ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

MUR DM 117/Infinera - Synergistic use of AI&ML and physics models for optical network tomography from telemetry (2 of 2)

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Politecnico di TORINO [P.iva/CF:00518460019]- Infinera Unipessoal LDA [VAT no. 510 553 079]
Supervisor	CURRI VITTORIO - vittorio.curri@polito.it
Contact	CURRI VITTORIO - vittorio.curri@polito.it
Context of the research activity	The activities will focus on modeling the physical layer and modeling results will be used together from data from telemetry to develop a mostly complete and accurate digital twin of the optical network. This goal will be obtained by relying on telemetry and extensively on AI&ML techniques. Such results will be used to get the precise infrastructure tomography allowing minimum energy control and self-healing functionalities. Results will be tested in experiments both in the Politecnico and Infinera Labs. Progetto finanziato nell'ambito del PNRR – DM 117/2023 - CUP E14D23002000004
Objectives	Next generation optical communications networks will consist of a high heterogeneous set of optical channels and links, where different optical domains will interact, and traffic will present various profiles varying over time and location, with strong dependency on the application. In this mix of network scenarios, various high-capacity high-end systems will co-exist with legacy ones. In this context, a deep knowledge of highly complex & heterogeneous telecommunication networks can simplify network management. The investigation of this co-founded 2 PhD candidates will address several aspects: -Transmission modeling (digital twin) for network tomography to enable: -Optimized planning, management, and control -Soft-failure detection - AI-based algorithms for troubleshooting - Dynamic bandwidth allocation for different types of traffic - Resilient network design and architectures -AI automatization and services in a context of fully integrated optical and wireless transport networks - Telemetry enabled by optical and digital data. - Techno-economics - Experimental verification of the

	concept on the testbed – which is being planned by Politecnico di Torino, Links Foundation, Telecom Italia and Infinera in Torino.

Skills and competencies for the development of the activity	- Basics of telecommunication theory - Basics of physics of optical communications - Basics of optical networks - Python coding - Basics of optical Machine Learning