

Global Network Architecture: 100G links from South America

Michael Stanton

RNP

michael@rnp.br

- The talk focuses on (near) future international 100G connectivity for R&E networks in South America, and how this fits in with the GNA perspective on future topology
- The first 100G international link is forecast for September, 2015, and can have a “pathfinder” role in the development of GNA.
- We also mention advanced plans for future submarine cables, which are expected to be commissioned by 2017

- Map shows current inter-regional connectivity
- Latin America has connections to US, and to Caribbean and Europe (via US)
- Proposal of Global CEO Forum to collaborate to build a more robust topology



- Map from the GNA (Global Network Architecture) Working Group

A possible future vision (from GNA)

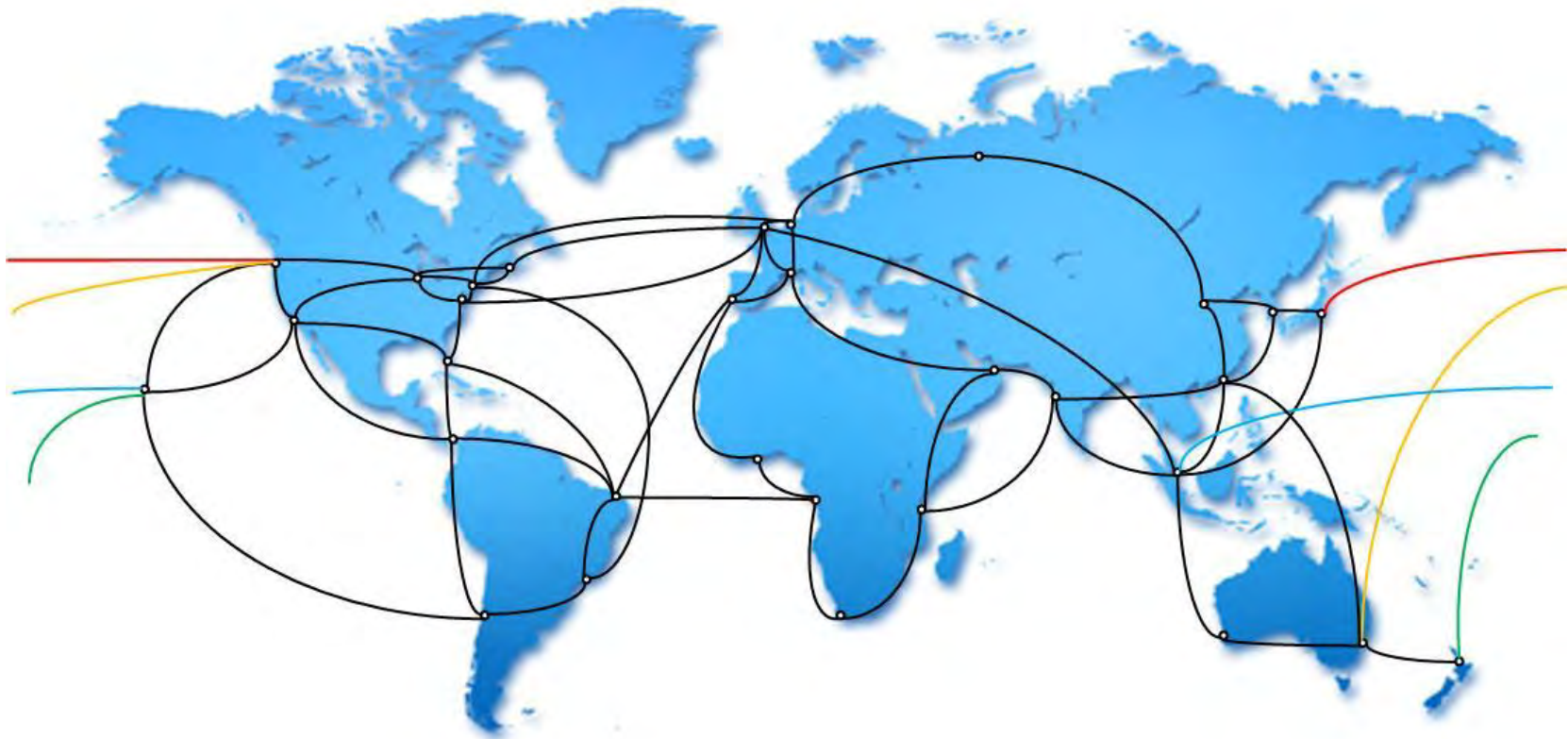
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Note: current plans for South America are compatible with this vision.



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REDE NACIONAL DE ENSINO E PESQUISA

PROMOVENDO O USO INOVADOR DE REDES AVANÇADAS NO BRASIL

South American RENs are currently served by 2 classes of intercontinental link

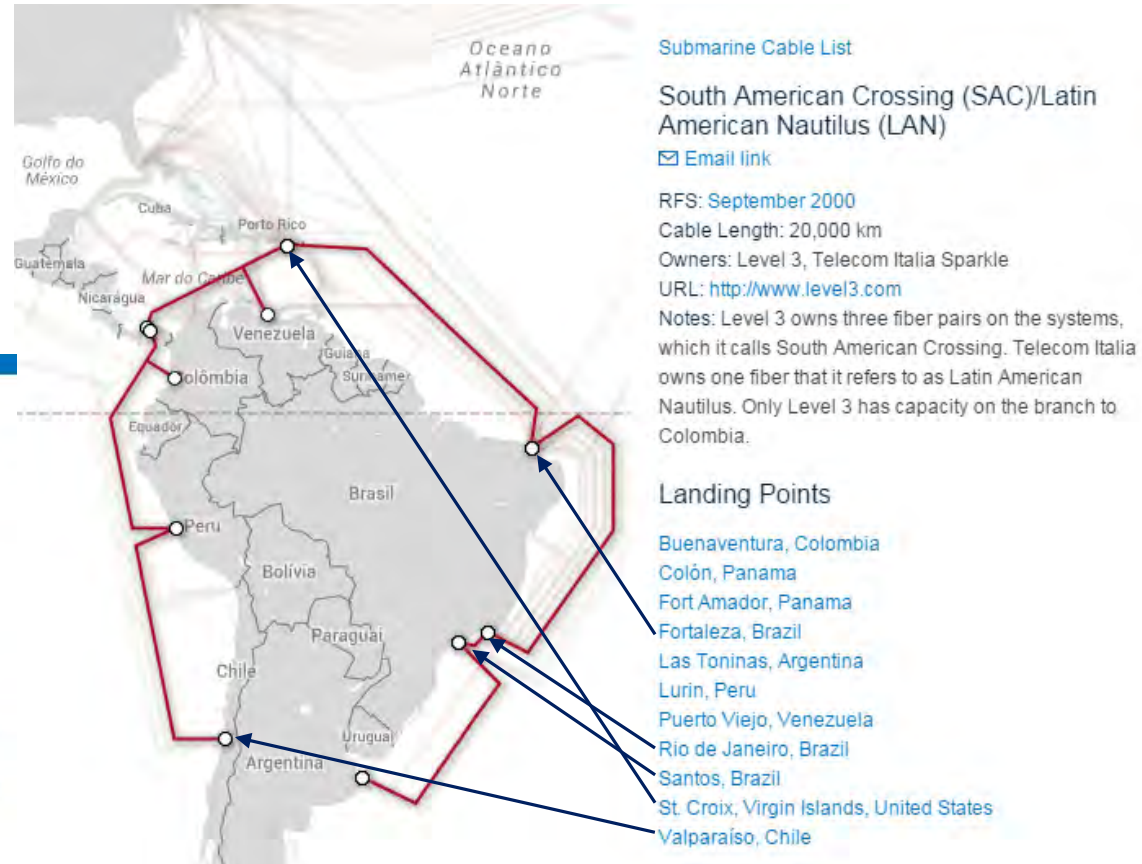
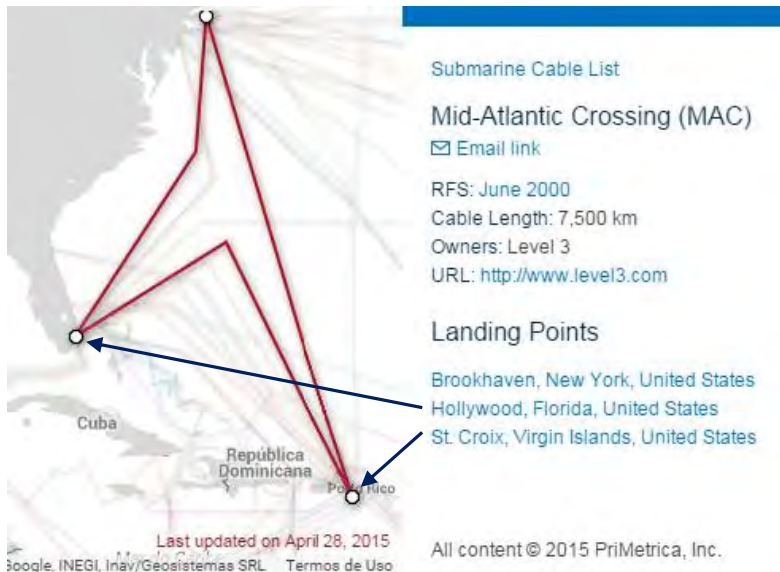
- RedCLARA, the Latin American backbone network, connecting NRENs of 13 mainland countries from Mexico south, operates two sub-lambda circuits: 1G (Panama-US), 5G (Brazil-EU).
(originally partially funded by EC)
- The Brazilian networks RNP (national) and ANSP (S. Paulo state) share 10G lambda links on submarine cable between Brazil and US, last upgraded in 2013-14 to 4x 10G (partially US-funded through IRNC)

- Collaboration ANSP – RNP – AMPATH (AmLight East)
 - IRNC 2009 award by NSF
 - ANSP – S. Paulo state network
 - AMPATH – academic IXP in Miami
- 2013: 4 spatially diverse 10G links (SAC and SAm-1 cables) between São Paulo and Miami, shared between ANSP and RNP.
- Hybrid use of connections for IP and L2 circuits, including GLIF link to global partners
- Cables used:
 - SAm-1 (Telefonica) —
 - SAC (LANautilus) —



- Latin America Nautilus provides submarine connectivity between 3 points in Brazil and 1 in Chile to Miami, Florida, using the cable systems SAC and MAC.

(Maps from TeleGeography
<http://www.submarinecablemap.com/#/submarine-cable/mid-atlantic-crossing-mac>
<http://www.submarinecablemap.com/#/submarine-cable/south-american-crossing-saclatin-american-nautilus-lan>)

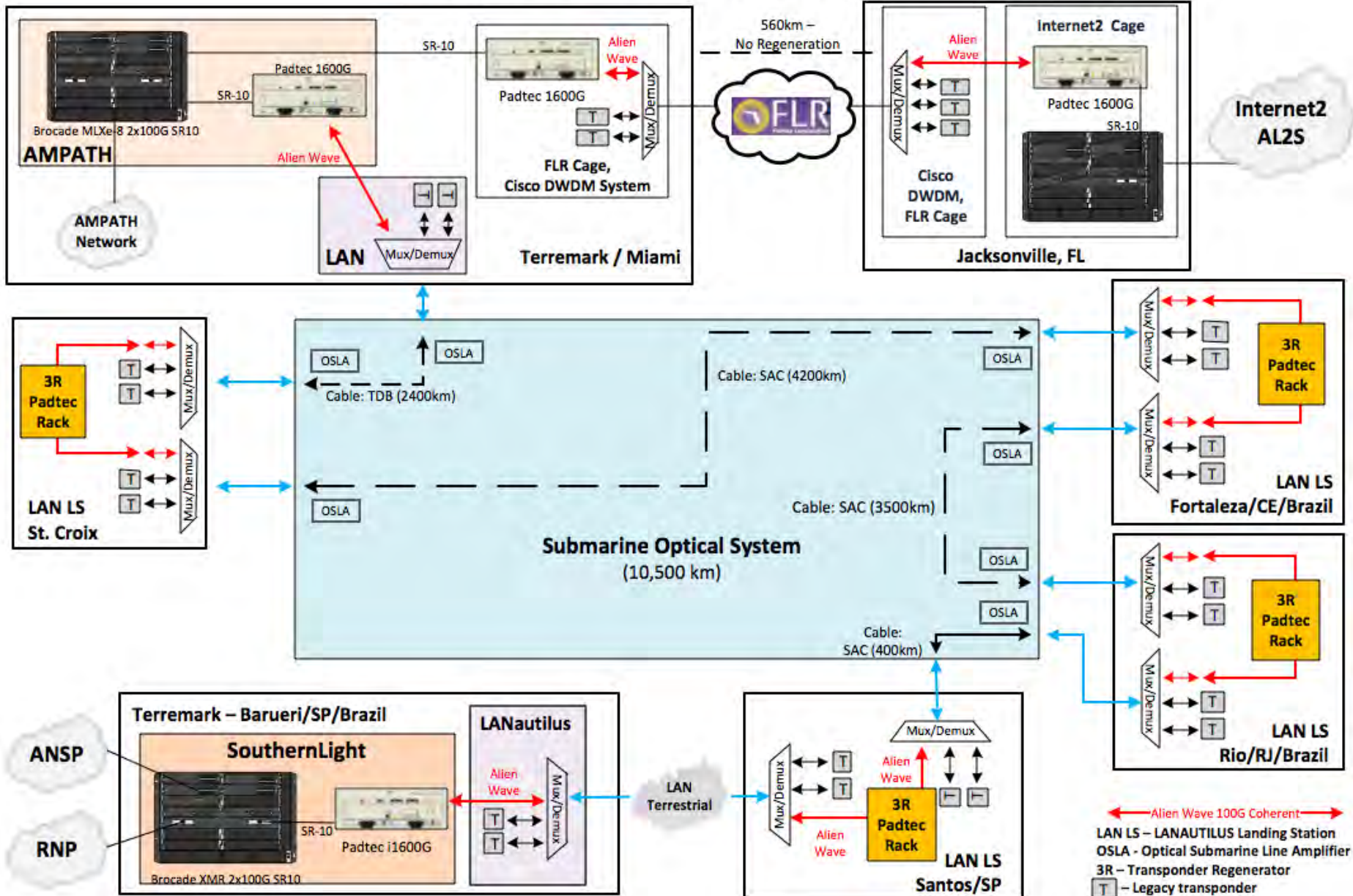


- There is currently being carried out the experimental upgrade of the existing LANautilus cable system to include an “alien” 100G wavelength between Florida and Brazil (Fortaleza, Rio de Janeiro and Santos)
 - An **alien wavelength** is a "coloured" optical signal that is originated from equipment not under the direct control of the transmission network operator (Wikipedia).
 - Technology provided by Padtec from Brazil
- Beneficiaries: the AmLight-East collaboration partners (ANSP – RNP – AMPATH)
- To be commissioned by September 2015 providing an early taste of 100G international connectivity
- Current “trial” (funded by NSF and FAPESP) should be extended until entry of future 100G US-Brazil Monet cable

- 4x 100G segments (2015):
 - St. Croix (STX)-Fortaleza 4,200km
 - Fortaleza-Rio, 3,500km
 - Rio-Santos, 400km
 - Miami-STX, 2,400km
- Existing 4x 10G links S Paulo – Miami
- 100G from Miami to AL2S in Jacksonville
- 100G access in 3 Brazilian cities



OpenWave & 100G AtlanticWave - 2014



New submarine cables by 2017



- Monet: Florida – Fortaleza – Santos
(<http://www.submarinecablemap.com/#/submarine-cable/monet>)
Acquisition of 300 GHz of spectrum by LSST Project for scientific and academic use.
- eulaLink: Portugal – Madeira – Canary Islands – Cape Verde – Fortaleza
(<http://www.submarinecablemap.com/#/submarine-cable/eulalink>)
In negotiation: acquisition of up to 2 THz of spectrum for scientific and academic use.
- SACS (South Atlantic Cable System) : Luanda, Angola – Fortaleza
(<http://www.submarinecablemap.com/#/submarine-cable/south-atlantic-cable-system-sacs>)
Direct access to Africa: of great potential interest – shorter routes, access to SKA.

also

- Seabras-1: New York – Fortaleza – Santos
(<http://www.submarinecablemap.com/#/submarine-cable/seabras-1>)

- The imminent availability of international 100G connectivity between South America and the US for REN use makes it possible to extend the coverage of the “pathfinder” connections being used for PoC of the GNA vision
- Current investments and agreements on access to future submarine cable systems in the South Atlantic will ensure long-term access to scalable international connections for RENs.

Thank you!

Michael Stanton
michael@rnp.br