

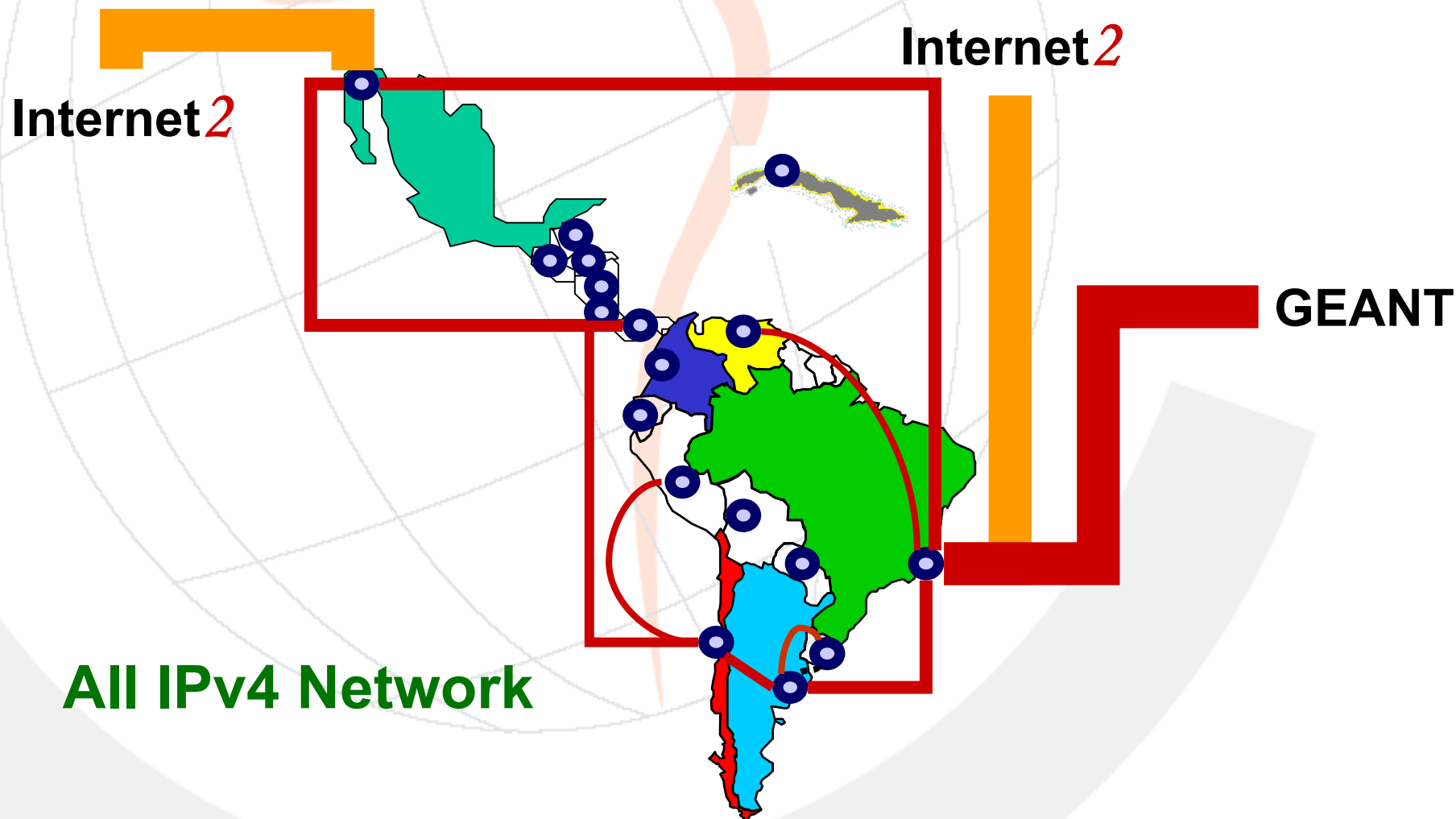


# Hybrid Networking in Latin America

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*Executive Director of CLARA*  
*June 4, 2005*



# RedCLARA as of May 2005





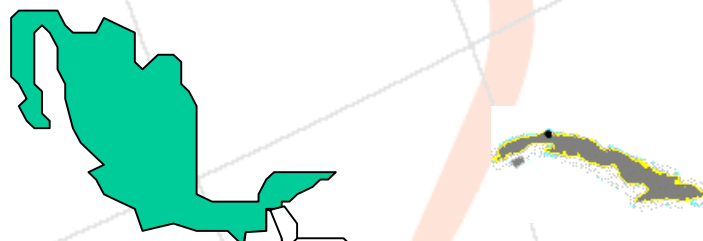
## Background on Telecom Operators in LA

- Most operator networks in Latin America are still using PDH or SDH/SONET for their production networks
- In few countries: Argentina, Brasil, Chile, Mexico, there exists a DWDM network installed to provide services
- No “lambda” services available
- Regulations do not allow anyone to operate its own network in most countries

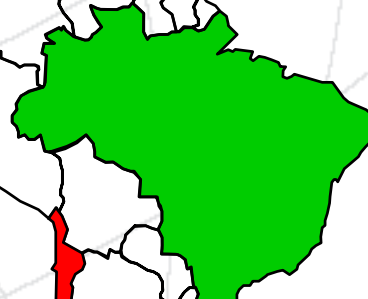


# Optical Experiences in LA

LILA Link



Project GIGA



WDM Project





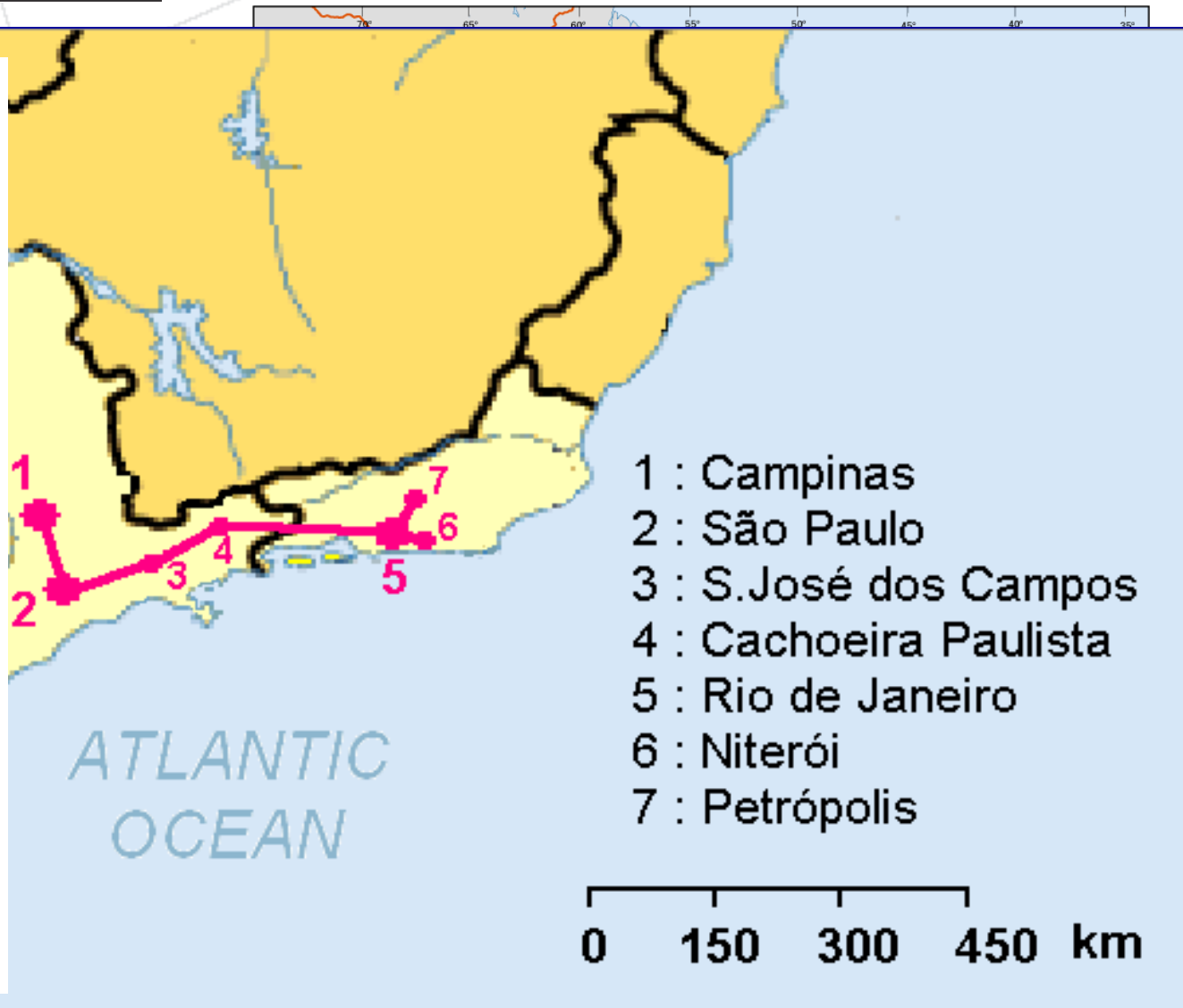
# **GIGA Testbed Network - objectives**

- **explore user control of optical fibre infrastructure**
  - **interconnect 20 academic R&D centres in S.E. Brazil**
  - **use of IP/WDM with Ethernet framing**
- **provide Networking Research Testbed (NRT) for optical and IP network development**
- **provide Experimental Infrastructure Network (EIN) for development and demonstration of applications**

**(NRT and EIN are terms defined by NSF in 2002)**

**Network was inaugurated in May 2004**

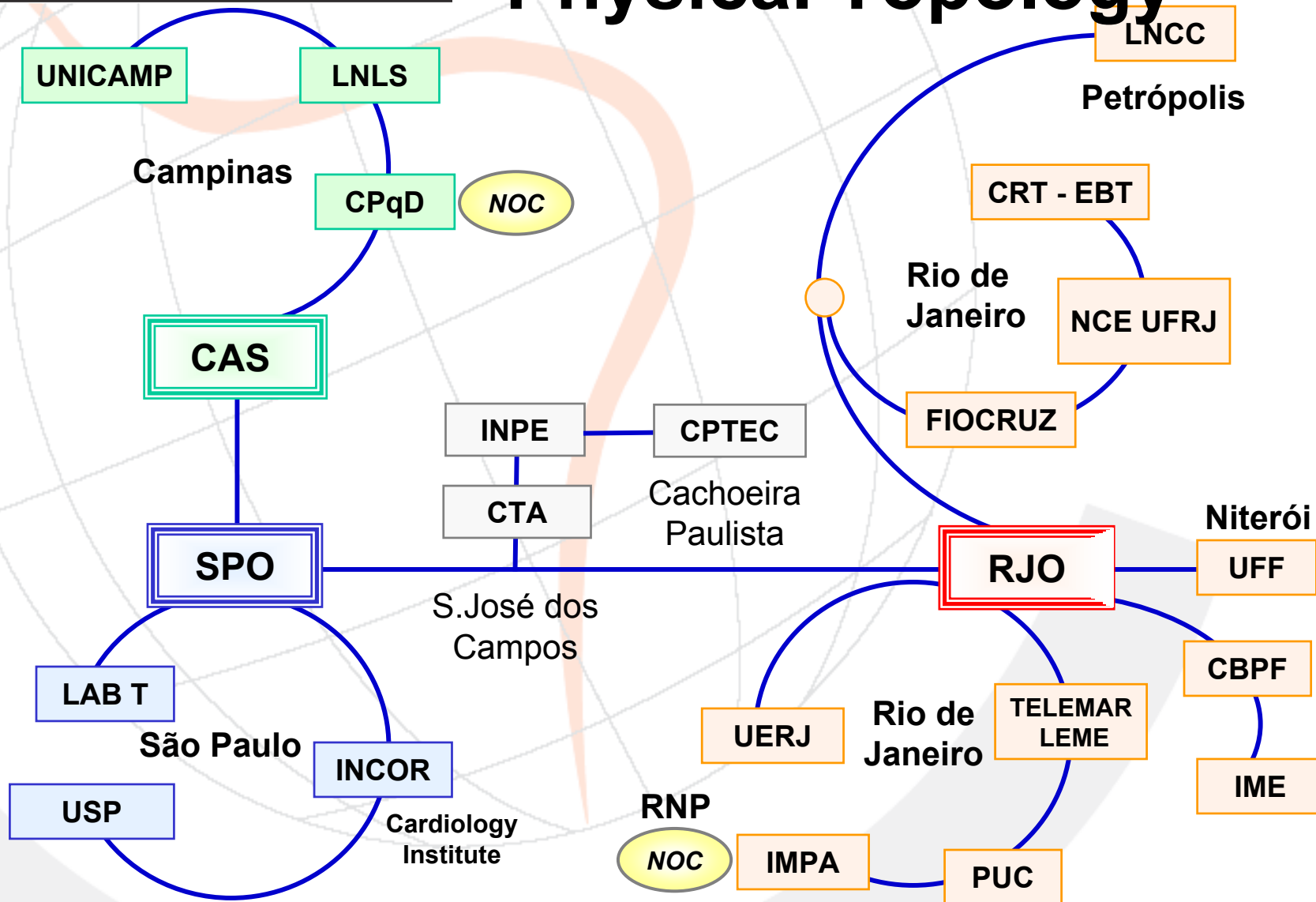
- Universities**
- FIME
  - PUC-Rio
  - PUC-Campinas
  - UERJ
  - UFF
  - UFRJ
  - Mackenzie
  - UNICAMP
  - USP
- R&D Centres**
- CBPF
  - CPqD
  - CPTEC
  - INCOR
  - CTA
  - FIOCRUZ
  - IMPA
  - INPE
  - LNCC
  - LNILS



- 1 : Campinas
- 2 : São Paulo
- 3 : S. José dos Campos
- 4 : Cachoeira Paulista
- 5 : Rio de Janeiro
- 6 : Niterói
- 7 : Petrópolis



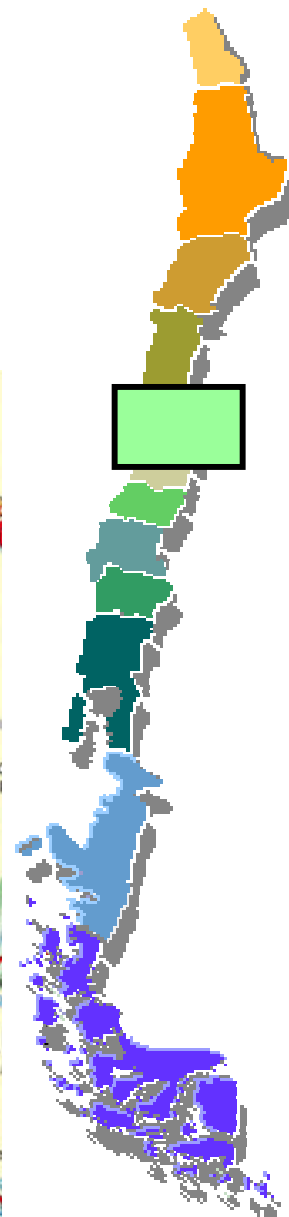
# GIGA Network: Physical Topology



NOC – Network Operation Center



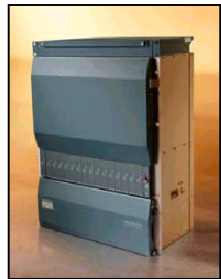
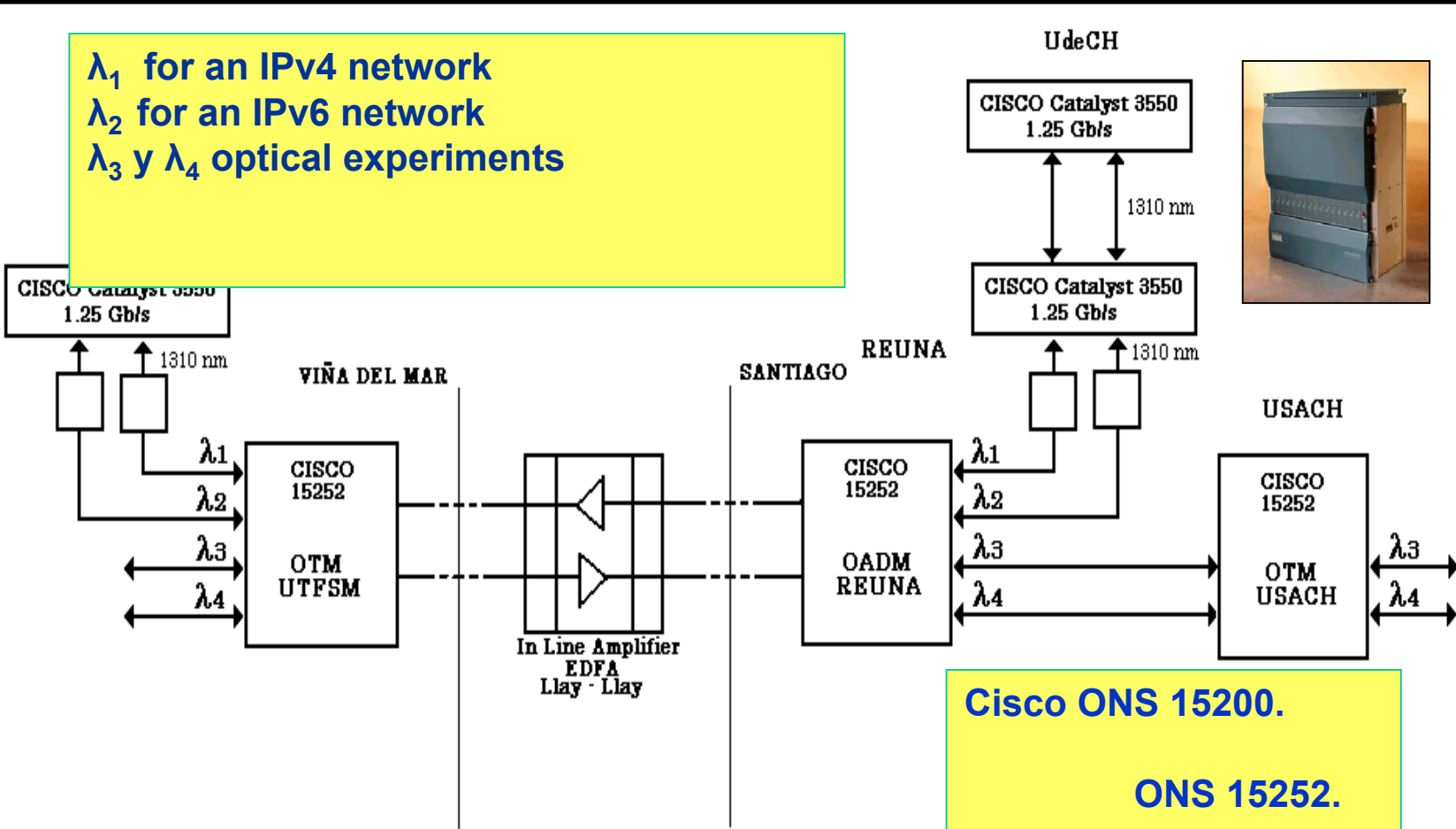
# REUNA's WDM Project: 4x2,5 Gbps





## Use of the $\lambda$ 's

$\lambda_1$  for an IPv4 network  
 $\lambda_2$  for an IPv6 network  
 $\lambda_3$  y  $\lambda_4$  optical experiments



Viña del Mar - Quillota 58 Km  
 Quillota - Llay Llay 40 Km  
 Llay Llay - Santiago 108 Km

**Cisco ONS 15200.**  
**ONS 15252.**  
**ONS 15216.**

**DWDM Technology**

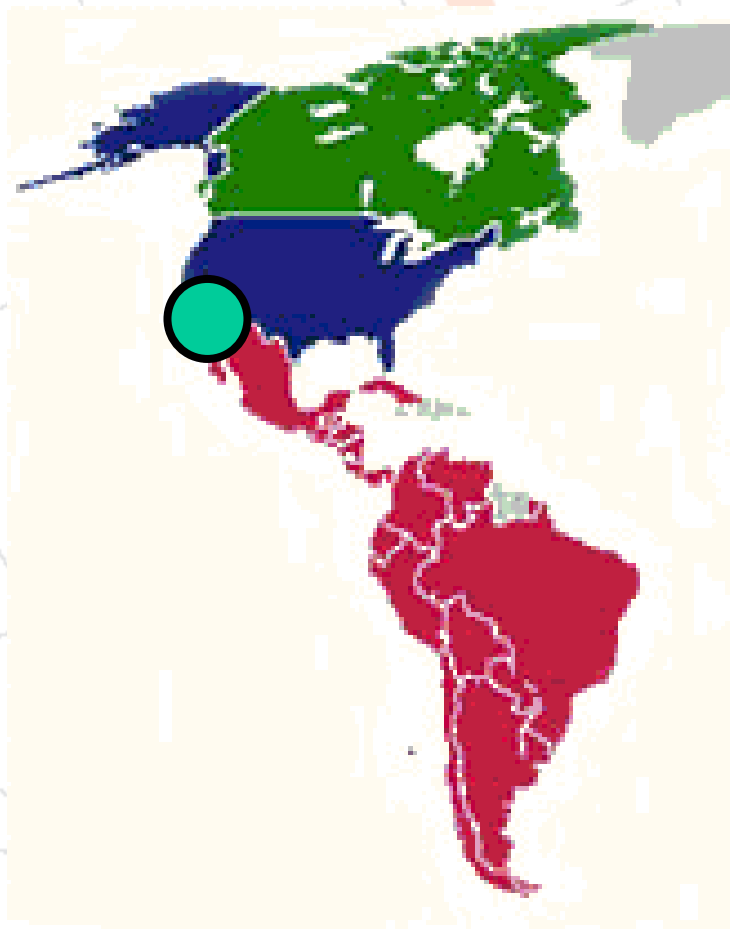


## Phases of G-REUNA

- **Phase I: Prototype March 2002-July 2003**
  - Funded by FONDEF-Manquehue Net-ChileSat-Cisco
- **Phase II: First Part of Backbone August 2003-December 2003**
  - Funding FONDEF – Telecom Operator
- **Phase III: Full Backbone Deployment January 2005-July 2005**
  - Funding MECESup – Telecom Operator
  - Under discussion 2  $\lambda$ 's under consideration, one for IP services, the other for experimentation.



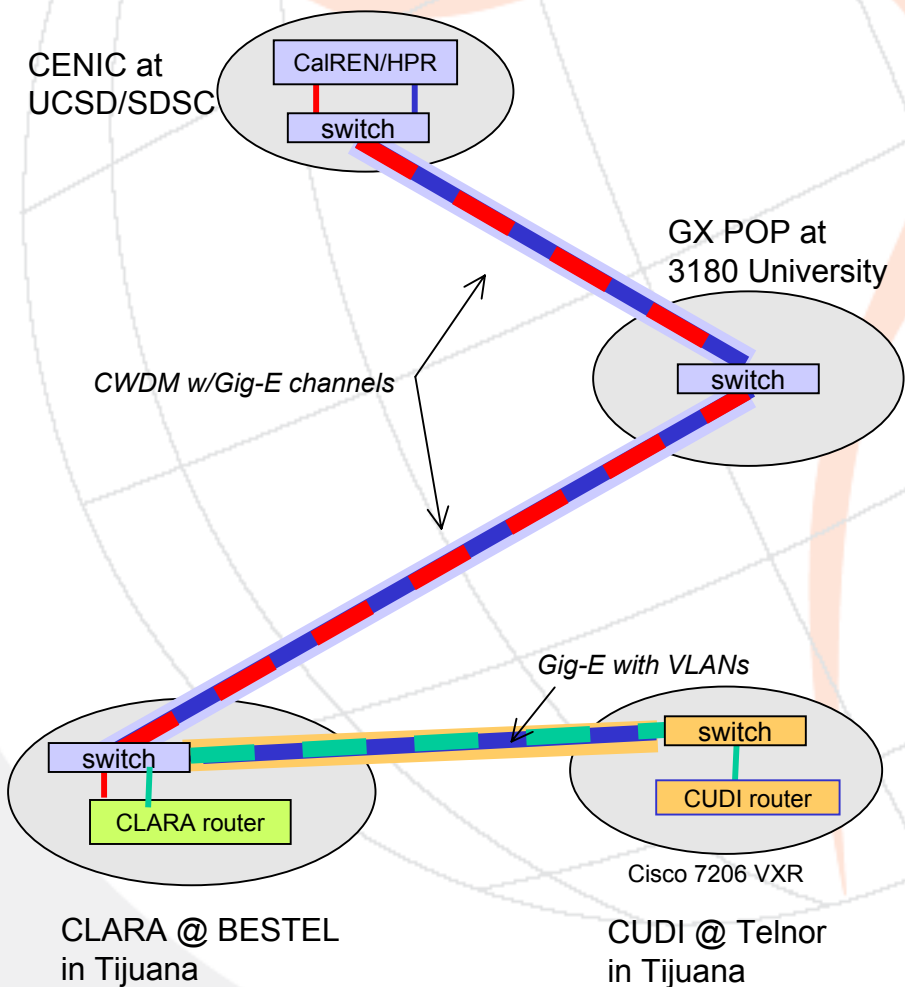
# The Tijuana-San Diego LILA Link



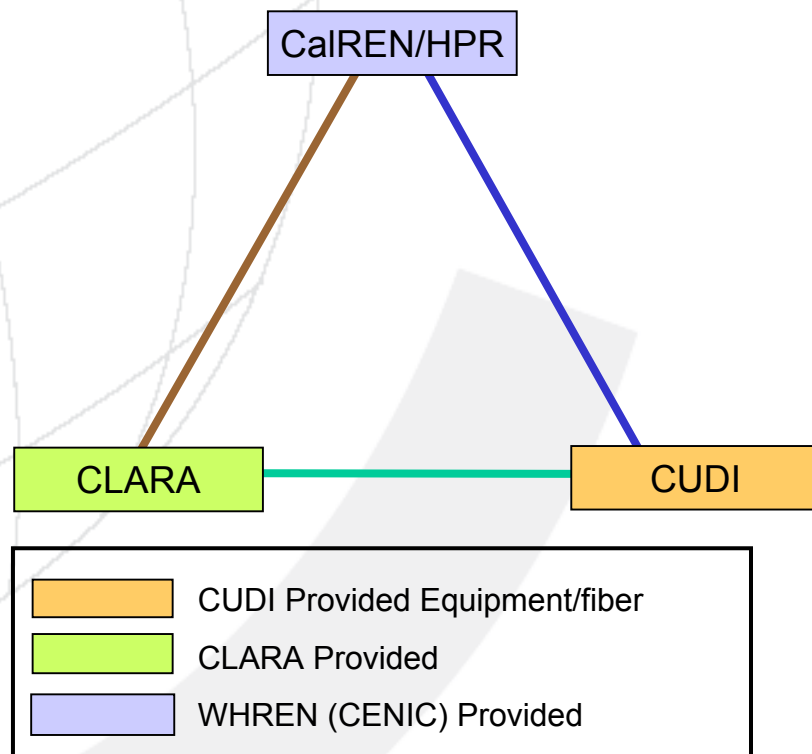


# Tijuana-San Diego RedCLARA-CENIC Optical Connection

## Physical Diagram



## Logical Diagram





## Oportunities

- Large infrastructure projects:
  - Power lines interconnection accross borders
  - Gas pipes in deployment
  - New roads
- IADB Promoted IIRSA Initiative (Integration of Regional Infrastructure accross South America)
- Agreements have been reached in Brasil
- Argentina-Chile fiber is currently being negotiated by RETINA-REUNA-CLARA
- Dark fiber is an oportunity to strengthen the RedCLARA backbone
- Regulatory issues will be hard to solve in some countries