

Network Infrastructure for radio astronomy in Italy

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Last Mile(s) connections

Starting point (3^e e-VIbi - Tokyo 2004)

Medicina (Inaf): 40 Km from Bologna

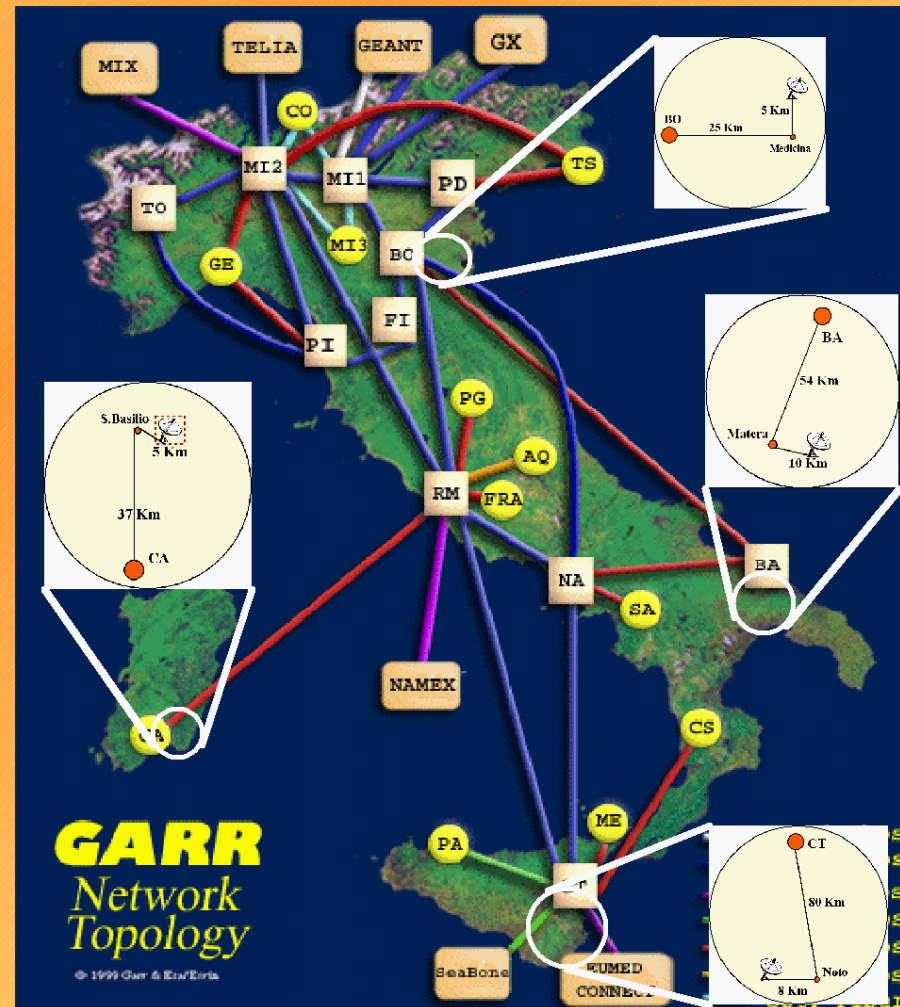
Noto (Inaf): 90 Km from Catania

SRT (Inaf): 40 Km from Cagliari

Matera(Asi): 65 Km from Bari

More than 150 miles of cables

... but more problems was present ...



Mc - Medicina



December 2005 :
*Connected by "Lepida"
Regional Network*

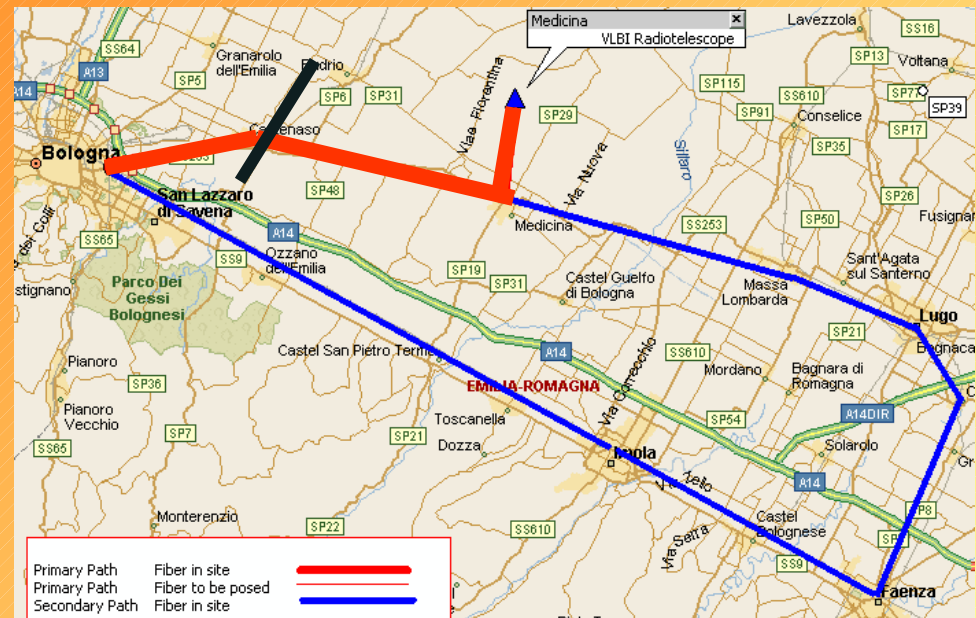
*Long path (120 Km.) with a
repeater in the middle.*

Was not a "dark fiber" !

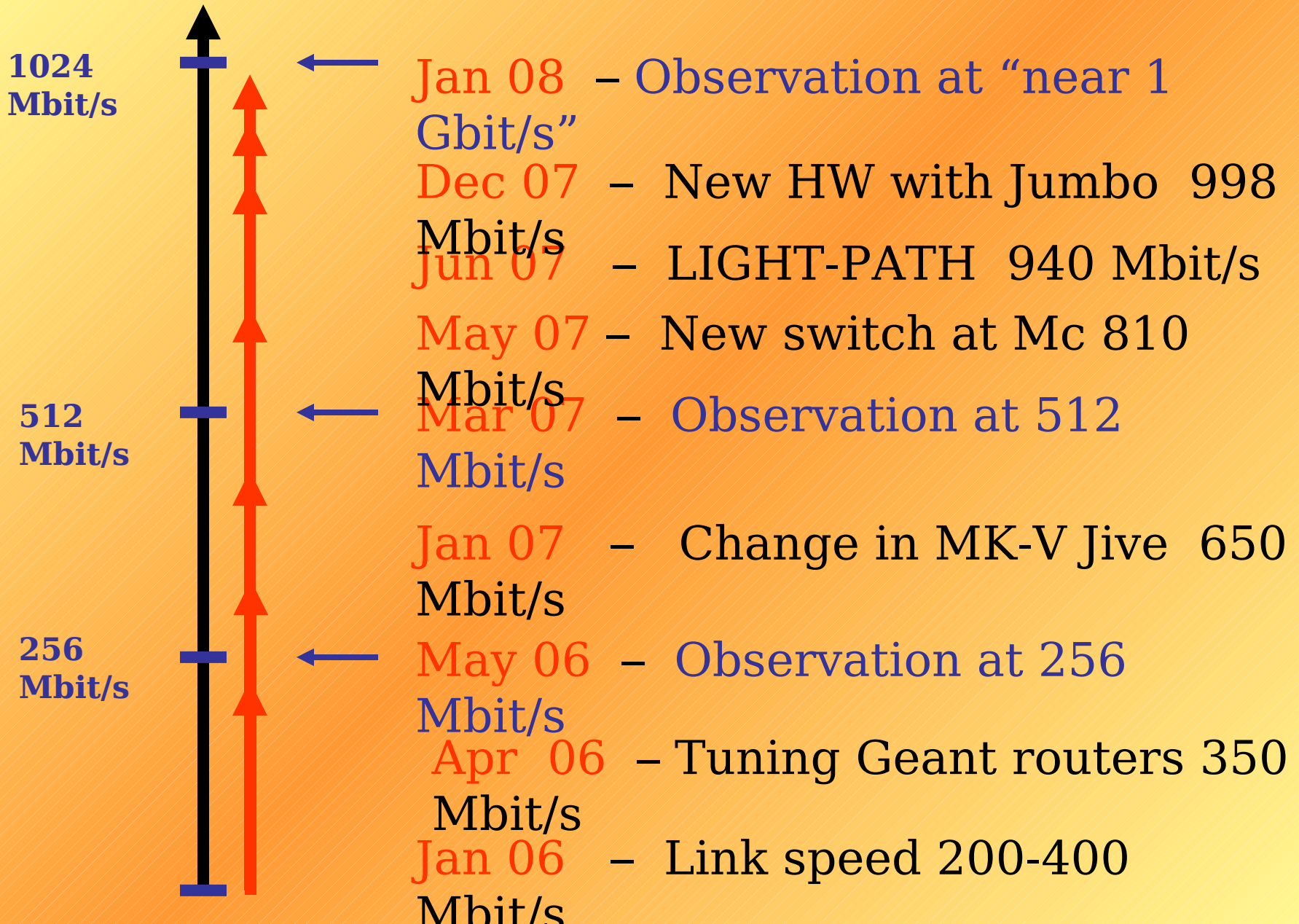
April 2009 : *Crossed
the railroad !*

Now "Dark fiber"

*We are acquiring
10Gbit/s transceivers*



Medicina-Jive: speed evolution



Nt - Noto

Agreement with the INFN Nemo Project in the south of Sicily

For many years was difficult to have information about the optical fibers present in the island

Last year we discover the TOP SECRET MAP !

And the project of the RAN



Two operators offer fiber connection. Economical tender for IRU is open (250-500 KEuro ?). We need regional help

SRT - Sardinia

Work in progress

Regional Order 18-3-2008

” The Region allocates 2 M Euro for the

implementation of the
From **April 2009** a
network of research”

couple 2.5 G lambda from island to continent on Telecom cable.



The **JANNA project** will connect Sardinia with Sicily and continent with two undersea cables

Expected (promised) link SRT-CA at the end of 2010

From GARR-G to GARR-X

GARR-X is the Project for the GARR network evolution in the next (at least) 6 years

The GARR-X network implementation starts at the end of this year (GARR-X Phase 0)

The transition from GARR-G network to the new infrastructure will take place through a continuous process

Garr-X The key evolution factors

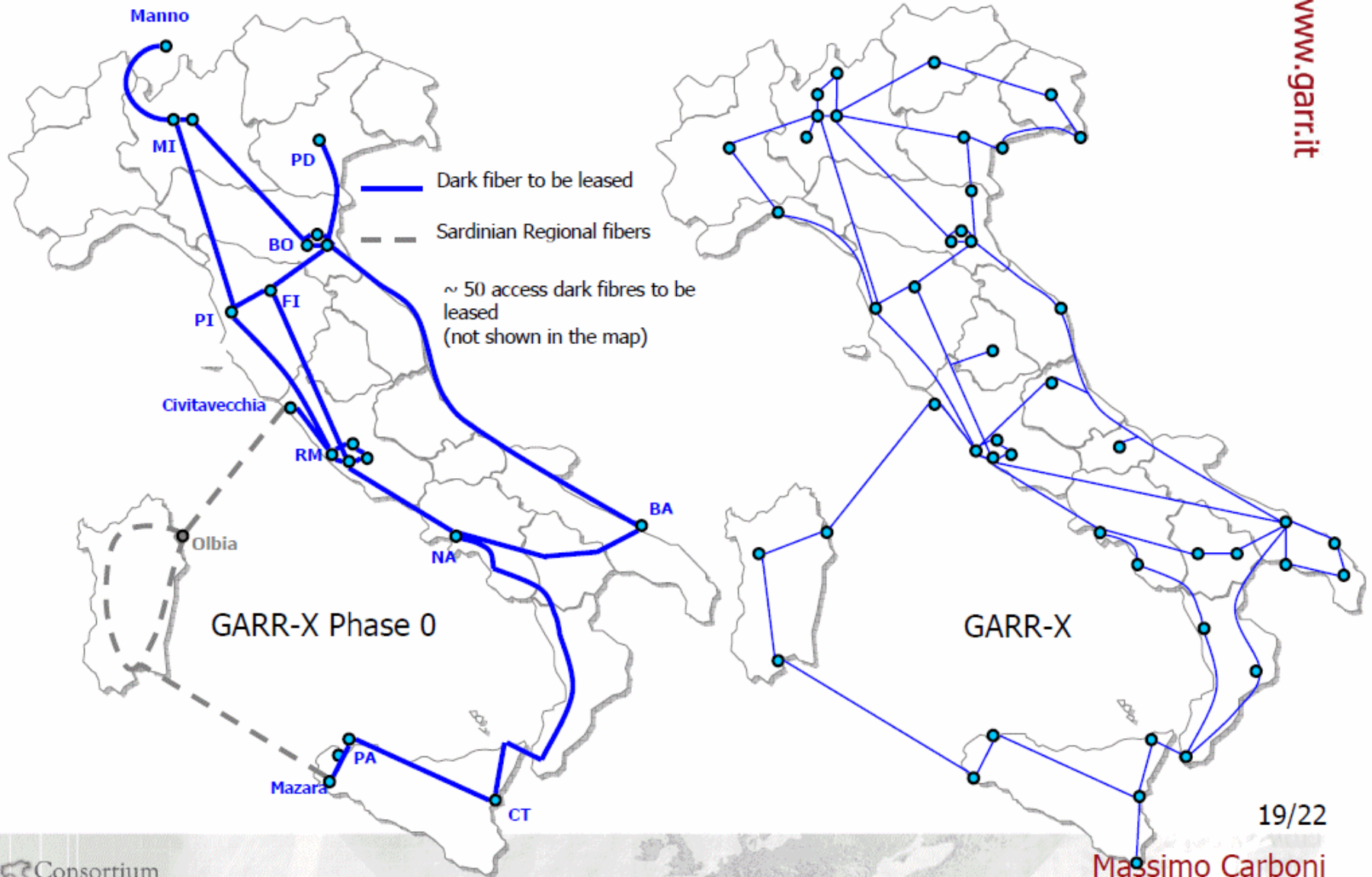
Long term leasing of optical fibres (both for backbone and access) under the exclusive control of GARR

Acquiring and installing new generation equipments
(router and photonic)

- High level of reconfiguration
- Multi lambda capacity on the same fibre pair
- (**10Gbit/s, 40Gbit/s, 100Gbit/s** when available)

The direct control and management of the whole network infrastructure (today only at IP level)

GARR-X-phase0: the dark fiber backbone topology



Garr-X Phase0

Budget: 27 M Euro to connect 40% of sites

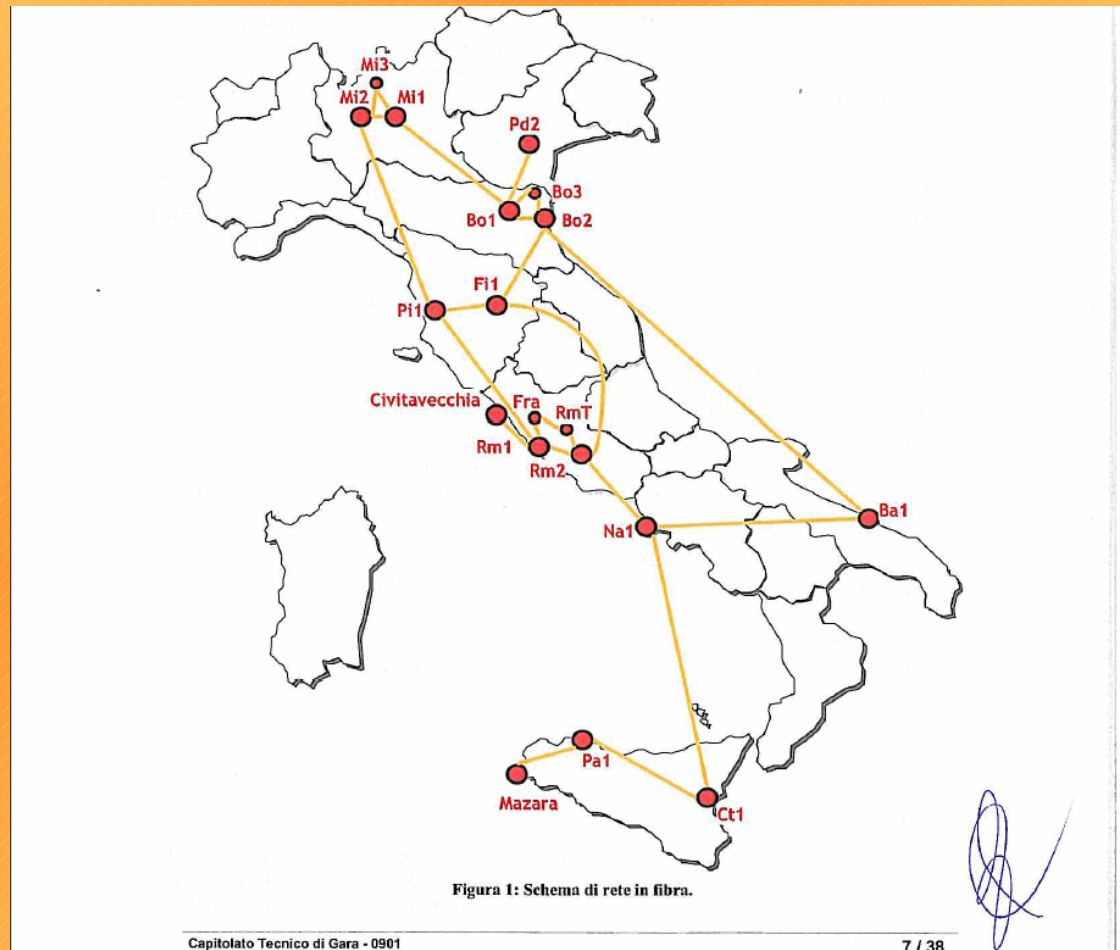
Tender starts

**February
2009**

Network set up

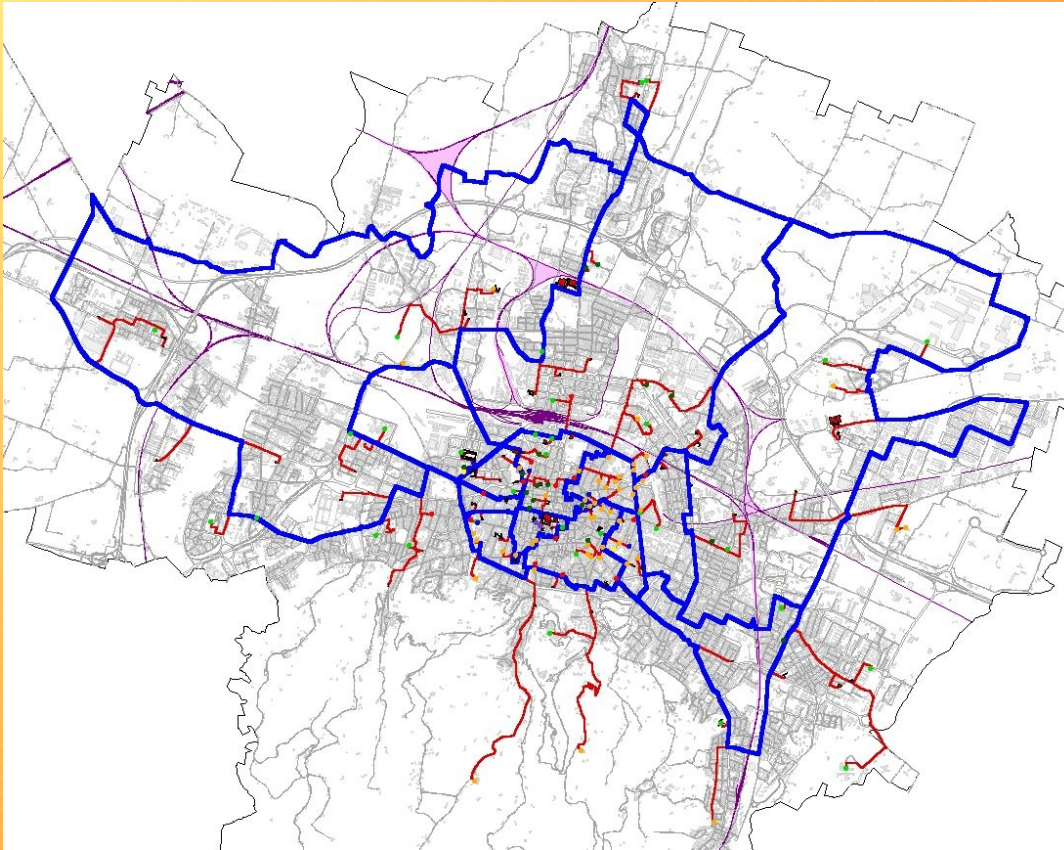
**Summer
2010**

3 POP in
Bologna



Lepida MAN in Bologna

Seven independent layers of dark fibers
33.000 Km of optical fiber, 150 Km tunnel (4.3 MEuro)



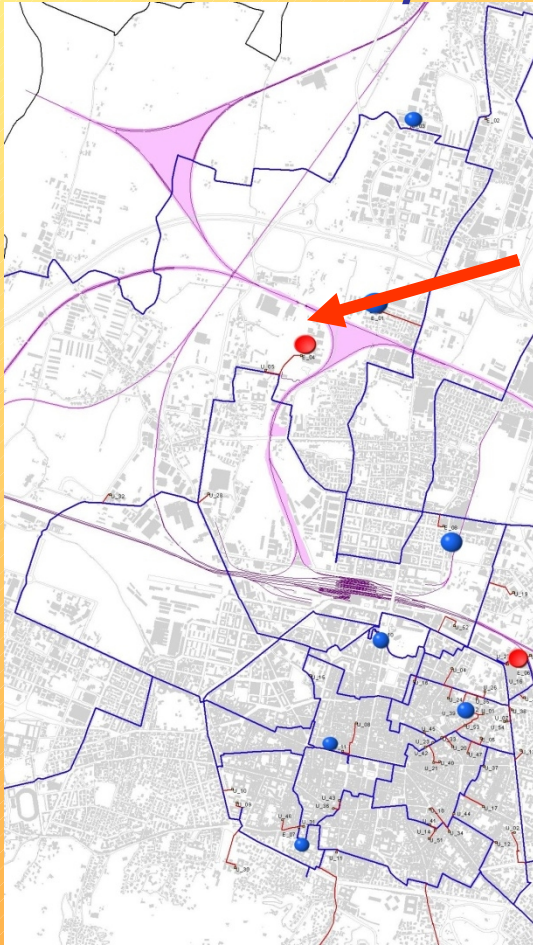
- Municipality and Schools
- Province
- Region
- Hospitals
- University
- Policy
- Research (Garr)

**More than 350
optical nodes**

Work in progress: Backbone ready in september,
peripheral links in summer 2010

With “Lepida MAN” a POP Garr at IRA

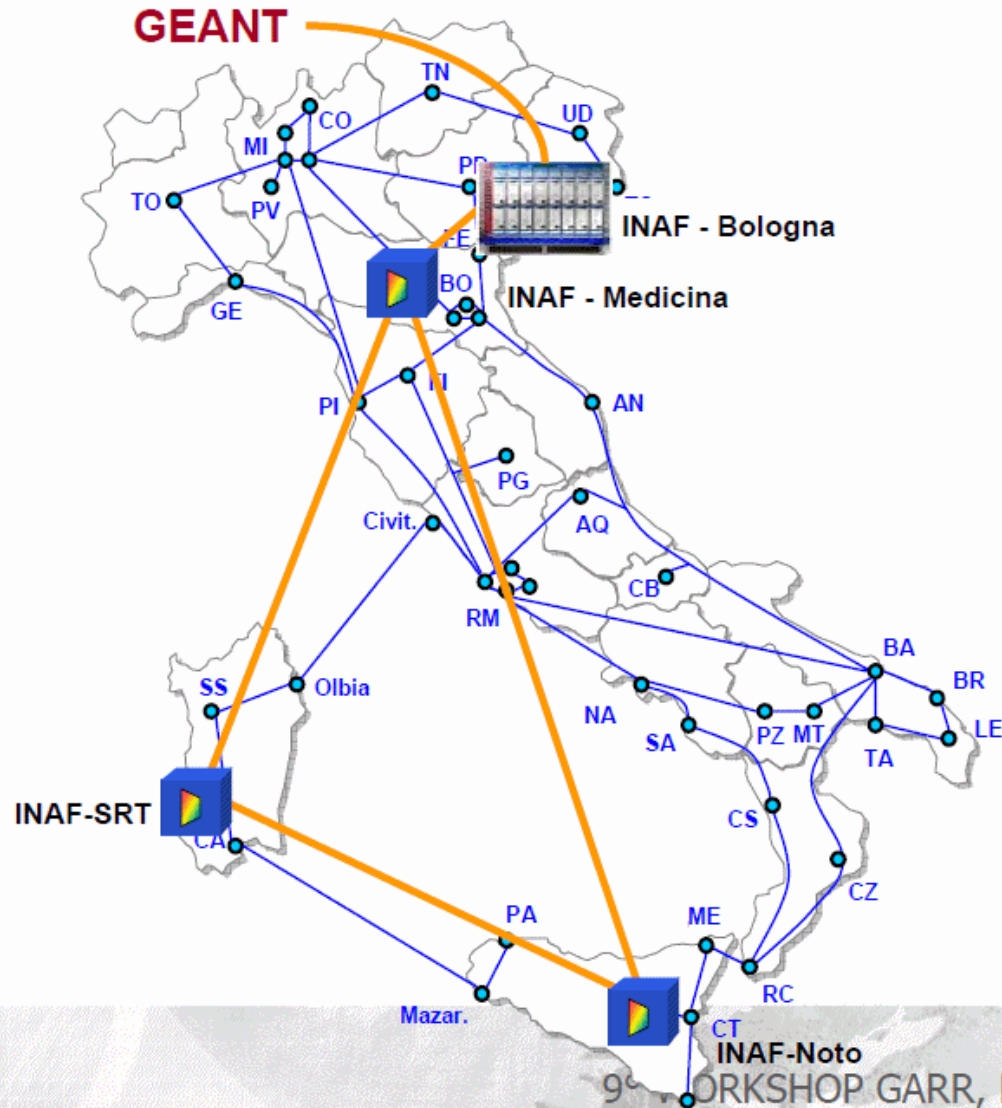
The CNR/INAF Campus will hosts a Garr POP



And we are ready !

INAF Radio astronomy OPN (eVLBI project)

www.garr.it



12/22

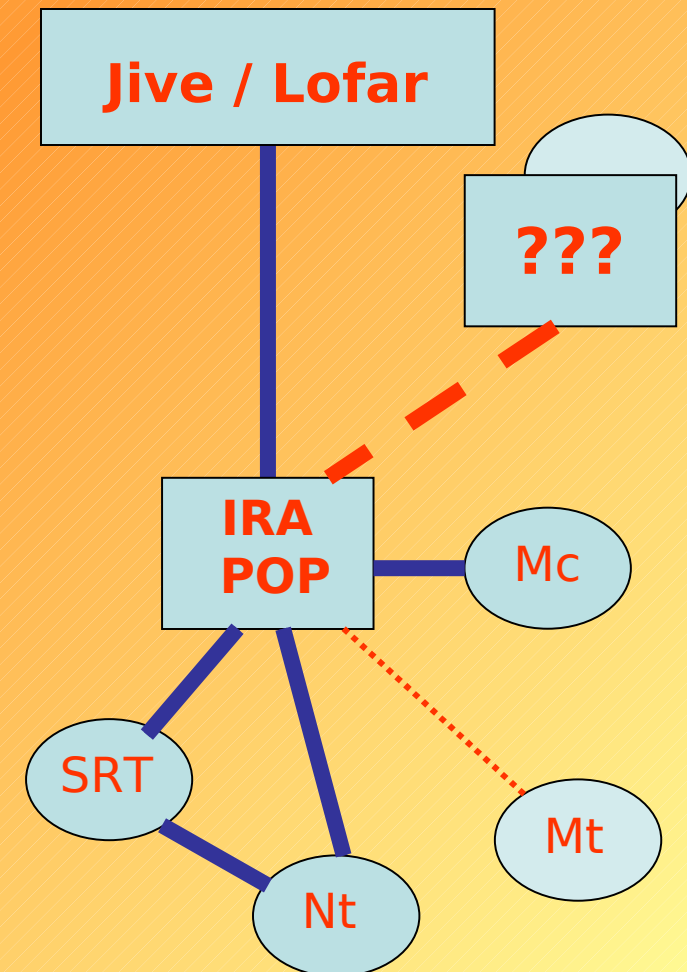
Annual costs of Optical Privat Network

Try to estimate with actual costs

Minimal Configuration

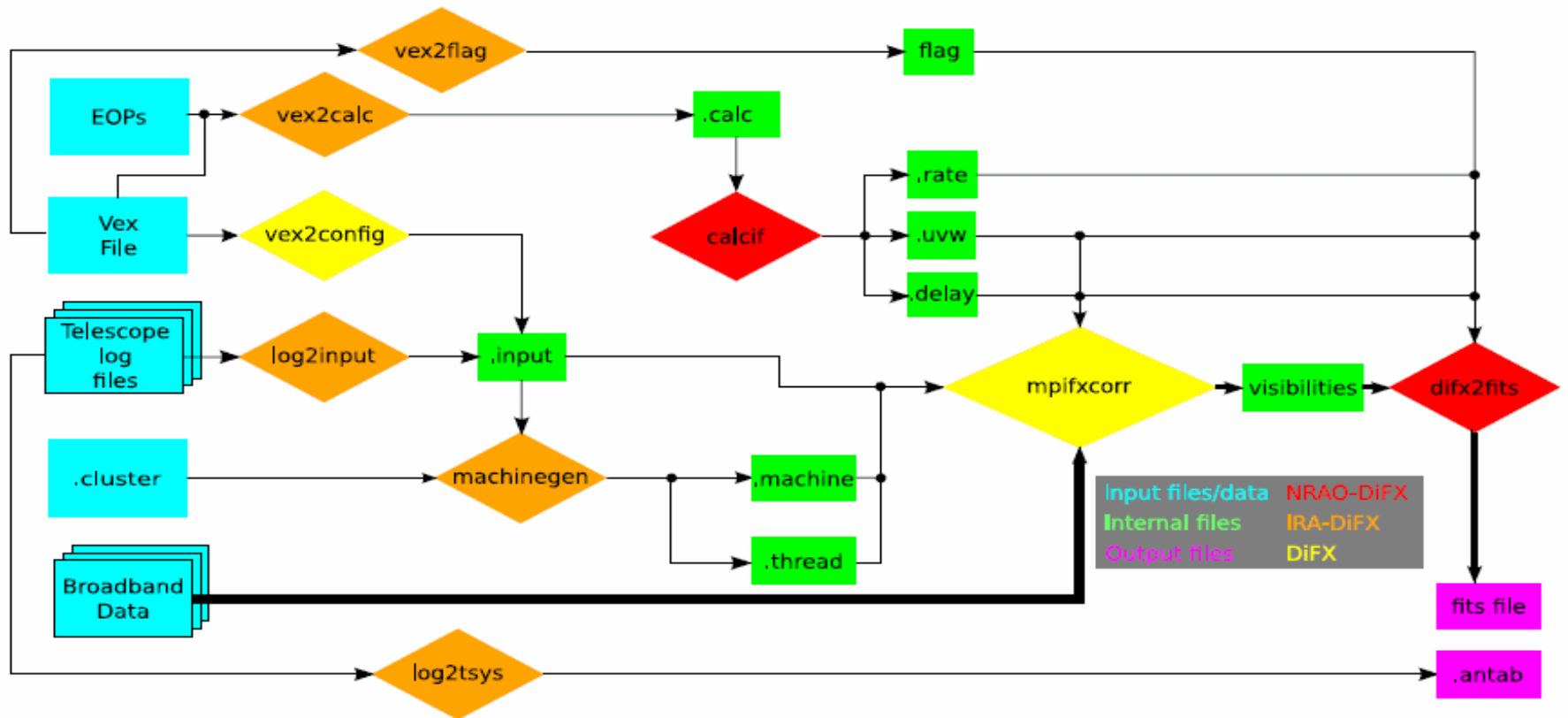
Link	Speed	K Euro
Ira – Jive/Lofar	10 G	50
Ira - Medicina	10 G	0
Ira – Noto	1 G	20
Ira - SRT	1 G	20

Others optical link “on demand” (costs not yet defined)
 200 KE /year for a 10 Gbit and complete loop network



A Correlator for the antennas in Italy ?

An Overview of the Software Correlator



John Morgan (Ph.D thesis) is involved in the world wide development of DiFX software

A Correlator for the antennas in Italy ?

**Hardware test of DiFX
in next weeks**

DELL Blade M1000

**(Get for Alma Regional
Center)**

12 Blades : 96 Cores AMD

10 Gbit internal switch

GPFS Filesystem

**We think that Infiniband is
better . . .**

**. . . but with 10 Gbit/s
we can create cluster on
the Optical Private
Network**



Conclusions:

Medicina is a member of e-EVN at 1Gbit/s

Matera: connected at 32Mbit/s.

In 2010 with Lepida MAN and Garr-X Phase 0
Ira-headquarters hosts POP of the optical network

Medicina at 10 Gbit/s for e-Vlbi and Lofar (?)
SRT at 1 Gbit/s by regional network.

Noto: Fibers are available. We get the costs.

In 2011-2012 with JANNA and Garr-X phase-1
SRT at 10 Gbit/s

NExpres is Welcome !!