RedCLARA:
regional network in Latin America

CCIRN 2009 Meeting

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CLARA and RedCLARA

- CLARA is the regional association of NRENs in Latin America (LA), created in 2003
- CLARA operates the LA regional R&E network – RedCLARA – an advanced network which currently joins together NRENs from 12 countries in South, Central and North America
- RedCLARA also provides inter-regional connectivity to Europe and the US

CLARA countries and their networks

- Argentina – InnovaRed (†)
- Brazil – RNP
- Bolivia (*)
- Chile – REUNA
- Colombia – RENATA (†)
- Costa Rica (*)
- Cuba (*)
- Ecuador – CEDIA (†)
- El Salvador – RAICES (†)
- Guatemala – RAGIE (†)
- Honduras (*)
- Mexico – CUDI
- Nicaragua (*)
- Panama – RedCYT (†)
- Paraguay (*)
- Peru – RAAP (†)
- Uruguay – RAU
- Venezuela – REACCIUN2

† *network created since 2002*

* *currently not connected to RedCLARA*

RedCLARA today

- 9 PoPs (1 in Miami, US)
- Internal links up to 155 Mbps
- Country links ≥ 34 Mbps
- 3 external connections:
  - MX – Pacific Wave (LAX) @ 1 Gbps
  - BR – Atlantic Wave (MIA) @ 2.5 Gbps (shared)
  - BR – GEANT (Madrid) @ 622 Mbps

ALICE project:
May 2003 to April 2008

ALICE - América Latina Interconectada Con Europa

- Funded by @LIS
- Coordinated by DANTE, with participation of NRENs from Italy, France, Spain, Portugal and the CLARA countries, and CLARA itself (once formally incorporated)
- 12.5 M€ budget (20% LA NRENs, 80% EC)
- Main objective: Build the RedCLARA network
  - Interconnect LA NREN (and new initiatives) and link the resulting network to GEANT
  - September 2004: first links operational

RedCLARA development to 2008

- Initial network deployed in 2004 with single external link to GEANT
  - generous funding (80%) from EC @LIS programme through the ALICE project (2003 – 2008), managed by DANTE
  - equipment donations from Cisco
- Linked to US from 2005 through IRNC project WHREN-LILA (2005 – 2009), with funding from NSF and FAPESP (Brazil)
- Steady increase in capacity of country connections and of the Brazil – US link (WHREN-LILA)

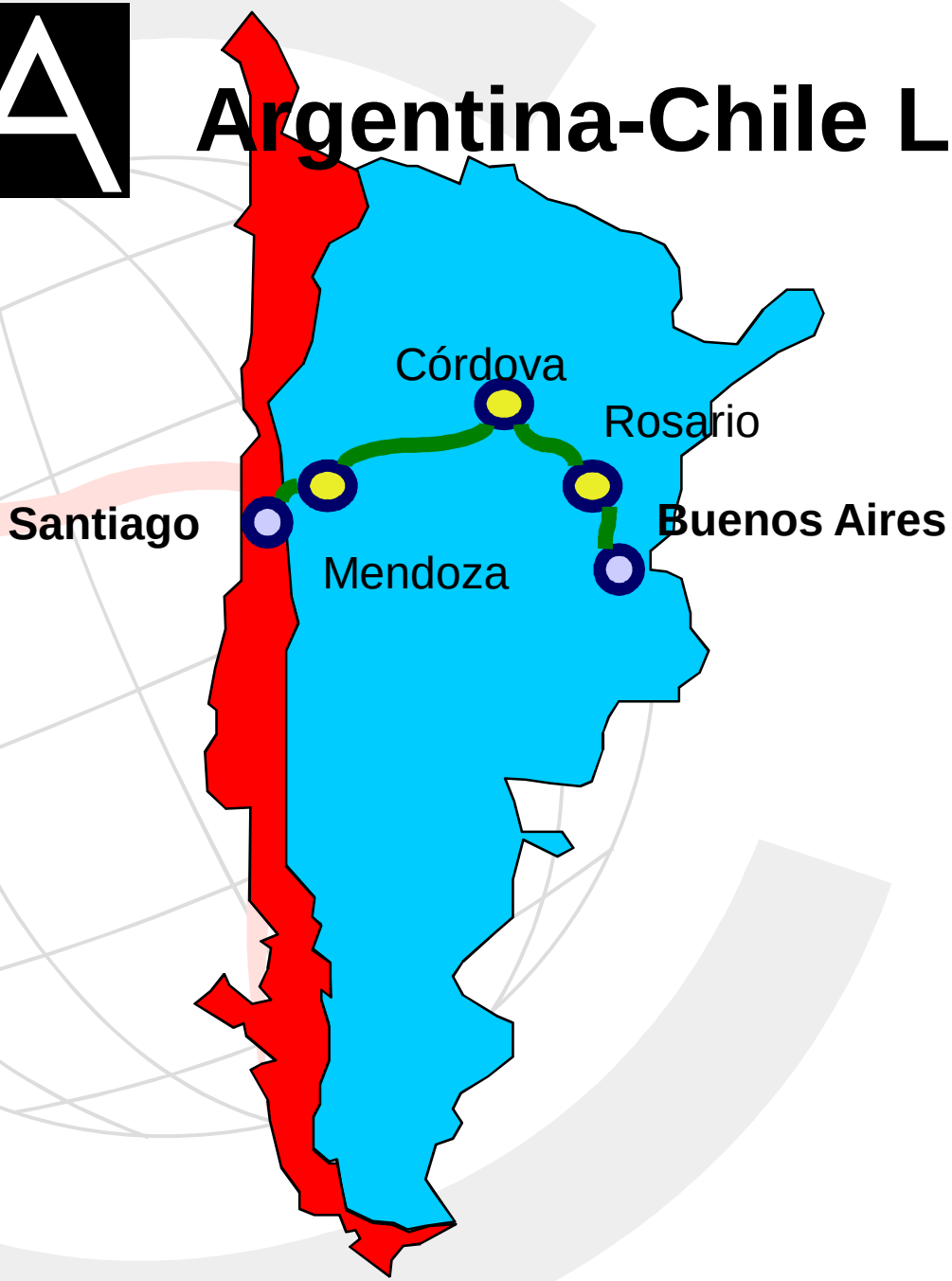
2008: waiting for ALICE2

- The ALICE project (mostly funded by the EC) terminated in March, 2008.
- The EC was persuaded that a second project would be needed, before RedCLARA could become self-sustainable
  - A new 4 year project (ALICE2) was aproved by the EC and began in November, 2008

ALICE2 and the future of RedCLARA

- ALICE2 is a 18M€ project of the @LIS2 programme of the EC
  - 1/3 comes from LA NRENs, 2/3 from EC
  - coordinated by CLARA
- Objective is to build a new network (RedCLARA2) which will be self sustainable at project end, by lowering Opex through non-use of leased circuits
  - first steps in Argentina, with agreement with Silica Networks for sharing fibre between Buenos Aires and Santiago
  - CLARA + NRENs pay for DWDM; capacity divided with Silica

Argentina-Chile Link



Argentina – Chile link

- Fibre owned by Silica Networks (Argentina) – follows a gas pipeline
- Fibre follows the path Buenos Aires-Rosario-Córdoba-Mendoza-Santiago (1767 km)
- Research network partners are InnovaRed, RNP and CLARA
- EC partial funding for connection to Pierre Auger Southern Cosmic Ray Observatory in Argentina
- Padtec (Brazil) won the tender for providing 5 x 10G wave DWDM system – currently being deployed
  - Research partners gain 25 Gbps capacity – RedCLARA gets 10 Gbps connection between Buenos Aires and Santiago

A future terrestrial backbone

- Currently many RedCLARA links use submarine cables, usually operated by telcos from outside the region
- Most countries telcos are also non-national
- CLARA seeks to build a terrestrial backbone from Brazil to Mexico
  - this can be shared with the NREN in each country crossed
- The Argentina – Chile link is considered to be a paradigm for such a development
  - one possibility is to seek similar agreements with electrical energy distributors with their own fibre

Possible Fibre Links
Central America/México

Central America Possibilities

- Private Fiber Optic Networks
- Plan Puebla Panamá (COMTELCA)
  - intergovernment plan for integrating electrical energy systems
- Distances
  - Puebla (MX) – Guatemala City (950 Km
  - Guatemala-San Salvador 274 Km
  - San Salvador-Tegucigalpa 363 Km
  - San Salvador-Managua 575 Km
  - Managua- San José 550 Km
  - San José- Panamá 885 Km

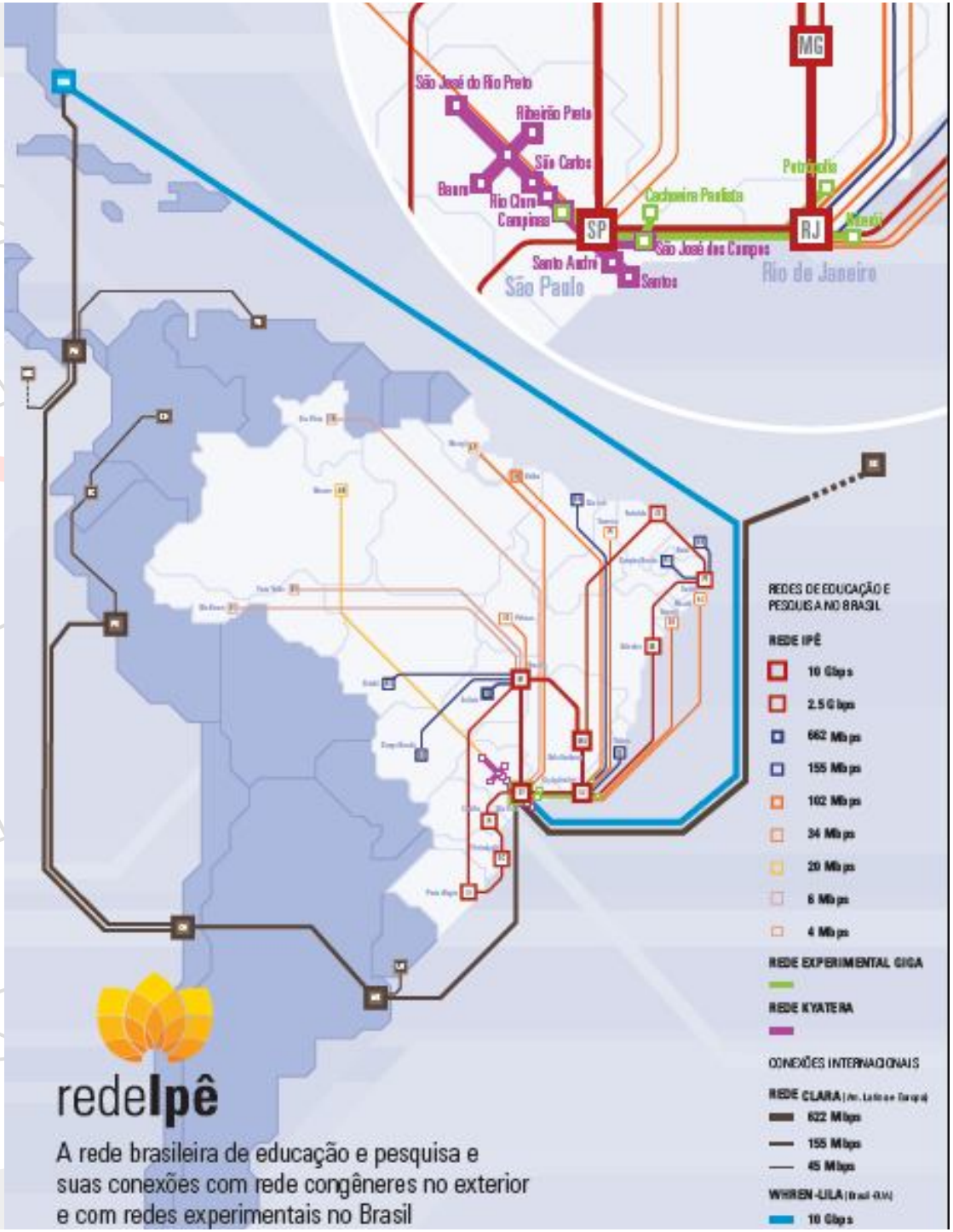
Possible Fibre Links
South America

South America possibilities

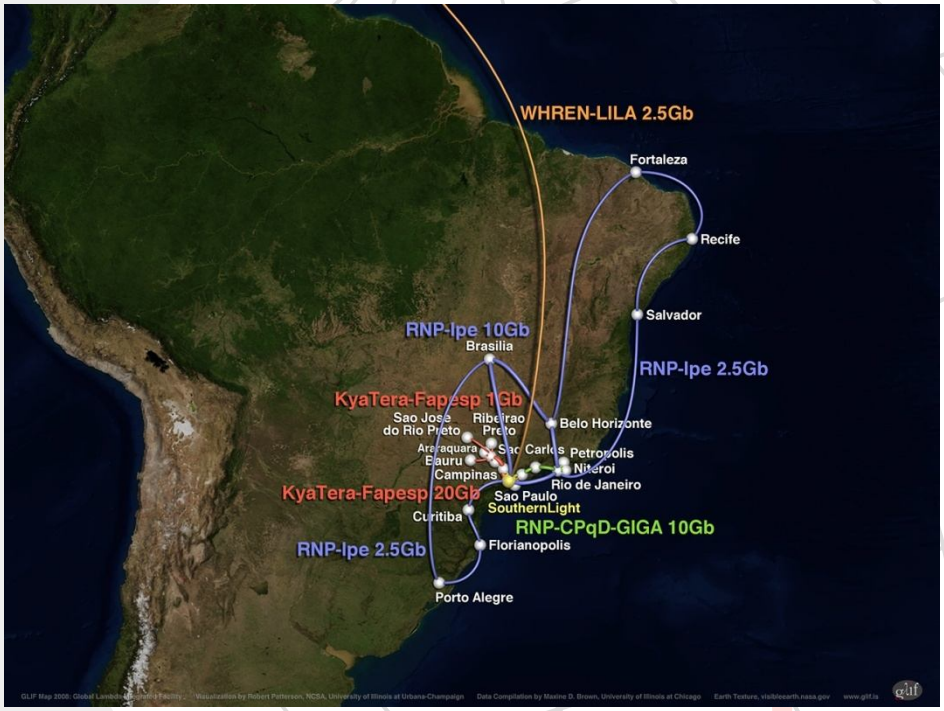
- Andean subregion (Venezuela, Colombia, Ecuador, Peru, Bolivia):
  - integration of electrical transmission systems
- Peru – Northern Chile
  - international interest in access to radio and optical astronomical observatories in northern Chile
- Argentina – Brazil
  - possible joint investment in existing fibre
- Uruguay – Brazil
  - integration of electrical transmission systems
- Paraguay – Brazil
  - collaboration with Itaipu binational hydroelectric scheme

Brazilian networks

- Brazil currently has the most developed internal networks of any LA country
  - RNP backbone (up to 10G links)
  - KyaTera in S. Paulo state
  - GIGA testbed
- External links
  - US (WHREN-LILA)
  - EU (RedCLARA)



Brazil on the GLIF map



SouthernLight GOLE in São Paulo

Source: *www.glif.is*

Upgrading WHREN link to Brazil

- Current WHREN-LILA link São Paulo – Miami
  - 2.5 Gbps capacity
  - NSF + FAPESP funding
  - shared by RedCLARA and Brazilian networks (RNP and ANSP)
- RNP and ANSP both buy int´l commodity transit from commercial provider (3.5 Gbps total)
- Future scheme (with assistance from LAUREN):
  - acquire fat pipe to US
  - purchase commodity transit in US (lower price)
  - increase capacity for research and education
- Plans:
  - upgrade current 2.5G to 10G in May, 2009 (FAPESP funding)
  - upgrade to 20G by July-August, 2009 (RNP funding)
- Results in 15 Gbps for R&E purposes, including RedCLARA

RedCLARA2 tender
(under EC rules)

- Published in 2009, to be opened May 4th
- Proposals were requested both for facilities, which are preferred, and leased circuits of several capacities per link (due to uncertainty over pricing)
- The new network will be built by a mixture of both kinds of links, with the possibility of some leased links being retendered after 1 or 2 years
- The topology should be similar to the present topology, with some new terrestrial links in the Andean subregion
- Submarine links sought within the region and to GEANT
- Final topology/capacities/technology to be determined

Future connectivity services

- Currently:
  - RedCLARA provides a MPLS-capable IP network
  - The Brazilian networks provide a mixture of level 2 (Ethernet) and level 3 (MPLS + IP)
    - experimenting with dynamic circuits
  - WHREN link to Brazil is a level 2 connection, which extends Atlantic Wave southwards
- Future intentions:
  - adoption of hybrid packet-circuit networking in all “high capacity” links (greater than 1 Gbps)
  - extension of GLIF to Argentina and Chile
  - adoption of dynamic circuits ASAP
  - CLARA is also interested in buying bulk commodity transit outside the region for NREN use (as being done in Brazil)

Support for R&D

- Domain sciences:
  - HEP/LHC
  - Astronomy (optical and e-VLBI)
  - Climate
  - Biomedical
  - ....
- International grid initiatives
- Future Internet Architectures
  - collaboration with GENI, FIRE and similar testbed initiatives

Questions?

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