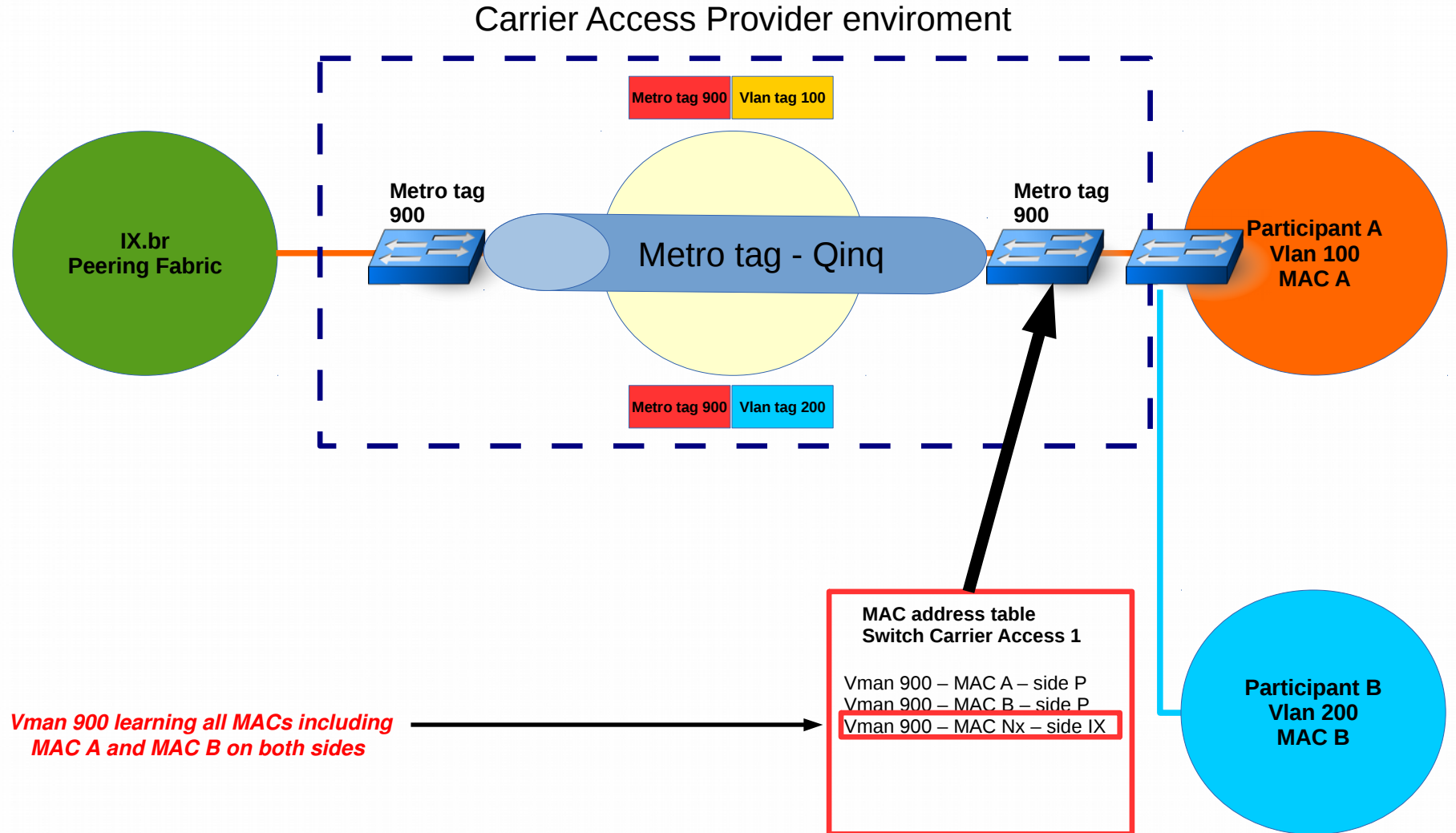
IX.br – CIX – MAC flapping



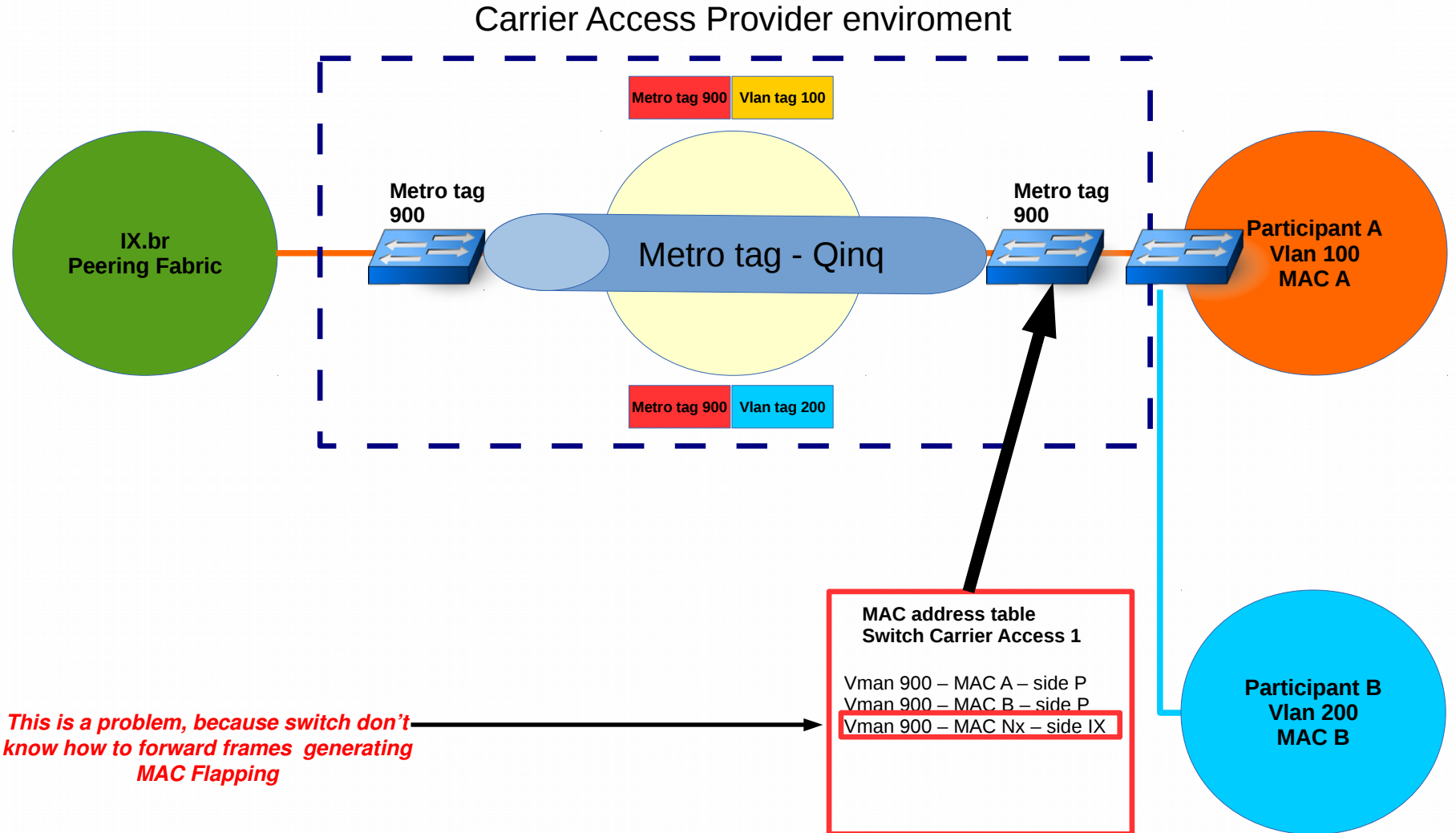
IX.br – CIX – MAC Flapping



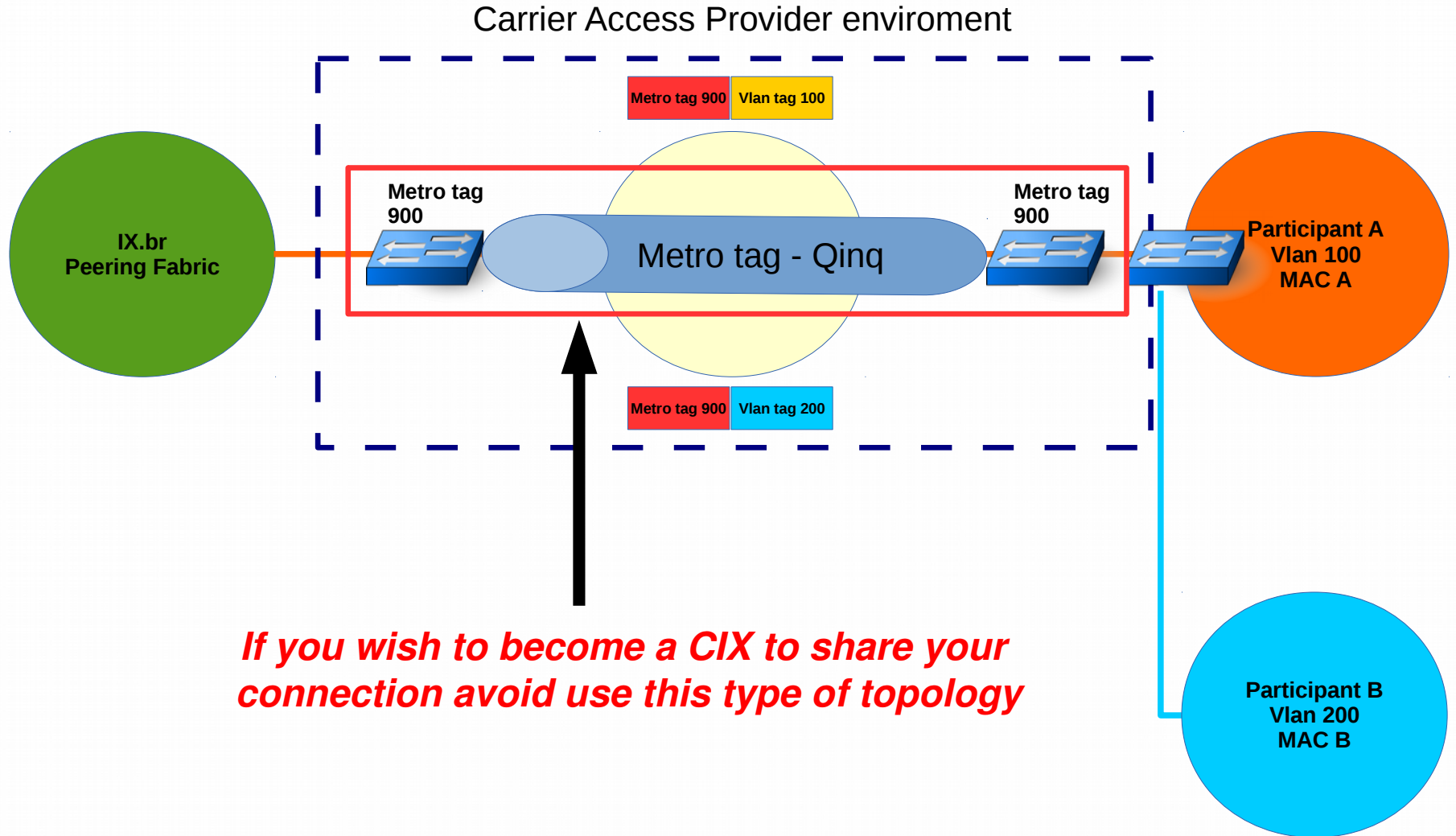
IX.br – CIX – MAC Flapping



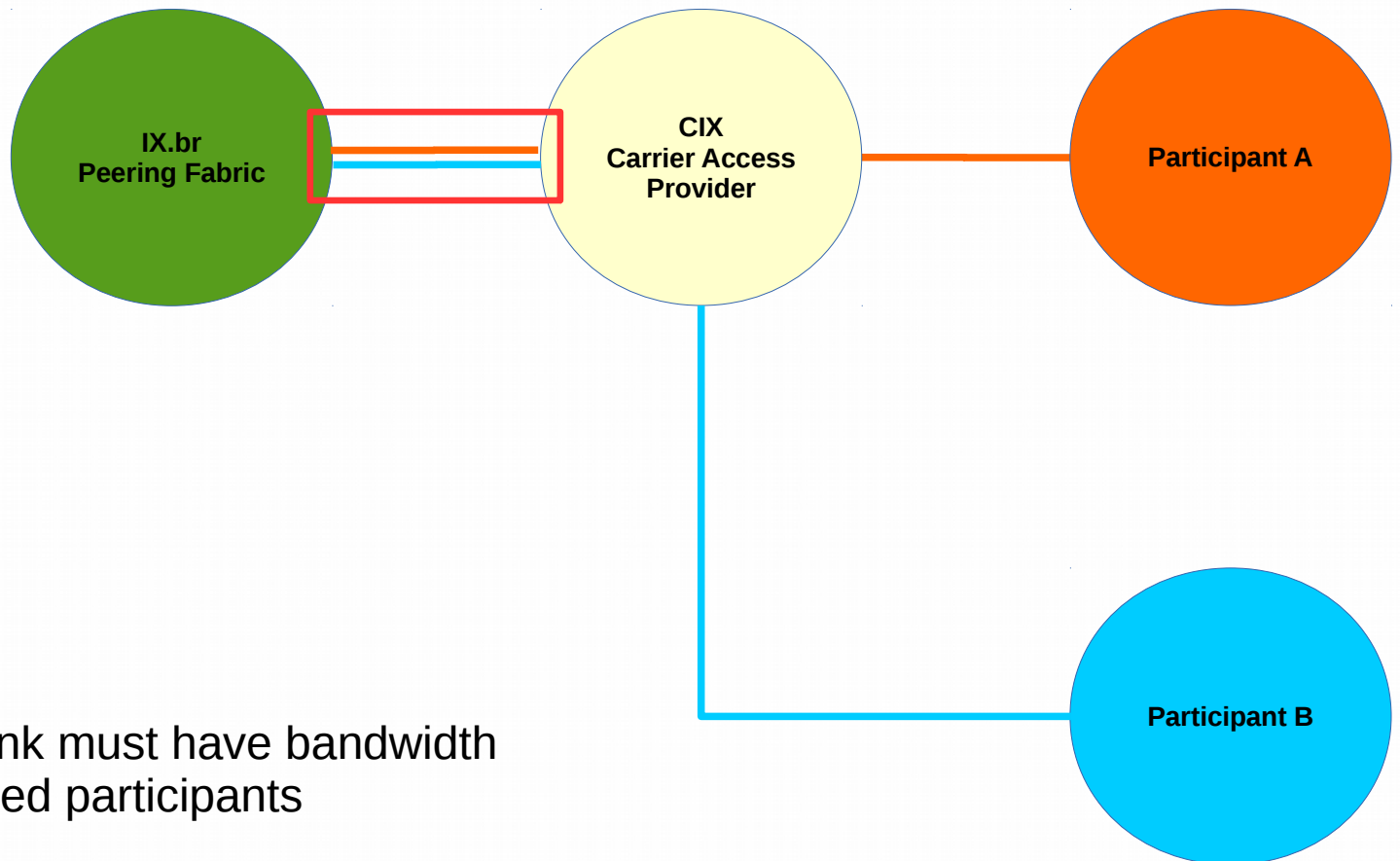
IX.br – CIX – MAC Flapping



IX.br – CIX – MAC Flapping

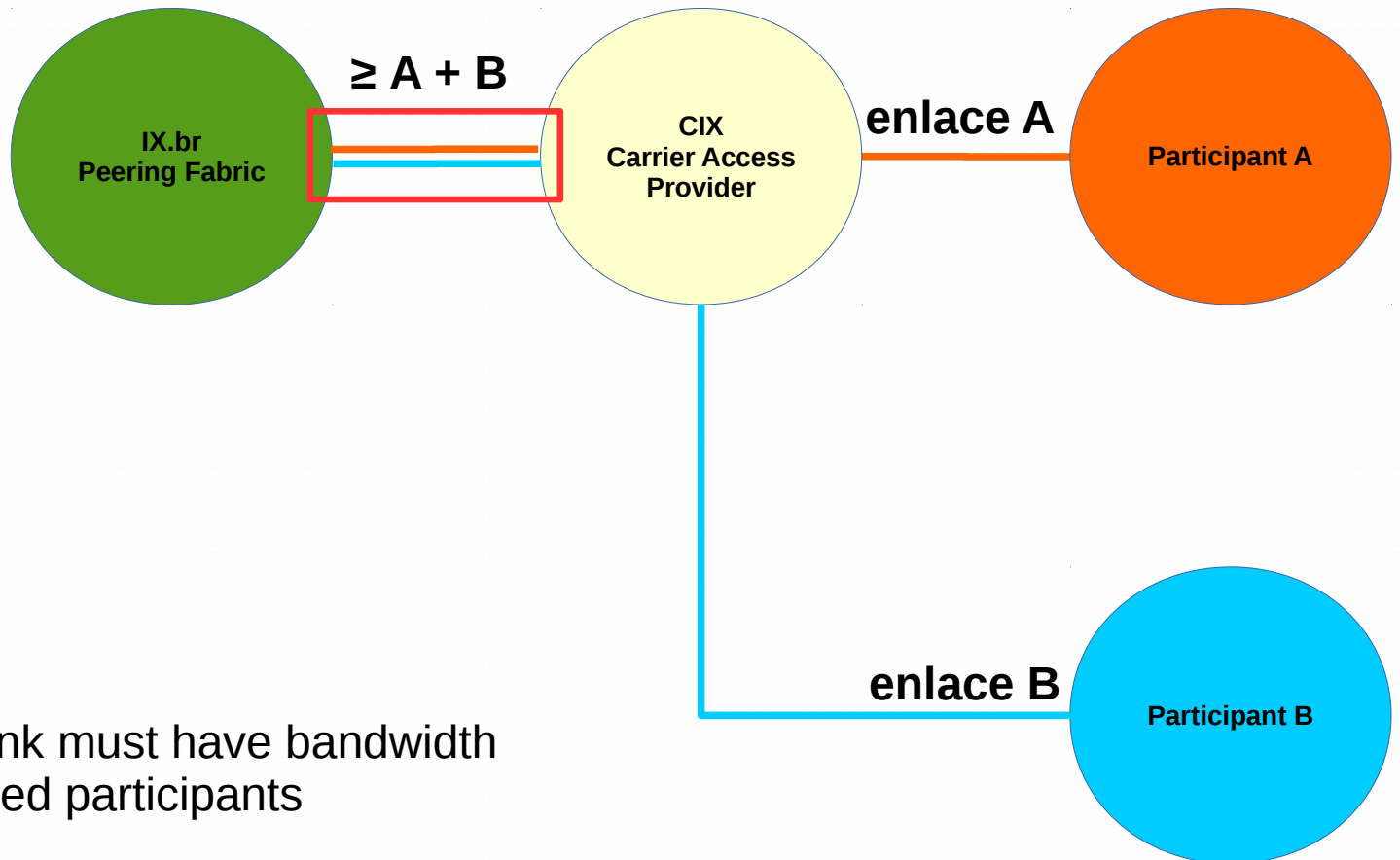


IX.br – CIX - Bandwidth link limitation



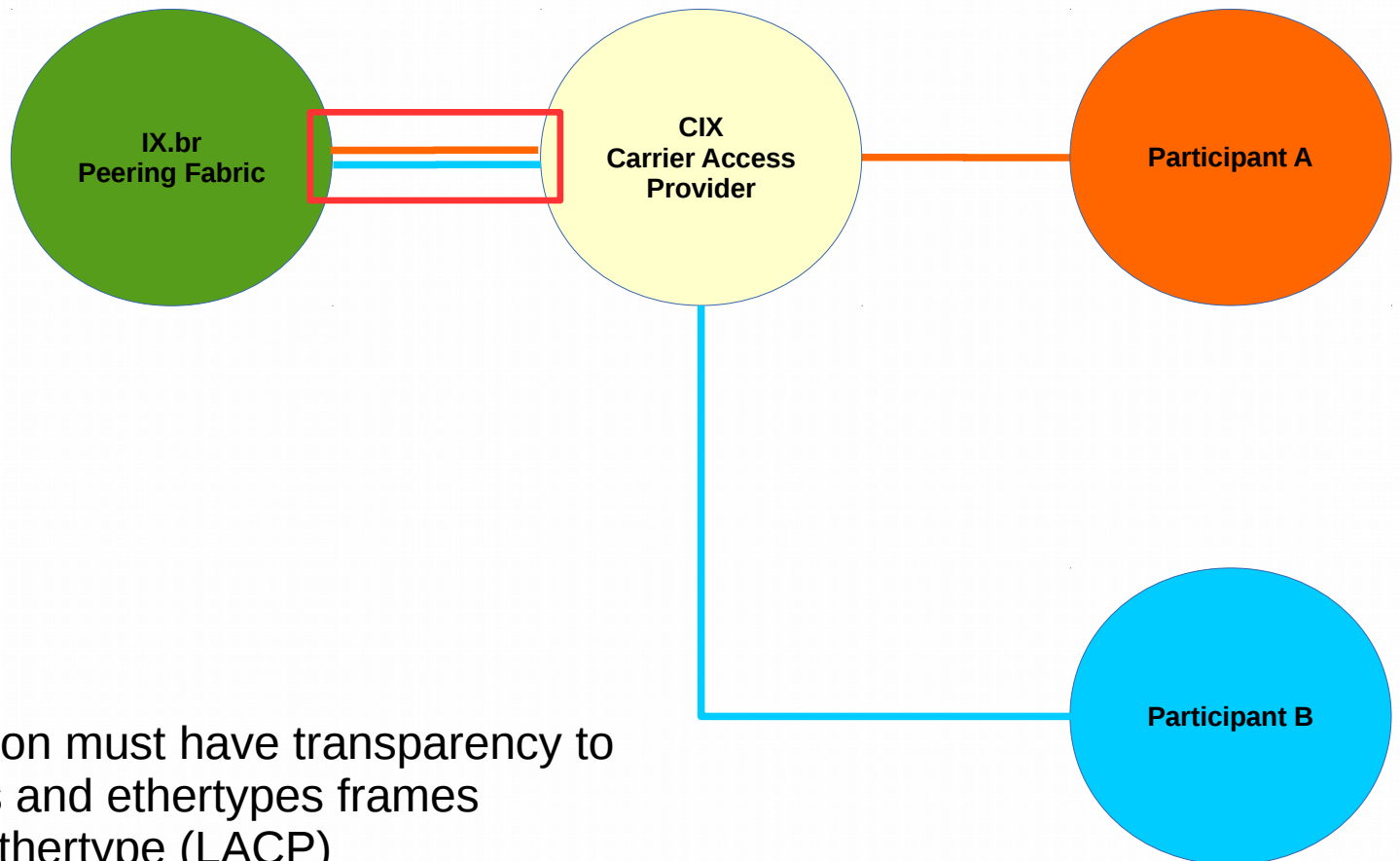
The shared link must have bandwidth to all connected participants

IX.br – CIX - Bandwidth link limitation



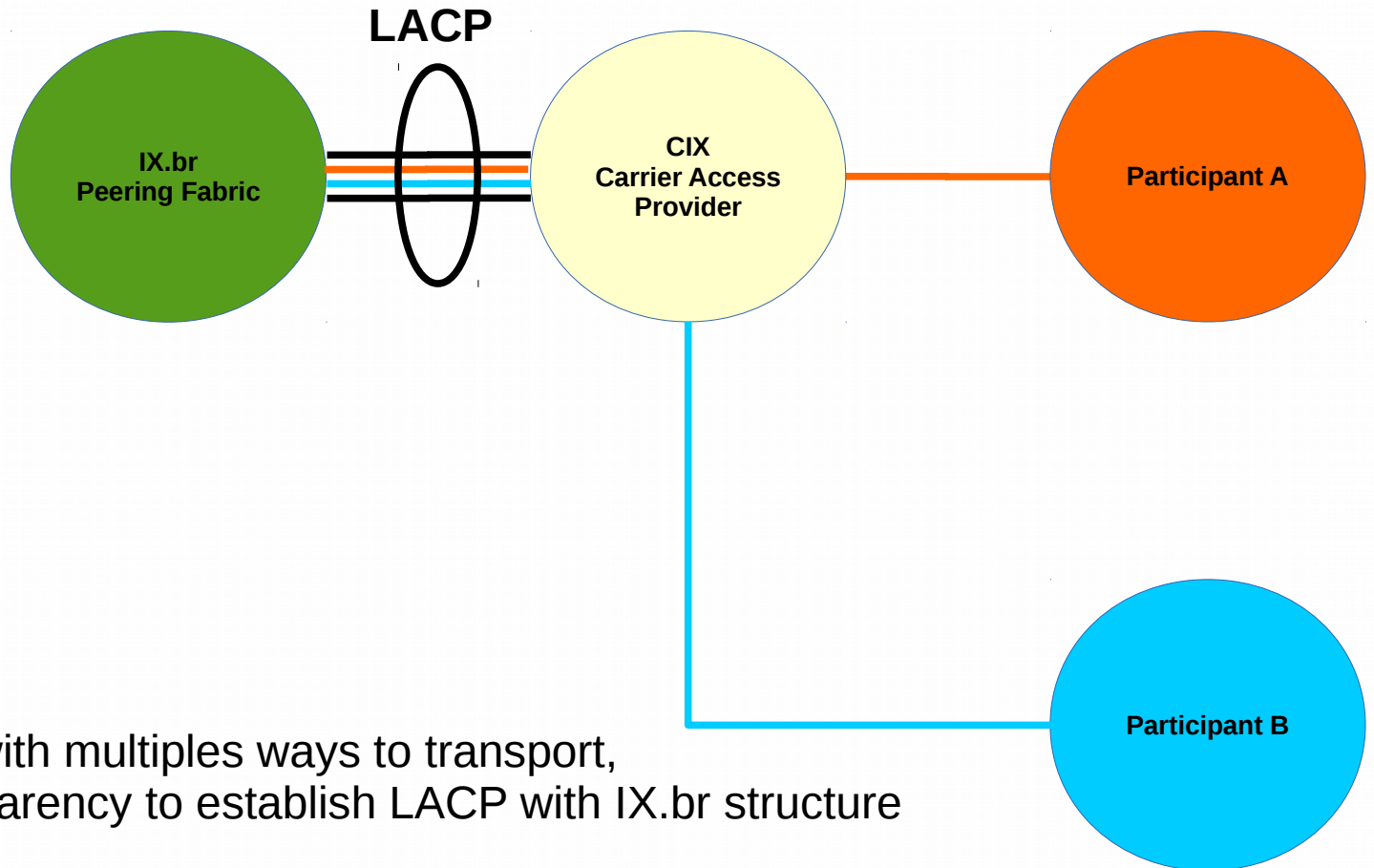
The shared link must have bandwidth to all connected participants

IX.br – CIX – Protocol transparency



This connection must have transparency to any protocols and ethertypes frames
Ex: 0x8809 ethertype (LACP)

IX.br – CIX – Protocol transparency



A company with multiples ways to transport,
needs transparency to establish LACP with IX.br structure

IX.br – CIX – Availability and stability



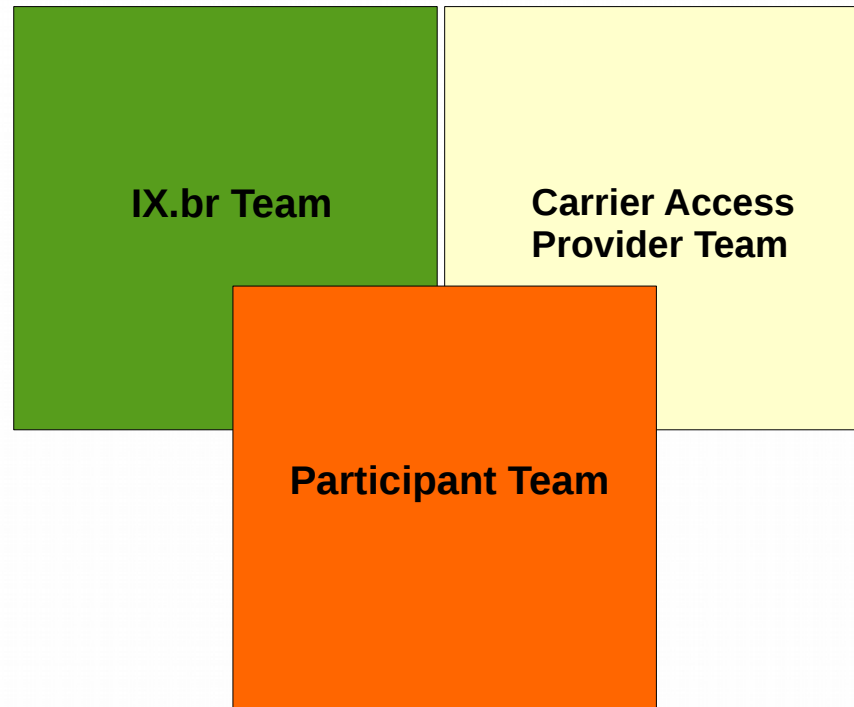
What is the availability, stability and recuperation time of this enlace?



Most of times Carrier Access Provider topology have no public information.

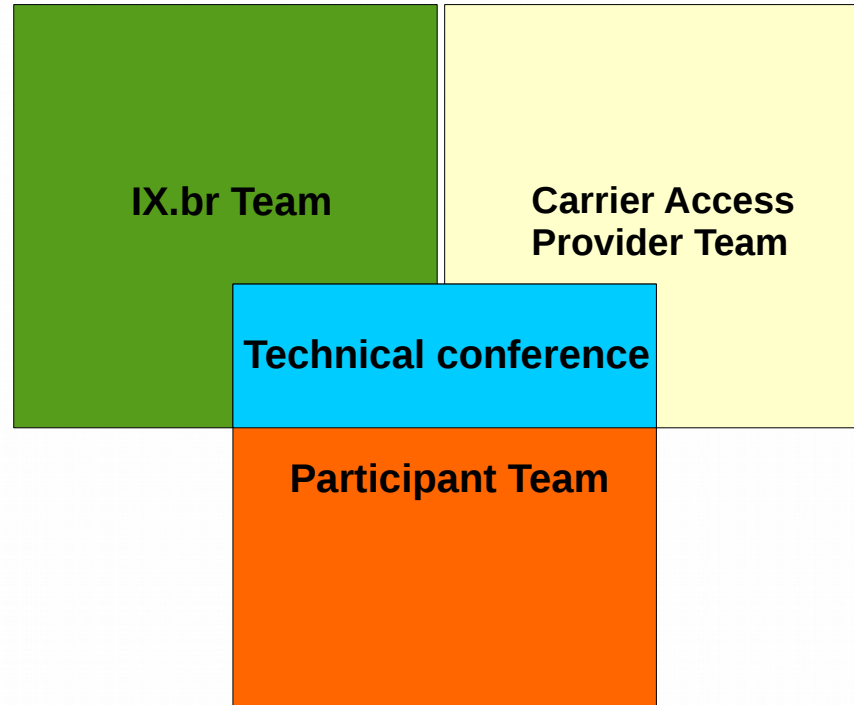
It's a security question and business competition.

IX.br – Technical conference



Although many enlase problems do not occur, this type of incident may take longer than the other incidents to be solved.

IX.br – Technical conference



When we have a problem that is no clear where is, we need to involve all responsible parts to solve.

IX.br – Understanding network CIX/participant



A good talk may help to solve many problems, for example in forums.

<http://forum.ix.br>

The PTT Fórum 12 event will take place in São Paulo, Brazil on December 2018.

IX (PTT) Fórum normal audience is composed by Brazilian Autonomous Systems (AS) and IX.br participants (some of them are international companies).

The event will be translated between Portuguese and English.

The event will be part of the **Brazilian Internet Infrastructure week** together with GTER/GTS (Network Engineering, Operation and Security Working Groups).

Thank you

ix.br

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May 02th, 2018

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