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D2.3.2 & KPI

DELIVERY AND TESTING OF THE PACKET EQUIPMENT

TeRABIT

FIRST RELEASE

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Executive Summary

The GARR-T network expansion project, part of the TeRABIT initiative, aims to enhance the existing GARR-T infrastructure. This expansion is linked to the improvement of the technical equipment currently in production with particular attention to routers, including cards and optics. This allows the capacity of the GARR-T backbone to be increased and thus the whole process is updated regarding monitoring, traffic engineering management and service implementation.

This deliverable reports the status of work and the KPIs associated with the tender.

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1 EXPANSION AND EVOLUTION OF THE GARR-T NETWORK

The GARR-T network evolution plan involves the acquisition of network equipment and related hardware and software components through this tender procedure. This includes the supply, construction and equipment of the network, along with assistance and maintenance services. The goal of these acquisitions is to ensure, with the GARR-T network already operational, a unitary packet network system which continuously implements the expansion of the network.

Specifically, the interventions focus on expanding the router equipment currently in production, including cards and optics. This makes it possible to increase both the backbone capacity bringing it in many cases to values equal to 100G and/or 400G, in particular for links to Spine, and the access capacity of some users who require high throughput such as INFN Tiers and other institutions.

In other cases, it is necessary to upgrade the type of equipment, in particular for routers that perform the function of Edge routers, as in the case of the Milano-Caldera (MI02) and Milano-Lancetti (MI01) Points of Presence (PoPs), which represent the exit points of the network. This upgrade facilitates an increase in backbone bandwidth capacity from nx100G to 400G, while maintaining all current functions, including those related to security, implemented through the use of the DDoS mitigation system, CORERO. The planned devices belong to the same family as the current ones and support features regarding the implementation of dynamic filters for the mitigation of DDoS, a functionality currently operational on the GARR-T network.

A further aspect concerns the management and automation systems in production on the GARR-T network, namely Paragon Insights and Pathfinder. These systems handle equipment monitoring, traffic engineering management, and service implementation. The technological continuity characteristic ensures that all the equipment subject to the upgrade is correctly managed by the systems.

The request to provide a solution in technological continuity with the current network is also necessary to comply with the time constraints and the requirements on the operation and operability of the network required by the ICSC and TeRABIT projects. This approach aligns with the GARR-T architectural design. In order to achieve a unified solution at the national level, it is required that the network equipment supplied belongs to the Juniper Networks MX and PTX platforms and that the passive components, cabling and MPO modules, are from the vendor Leviton.

Figure 1 shows the packet network topology to be achieved through the enhancements carried out as part of the NRRP, the National Recovery and Resilience Plan.

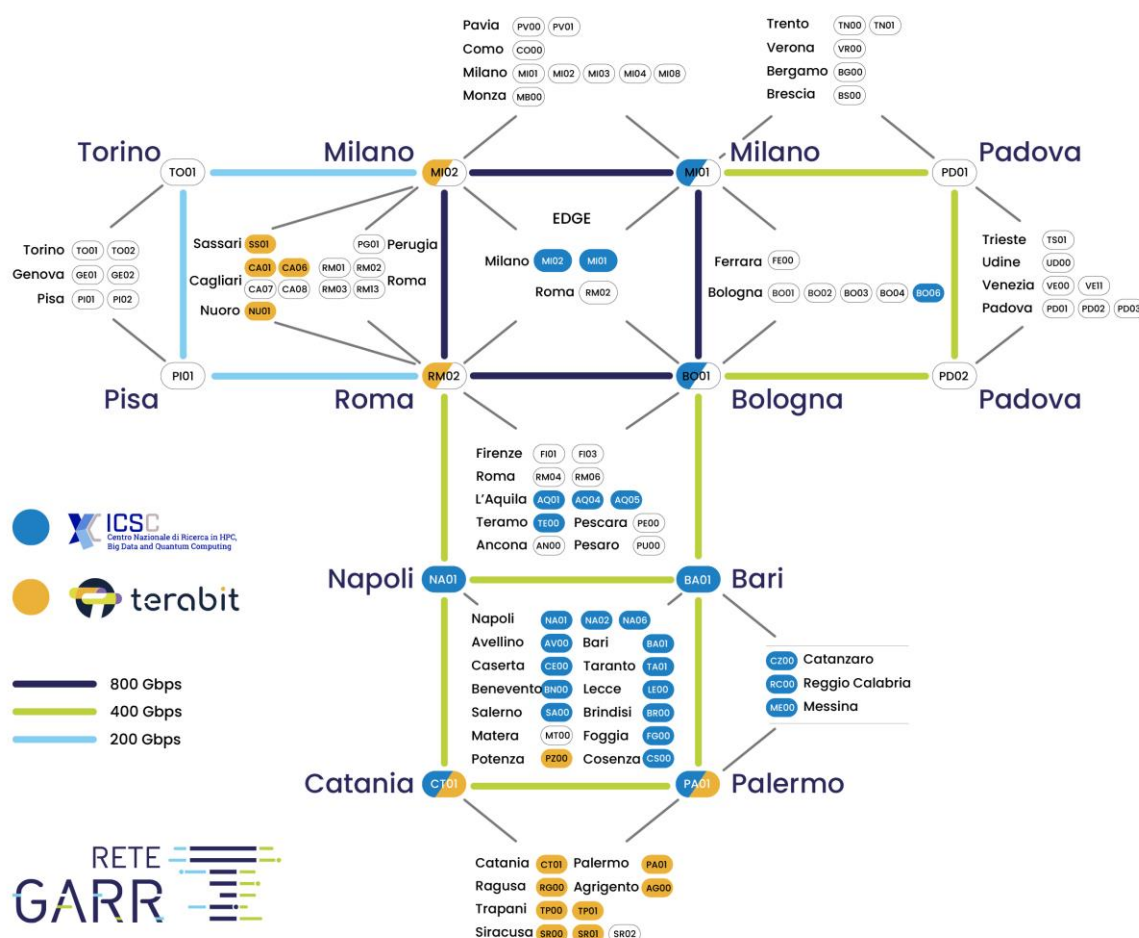


Figure 1 - GARR-T NRRP packet network

2 SUMMARY OF DELIVERY TIMES

GARR sets a time-schedule for the implementation of the Terabit project for tender 2303 TENDER FOR THE ASSIGNMENT OF THE SUPPLY OF PACKAGE NETWORK EQUIPMENT AND RELATED SPECIALIST ASSISTANCE AND MAINTENANCE SERVICES (Lot1), as detailed in the following sections. Considering the time constraints dictated by the planned financing, an essential term of supply is established at 9 months from the purchase order. The elements and releases necessary for verifying this essential deadline will be outlined in the following sections. Please note that months are intended as calendar months starting from the purchase order.

Additionally, GARR requires the complete testing of the Supply by **31 March 2025**.

The following sections provide a summary of the elements required for each release phase.

2.1 Delivery time Terabit Project

Term	Expiration from purchase order	Planned Tasks
Milestone 1	6 months	Hardware available for installation in the area

<i>Term</i>	<i>Expiration from purchase order</i>	<i>Planned Tasks</i>
Milestone 2: Essential Deadline	9 months	Hardware successfully installed and tested in POPs CA01, CA06, SS01, NU01, MI02, RM02.
Milestone 3:	12 months	Hardware successfully installed and tested in PoPs PA01, CT01, AG00, RG00, SR00, SR01.
Milestone 4:	18 months (no later than March 31, 2025)	Complete testing of 100% of the supply in all its components and elements belonging to the completed Lot. PoP PZ01, TP00, TP01.
Milestone 5: Project Closure	May 31, 2025	Closure of verifications and complete consolidation of release documentation.

Table 1 - Terabit Project Packet Network delivery time

The Milestones 1 to 4 have been completed, while the completion of Milestone 5 is in progress.

2.2 Report of Terabit Project

In Table 2 the details with the installation and testing dates of the PoPs included in the Terabit Project is reported, divided into phases in accordance with the Milestones. The activity column of Table 2 shows the details of the upgrading intervention planned by the project, which in some cases involved the replacement of existing equipment with others with greater capacity and performance, in others the installation of new transceivers and/or licenses and finally the construction of new PoPs.

<i>Project Phase/PoP</i>	<i>Status</i>	<i>Installation/Test Date</i>	<i>Activity</i>
PHASE1 (M1)			
Check Hardware Availability system integrator	completed	05/2024	All the hardware required by the consistency is delivered, in compliance with the tender timing of the Milestone1 (approximately 95% of the hardware required was already available in 04/2024)
PHASE2 (M2)			
CA01	operational	23/04/2024	Replace existing LEAF MX204 with MX480, transceivers and licenses
CA06	operational	22/04/2024	Replace existing LEAF MX204 with MX480, transceivers and licenses
SS01	operational	18/04/2024	Replace existing LEAF's 2xMX204 with

<i>Project Phase/PoP</i>	<i>Status</i>	<i>Installation/Test Date</i>	<i>Activity</i>
			MX480, transceivers and licenses
NU01 (new)	operational	28/01/2025	Installation of new LEAF's 2xMX204
RM02 (L1)	operational	02/05/2024	Installation of new transceivers and licenses on PTX10k4
MI02 (L1)	operational	06/05/2025	Installation of new transceivers and licenses on PTX10k4
PHASE3 (M3)			
CT01 (L1)	operational	13/05/2024	Installation of new transceivers and licenses on PTX10k1
PA01 (L1)	operational	14/05/2024	Installation of new transceivers and licenses on PTX10k1
AG00	operational	18/06/2024	Installation of new transceivers
RG00	operational	18/06/2024	Installation of new transceivers
SR00	operational	26/06/2024	Installation of new transceivers
SR01 (new)	operational	25/06/2024	Installation of new LEAF's 2xMX204
PHASE4 (M4)			
PZ00	operational	16/09/2024	Installation of new transceivers
TP00	operational	17/09/2024	Installation of new transceivers
TP01	operational	18/09/2024	Installation of new transceivers
PHASE5 (M5)			
Project Closure	In progress		

Table 2 - Terabit Project Packet Network PoP implementation report

From the point of view of the new backbone circuits planned by the project, which represent the upgrade of the capacity of both the main backbone and the connectivity of the remote PoPs listed above, the activation process of those planned links started.

KPI: KPIs definition is described in the Table 3.

<i>KPI</i>	<i>KPI brief description</i>
Hardware Shipped (%)	Percentage of the hardware shipped and available into system integrator warehouses

<i>KPI</i>	<i>KPI brief description</i>
Delivered Nodes (stand-alone acceptance)	Network nodes installed on site, configured. Stand-Alone acceptance documentation completed, reviewed and accepted from GARR
PoP Nodes activated and on-boarded	Network nodes activated and on-boarded in the GARR-T Network Management System
PoP Nodes operational	Network nodes fully active and operational, migrated and integrated with the GARR-T production network

Table 3 - WP2 Network - KPIs definition

<i>Report Date</i>	<i>31-Dec-24</i>		
Project	TeRABIT		
Tender ID	2303		
KPI Project: TeRABIT Tender: 2303	Total planned in Project	%	achieved by 02_25
Hardware Shipped (%)	100%	100%	100%
Delivered Nodes (stand-alone acceptance)	17	100%	17
PoP Nodes activated and on-boarded	17	88%	15
PoP Nodes operational	17	88%	15

Table 4 - KPI Tender 2303 – Packet Network