



OVER 100 GBPS TO BRIDGE ITALY'S DIGITAL DIVIDE: THE GARR FIBER OPTIC NETWORK

In just two years, the GARR-X Progress project has built an infrastructure to extend and enhance GARR's research and education network. The project is supported by the Ministry of Education, University and Research, and aims not only to reduce the digital divide, but also to convert some Italian regions into real innovation laboratories. Funded with EUR 46.5 million with 5.5 million dedicated to

connecting schools, GARR-X Progress targeted Italy's Regions of Convergence, where the European indicators on competitiveness and technological innovation are below the EU average, considering that the regular use of the Internet is around 40% while the objectives of the European Digital Agenda are set at 75%. Thanks to the project, currently Southern Italy has a digital infrastructure more advanced than the

Picture
Claudia Battista,
Project
Coordinator,
GARR

rest of the country, with a backbone of about 4000 km with a transmission capacity at 100 Gbps and up to several Terabits, highly distributed across 4000 km and 24 Points of Presence (PoP) (restructured and strengthened to host the new network equipment provided by the project) and a new distributed computing and storage environment of 8,448 virtual CPUs with capacity of 10PB.

There are hundreds of locations involved, including universities, schools, research centers, academies, conservatories, biomedical research institutes and cultural institutions (including museums, archives and libraries) that will benefit from a network access up to 10 Gbps, bringing aggregate capacity to over 400 Gbps, which is more than four times the current value, and serving about 500000 users among researchers, teachers and students. Finally, the project also provides training courses on the use, enhancement and development of digital infrastructures for different users.

We spoke to Claudia Battista, project coordinator.

GARR-X Progress is a very ambitious project realized in a very short time ...

Exactly. GARR-X Progress has achieved something really concrete for Southern Italy with GARR fully involved to deliver important results. We set ourselves some ambitious goals, making the most of all the experience we gained in the deployment of the first fiber optic network, GARR-X, setting up a highly efficient organizational machine and building an infrastructure similar to GARR-X in terms of size and complexity in half the time compared to the original effort. We started with the planning of the infrastructure, proceeding then with the adaptation and setup of Points of Presence, the delivery of fibers, the activation of the transmission and IP / MPLS network equipment, and the installation of hardware and software for the computing and storage infrastructure.

What technologies did you use?

For the equipment of the transmission network, the public tender was won by the innovative Infinera "Intelligent Transport Network" technology, which can support multi-terabit optical transmissions. The technological solution we chose is also adopted by the GÉANT network and is characterized by the use of so-called super channels capable of carrying on a single pair of long distance optical fibers a capacity of 500 Gbps (up to an aggregate of 8 Tbps) and deliver services from 40 to 100 Gbps.

We purchased routers in technological continuity with of the GARR-X ones: Juniper MX960 and MX480 updated with network interfaces at 40/100 Gbps, which allow the creation of a ring at 100 Gbps between the 4 core points of presence of Naples, Bari, Catania and Palermo, and the creation of links from 10 to 40 Gbps for the other aggregation PoPs.

A distributed computing and storage infrastructure has been implemented on five sites, which we plan to interconnect at 40 Gbps to create a single distributed data center available to the whole community.

What does a project like this mean for Italy?

It means first of all that we bridge the digital divide between different regions of the country. The regions of Southern Italy will be well positioned for participation in national and European research programs and in view of Horizon2020, bringing an advantage to the entire nation. The availability of a collaborative environment made up of symmetrical links and a simple and secure access to ICT resources to handle large amounts of data, will support the active participation within the European Research Area; we believe this can give a strong impetus to attract talent, knowledge and skills also in the South.

In accordance with the objectives of the Italian and European digital agendas, GARR-X Progress aims to become the enabler of existing collaborations and new ones; at the same time, it will allow users to experiment in a real environment innovative models of digital infrastructures that can be extended to the whole country.

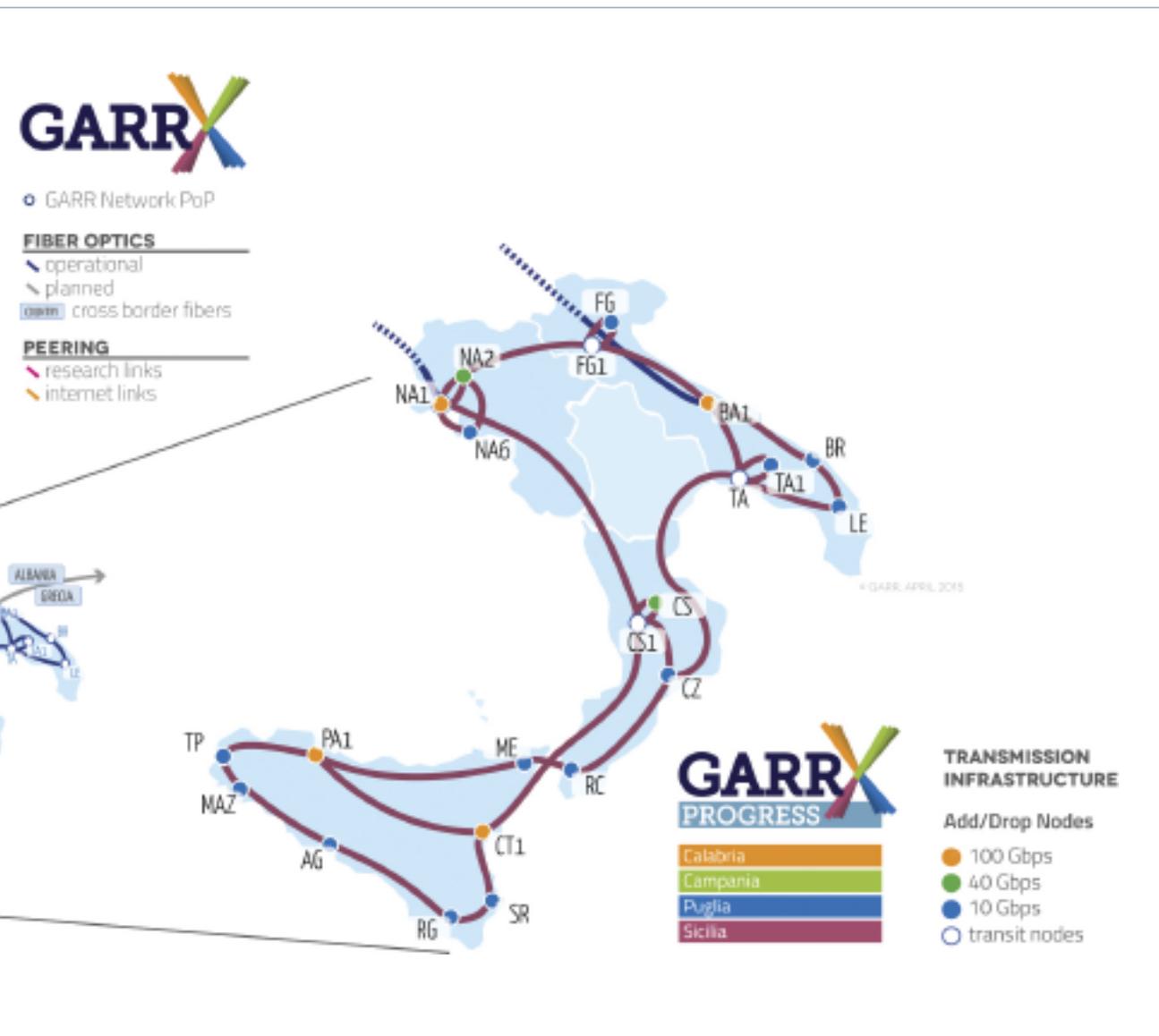
A collaborative environment that will include school students, thanks to the connection to the GARR-X Progress network...

Yes, because one new aspect of the project is the high-bandwidth access for the schools. GARR-X Progress is expected to connect 130 schools in the four Regions of Convergence by the



end of June, even in areas far from the largest towns, where the digital divide is stronger. These schools will join the other 130 already connected to GARR-X. The connected institutes are experiencing completely new learning processes, from distance learning to the creation of innovative training spaces, to the opportunity to participate in online university orientation courses. Our goal is to foster an innovative and experimental teaching environment by strengthening the link between schools, universities and research and by creating an integrated learning system of excellence at national level. The feedback we are receiving today from the schools is certainly very positive and I would like to let them speak directly!

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The schools speak:

Salvatore Giuliano
– Headmaster of the Majorana Institute of Higher Education, Brindisi

When we learned about the GARR network we quickly understood its potential. Thanks to the GARR-X Progress project, we are now connected with optical fiber and the advantage is evident. We are already a 2.0 school, but in addition now everyone can enter large amounts of data over the network in a short period of time. We have over 1,000 student devices and 500 computers: even the simple simultaneous viewing of a video for educational purposes would have been a problem without the high bandwidth network.

Antonio Guida – Headmaster of the Marco Polo Institute of Higher Education, Bari

We have been using electronic records, interactive whiteboards and tablets for three years, but only now we can make the most of them. As soon as we were connected to GARR we noticed an increase in capacity from 4 to 98 Mbps! The world has definitely changed. Without the broadband connection we could not start the Living School project to rethink the design of our learning spaces and conduct lessons even outside the classrooms.

Gabriella Chisari – Headmaster of the Galilei “Liceo Scientifico”, Catania

We welcomed with enthusiasm the GARR proposal because we believe in educational innovation and in the opportunity to connect students with universities and private companies. We are doing our best to provide better learning opportunities for our students!