Prepare the connection between the RENATER nodes (NR) and the users

Nicolas QUINTIN, LPL

Outline

- Get and share information
- Work out the end-user link
- Get equipments

REFIMEVE+ signal

Metrological laser signal at 1542 nm

Power from 1 µW to 100 µW

Frequency stability ≈ 10^{-14} @ 1 s (full BW)

Frequency accuracy ≈ 10^{-13}

better on demand to SYRTE

This stability is debased after propagation !

Main effect : thermal effect, 34 fs/K/m

Fiber noise DSP : 10^{-1}-100 rad²/Hz/km @ 1 s

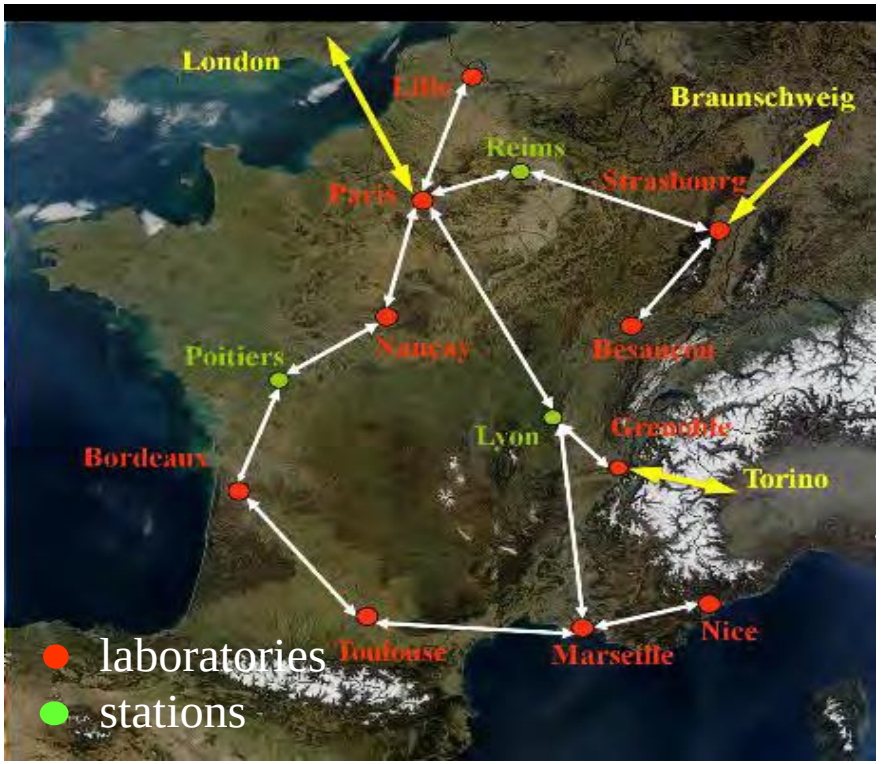
See Anne AMY-KLEIN *"How to use the metrological signal amplification and optical comb control", Kick-off meeting REFIMEVE,* 27/05/2013

Get in touch with the project

The REFIMEVE signal is
- **bi-directional**
at the center of ITU 44

- **not modulated at all**
no FM/AM/PM

Data is the frequency of the laser itself

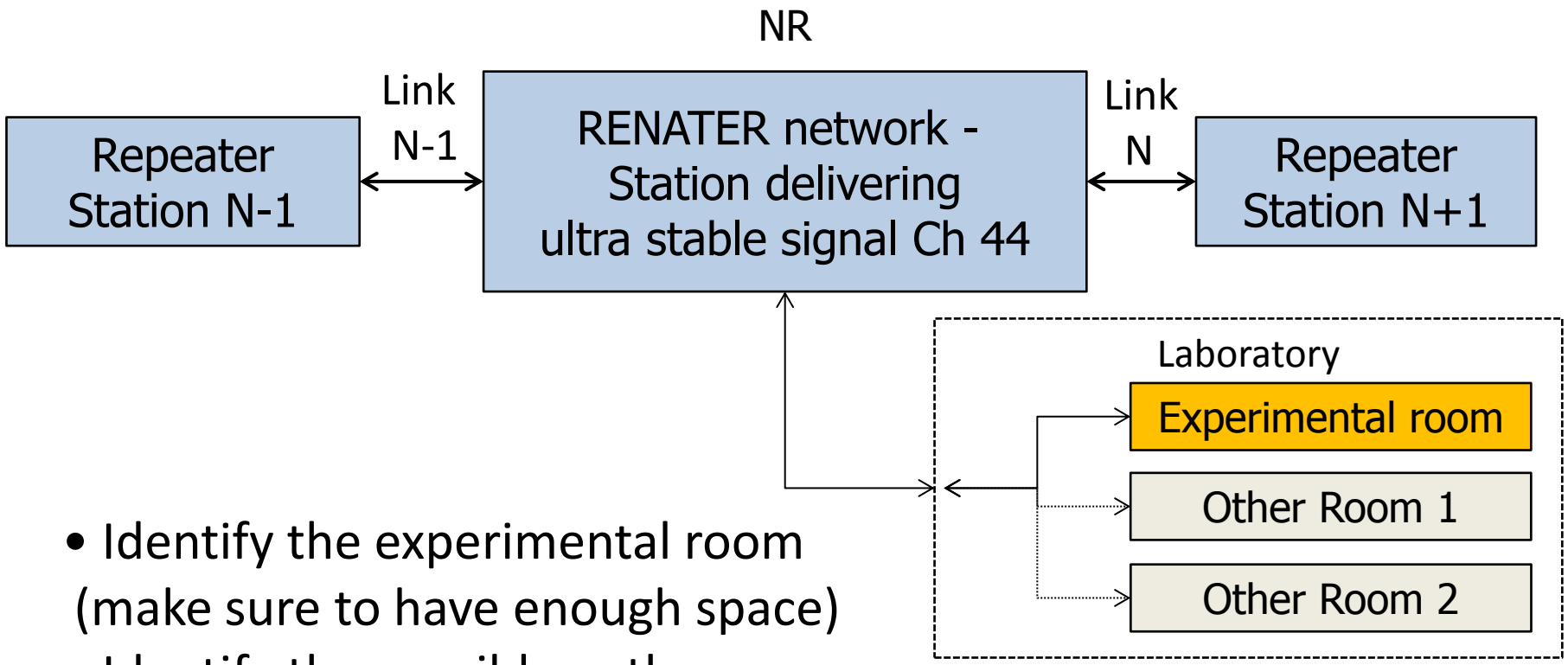


REFIMEVE signal is carried on RENATER, up to the nodes.
The end user must connect itself to the node

First : get in touch with the IT Ressource Center

carbon copy Nicolas Quintin (LPL)

Connection between the laboratory and the RENATER Node



- Identify the experimental room (make sure to have enough space)
- Identify the possible path

Work out the end-user link

- *Type of fibers*

SMF28 (G.652) already installed:

- Number of fiber(s) (must have at least one fiber)
- The availability of the 44th channel (1542.14nm)
- Connectors' type
- Attenuation and PMD
- Length of the fiber
- Number of connectors
- Number of fiber splice (spurious reflections)...

If not, work out two single mode fibers, with minimum PMD, losses, splices, temperature sensitivity, as much as possible...

Inquiries

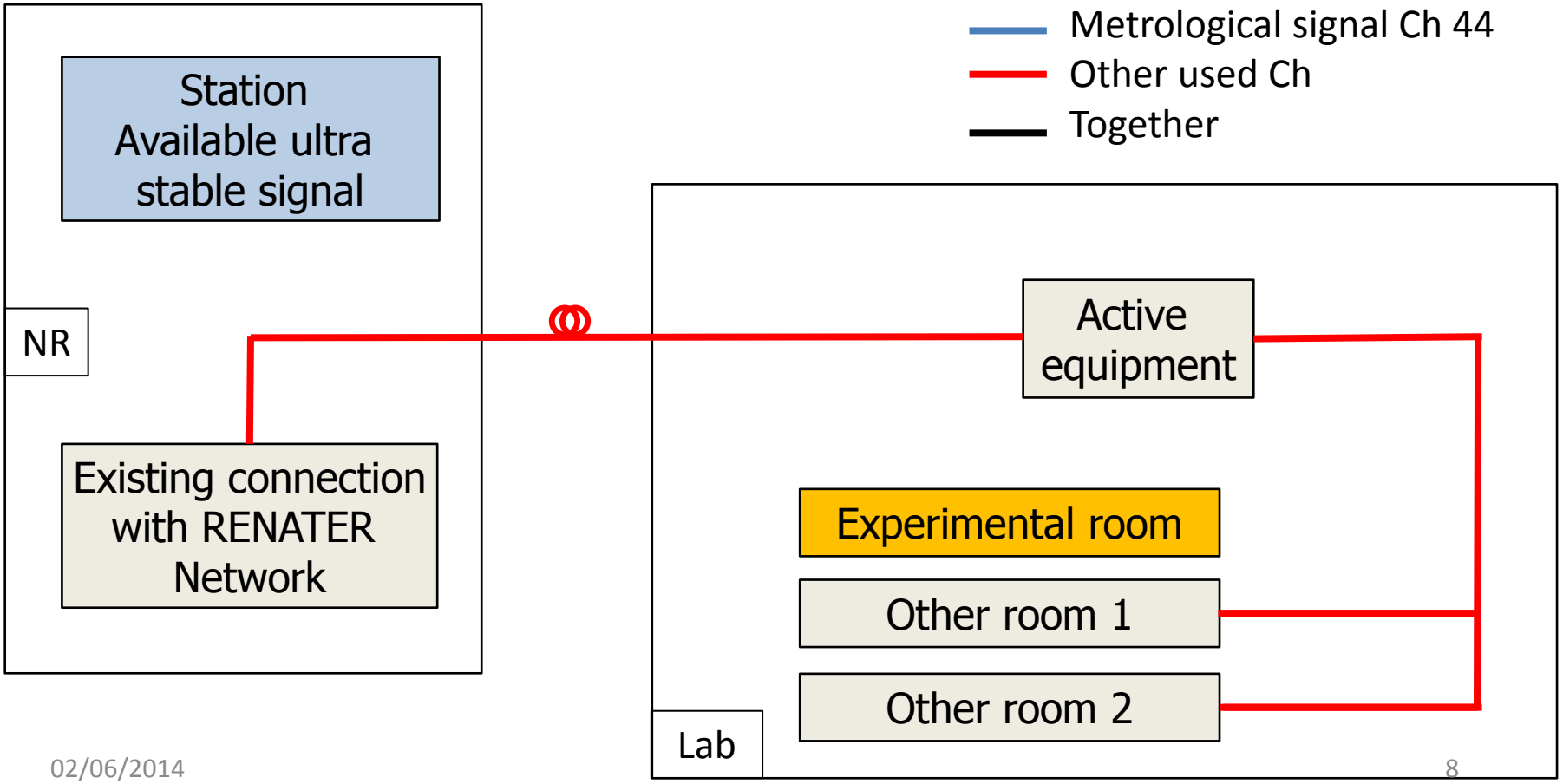
➢ *Check equipment on the link*

- Detail the presence of active or passive equipment:
  - switches,
  - routers,
  - telecom unidirectional amplifiers…
- If some are presents, you will have to by-pass them

Configuration needed to transfer the signal

➢ *By-pass the equipment*

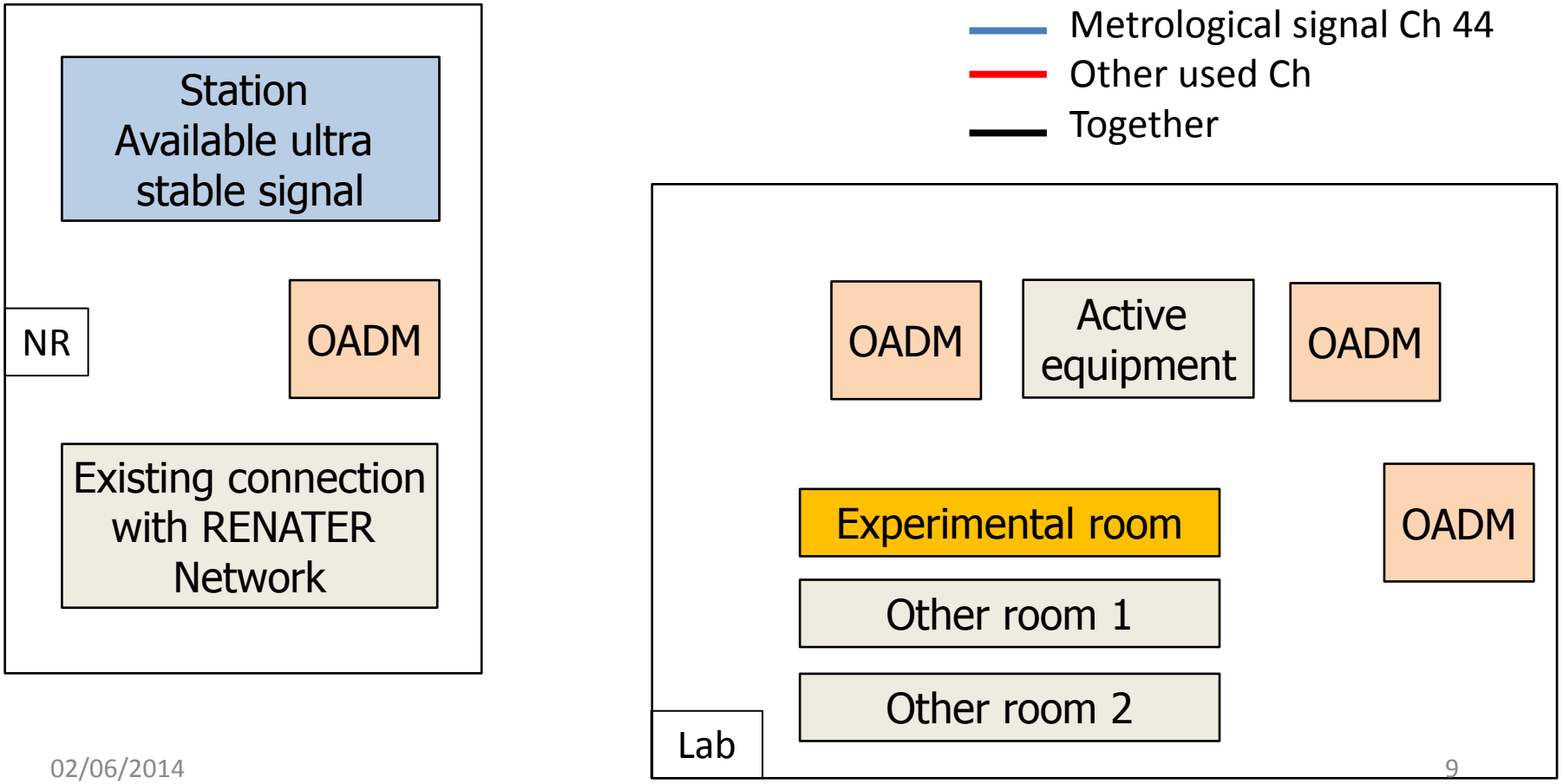
Operational link:



Configuration needed to transfer the signal

- *By-pass the equipment*

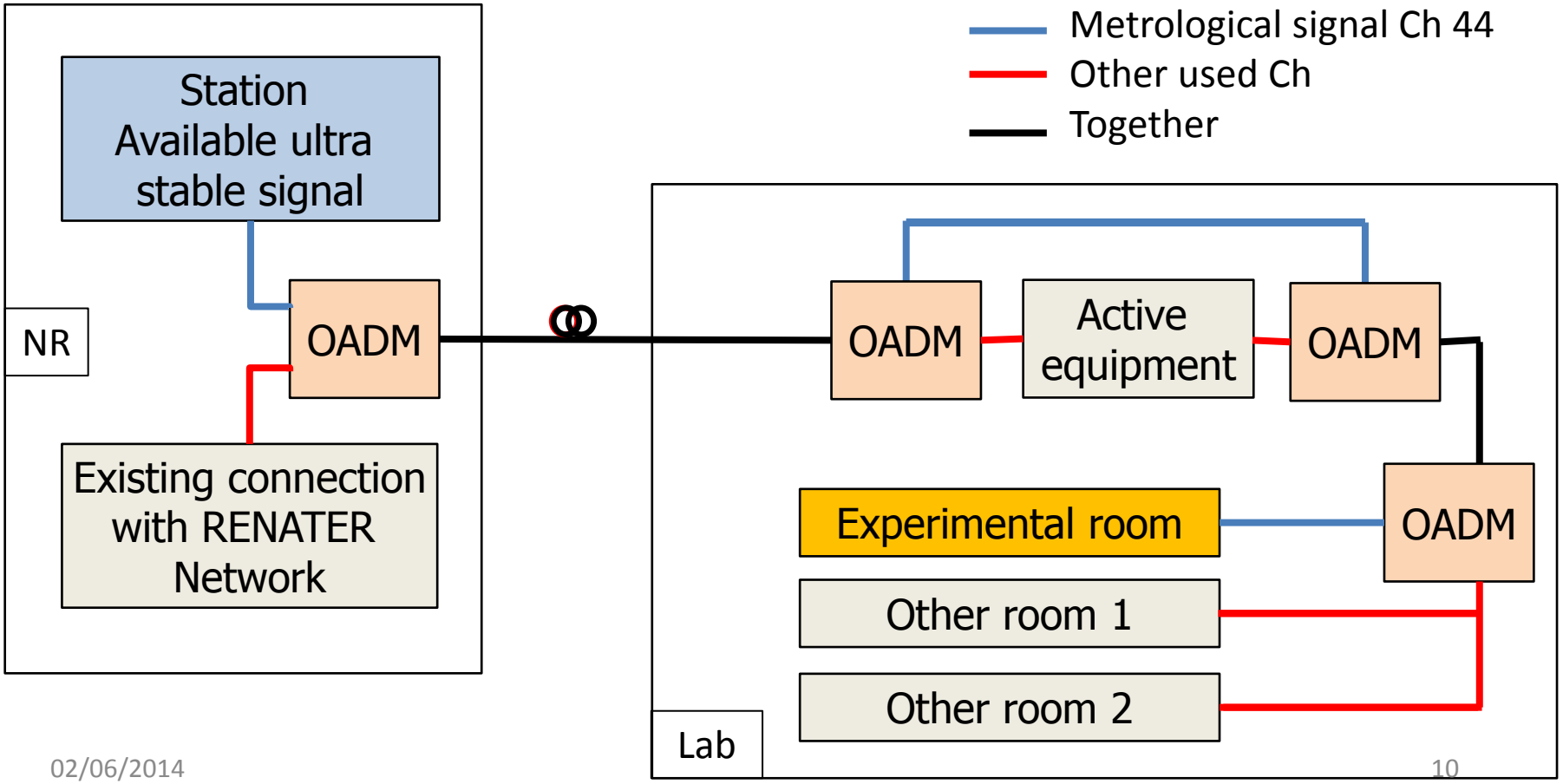
Operational link:



Configuration needed to transfer the signal

➢ *By-pass the equipment*

Operational link:



End user interferometer

➢ *Setup to send back the signal*

Equip yourself with an interferometer at the end of the link:

- 50x50 coupler,
- a Faraday mirror
- a photodiode,
- an acousto-optic modulator @40 MHz and its amplified frequency driver

- If need : Amplifiers/RIO lasers, frequency synthesizers, trackings, PLL, counters, spectrum analyzers...
- Frequency comb: takes time...
- For stringent applications, please contact REFIMEVE core team

Outlook

To do list to prepare the arrival of the signal:

1. Existence of the link between the laboratory and the nearest NR

Get in touch with your IT ressource center + N. Quintin (LPL) and E. Camisard (RENATER)

2.Get specifications

- Number of fibers
- Attenuation
- Length
- Active/passive equipment

3. Buy the needed equipment

- OADMs
- Interferometer

Thank you for your attention