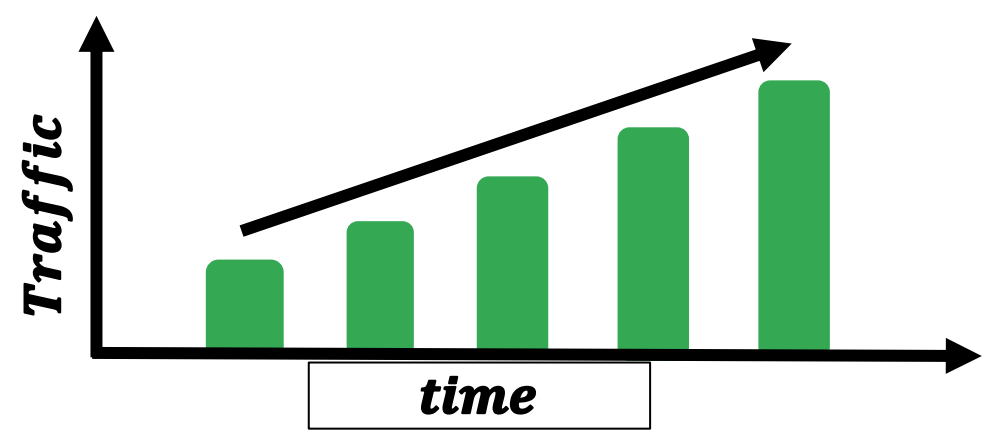
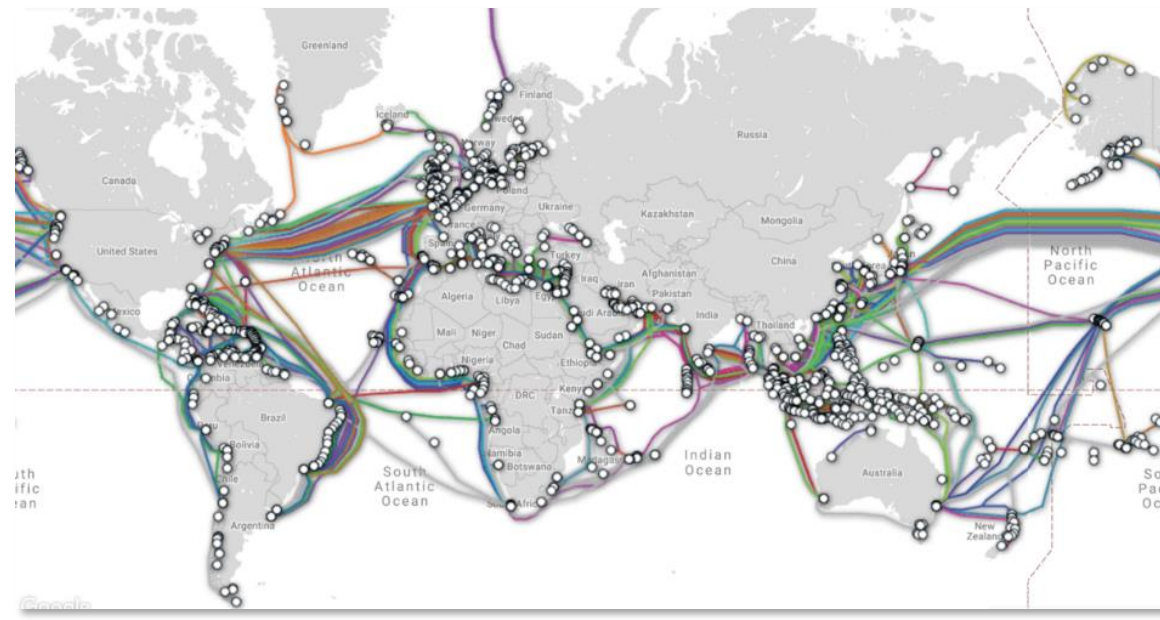


Research context and motivation

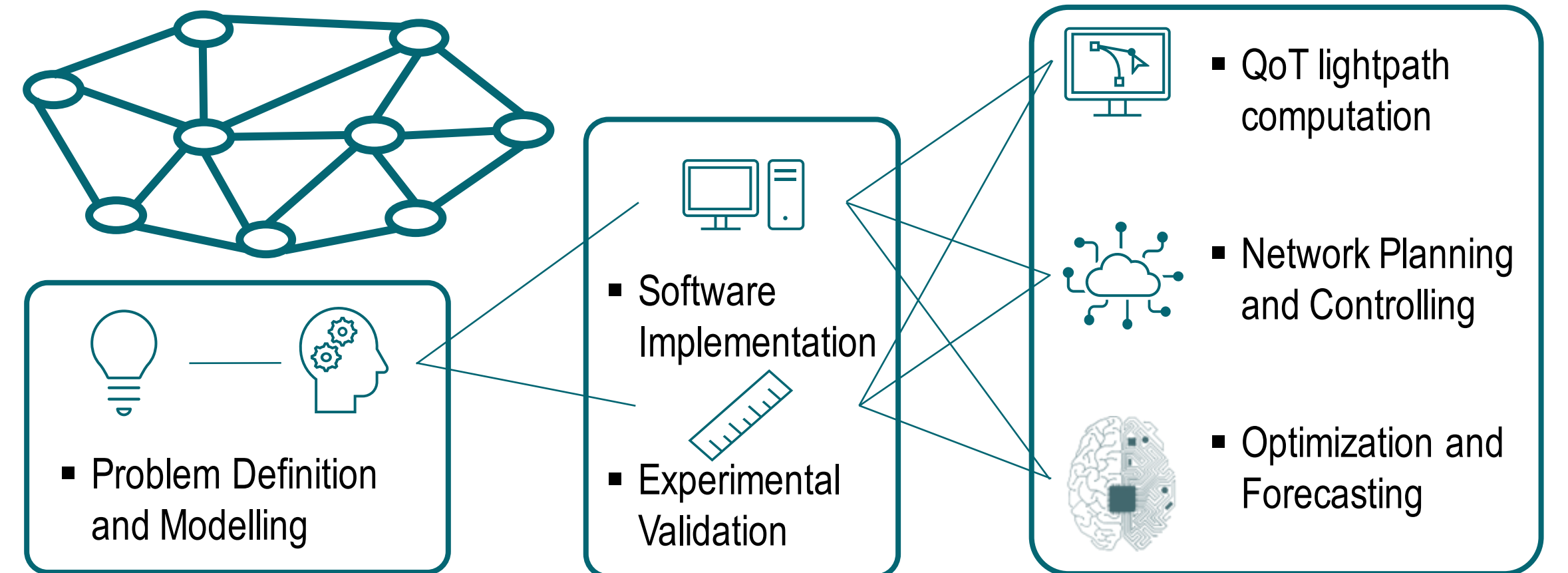


More than 90% of connections through optical fibers in terms of amount and distance



- 5G
- Internet of Things
- Augmented Reality
- Metaverse
- Cloud

Novel contributions and Adopted methodologies



Modelling and Implementation

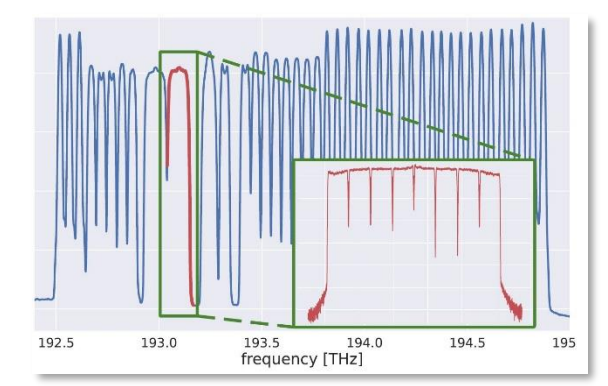
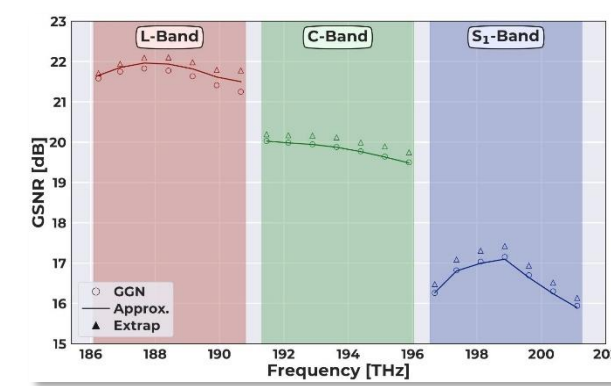
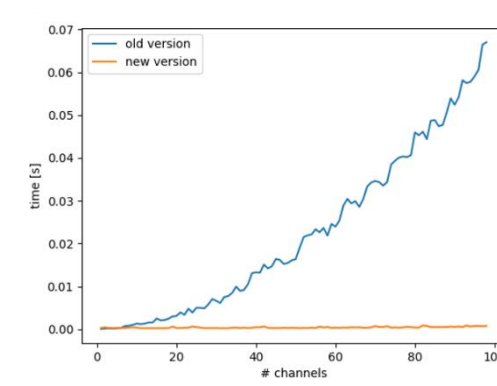
- Physical Differential Equation
- Software Implementation and Optimization

Experimental Proof of Concept

- Laboratory Testbed Validation
- Artificial Intelligence Implementations and Optimizations

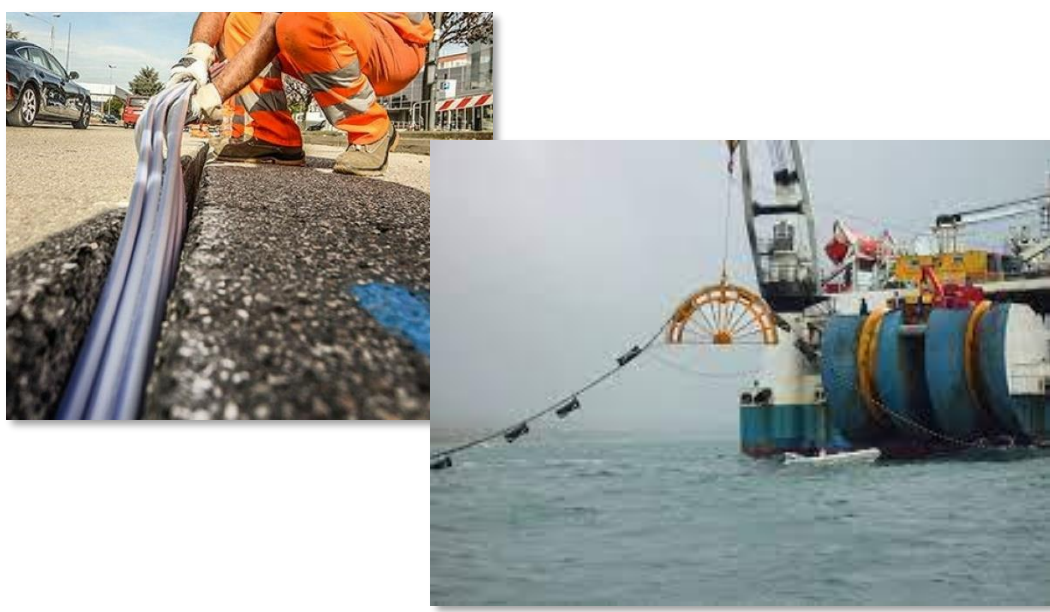
Commercial Testbed Validation

- Dynamic and Flexible Signal Propagation
- Nyquist Multi-Subcarriers Transmission

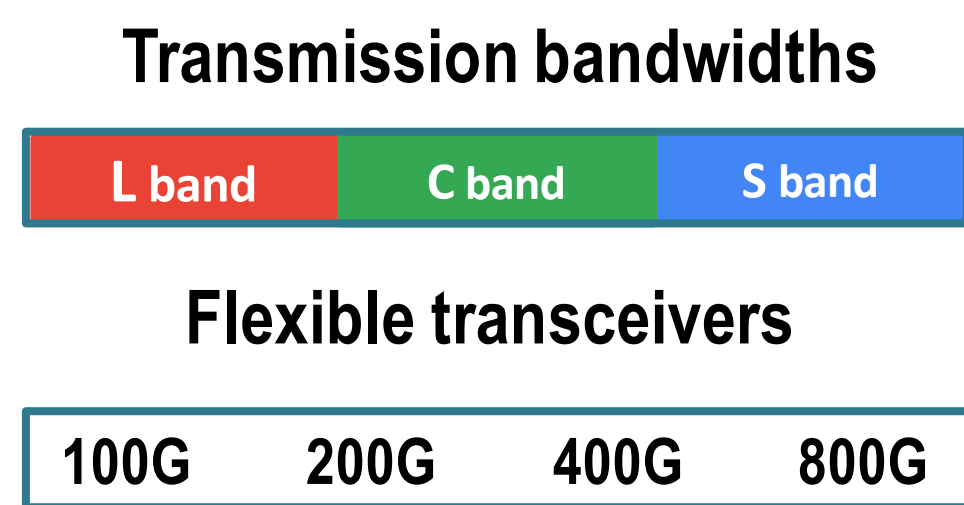


Addressed research questions/problems

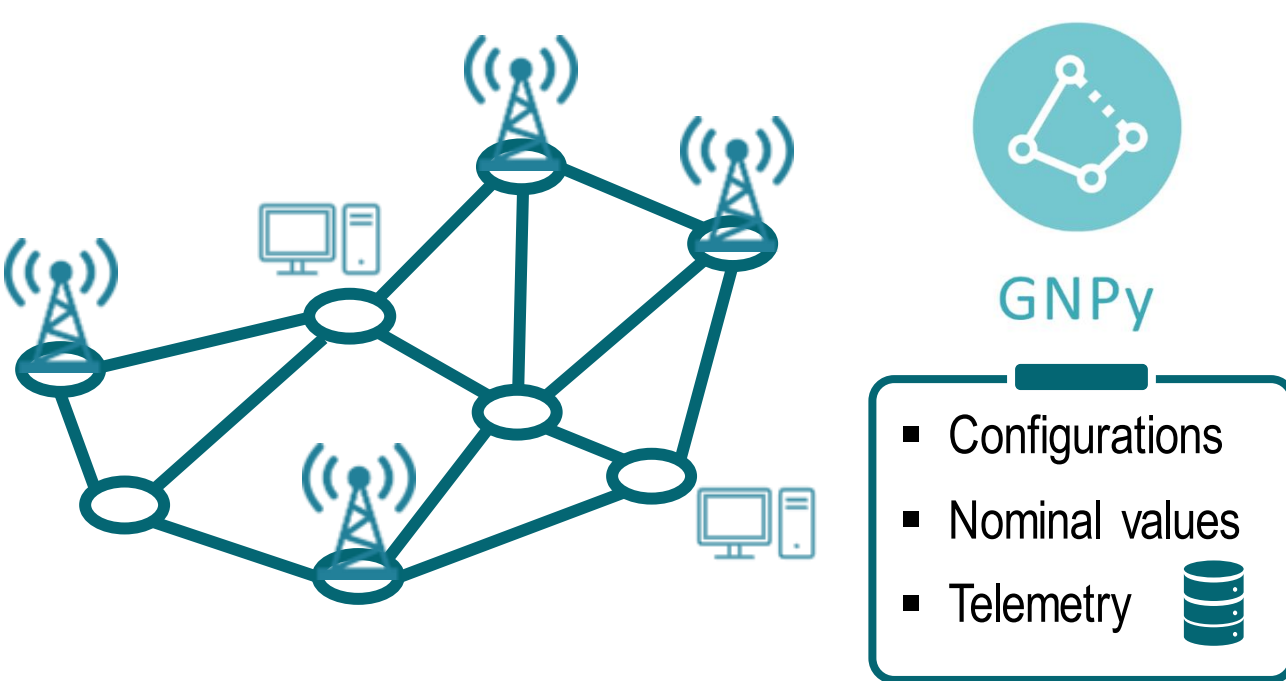
New Infrastructures



Infrastructures Optimization



Optical Network Digital Twin

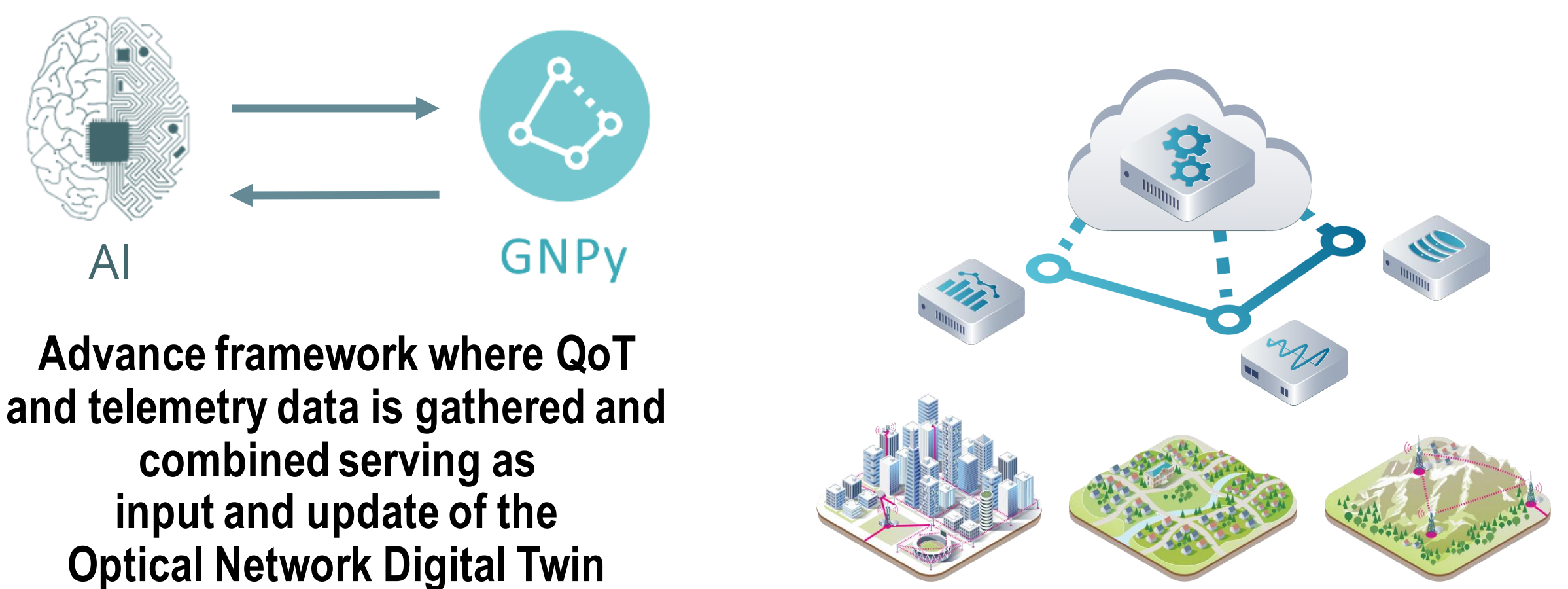


- Lightpath computation
- QoT forecasting
- Failure detection
- Network Planning and Controlling

Submitted and published works

- A. D'Amico, et al., "Scalable and disaggregated GGN approximation applied to a C+ L+ S optical network", JLT, 2022
- E. London, et al., "Modelling non-linear interference in non-periodic and disaggregated optical network segments", Optics Continuum, 2022
- M. S. Raza, et al., "LYNX: A GNPpy-based web application for multi-vendor optical network planning", OFC, 2022
- A. D'Amico, et al., "GNPy experimental validation for Nyquist subcarriers flexible transmission up to 800 G", OFC, 2022
- G. Borraicini, et al., "QoT-Driven Optical Control and Data Plane in Multi-Vendor Disaggregated Networks", OFC, 2022
- A. D'Amico, et al., "Experimental validation of GNPpy in a multi-vendor flex-grid flex-rate WDM optical transport scenario", JOCN, 2022
- E. London, et al., "Observing cross-channel NLI generation in disaggregated optical line systems", ACPC, 2021
- G. Borraicini, et al., "Autonomous Raman amplifiers in multi-band software-defined optical transport networks", JOCN, 2021
- G. Borraicini, et al., "Cognitive and autonomous QoT-driven optical line controller", JOCN, 2021
- A. D'Amico, et al., "Inter-band GSNR degradations and leading impairments in C+ L band 400G transmission", ONDM, 2021
- G. Borraicini, et al., "Autonomous physical layer characterization in cognitive optical line systems", OFC, 2021
- E. Virgillito, et al., "Single-vs. Multi-Band Optimized Power Control in C+ L WDM 400G Line Systems", OFC, 2021
- J. Kundrát, et al., "GNPy & YANG: open APIs for end-to-end service provisioning in optical networks", OFC, 2021
- A. D'Amico, et al., "GNPy experimental validation on flex-grid, flex-rate WDM optical transport scenarios", OFC, 2021
- G. Borraicini, et al., "QoT-E driven optimized amplifier control in disaggregated optical networks", OFC, 2021
- I. Khan, et al., "Lightpath QoT computation in optical networks assisted by transfer learning", JOCN, 2021
- A. D'Amico, et al., "Enhancing lightpath QoT computation with machine learning in partially disaggregated optical networks", IEEE Open Journal of the Communications Society, 2021
- E. London, et al., "Simulative assessment of non-linear interference generation within disaggregated optical line systems", OSA continuum, 2020
- A. Ferrari, et al., "The GNPpy open source library of applications for software abstraction of WDM data transport in open optical networks", 6th IEEE Conference on Network Softwarization (NetSoft), 2020
- A. D'Amico, et al., "Using machine learning in an open optical line system controller", JOCN, 2020
- A. D'Amico, et al., "Quality of transmission estimation for planning of disaggregated optical networks", ONDM, 2020
- G. Borraicini, et al., "Softwarized and autonomous Raman amplifiers in multi-band open optical networks", ONDM, 2020
- A. Ferrari, et al., "Assessment on the achievable throughput of multi-band ITU-T G. 652. D fiber transmission systems", JLT, 2020
- A.M.R. Brusin, et al., "Load aware Raman gain profile prediction in dynamic multi-band optical networks", OFC, 2020
- A. D'Amico, et al., "Machine-learning aided OSNR prediction in optical line systems", ECOC, 2019
- E. Virgillito, et al., "Observing and modeling wideband generation of non-linear interference", ICTON, 2019
- V. Curri, et al., "Synergetical Use of Analytical Models and Machine-Learning for Data Transport Abstraction in Open Optical Networks", ICTON, 2019
- E. Virgillito, et al., "Propagation effects in mixed 10g-100g dispersion managed optical links", ICTON, 2019
- E. Virgillito, et al., "Statistical assessment of open optical networks", Photonics, 2019

Future work



List of attended classes

- 01QRRRV – Advanced iterative techniques for digital receivers (12/7/2021, 26.67)
- 01REKRV – Coherent detection: a revolution in optical communication (29/9/2020, 50.00)
- 02LWHRV – Communication (16/7/2021, 6.67)
- 01QSAIU – Heuristics and metaheuristics for problem solving: ... (10/7/2020, 26.67)
- 01QUWRV – Mathematical-physical aspects of electromagnetism (26/10/2020, 25.00)
- 01TRLRV – Optical Transport Networks (16/7/2021, 50.00)
- 08IXTRV – Project management (16/7/2021, 6.67)
- 01RISRV – Public speaking (6/10/2020, 6.67)
- 01SYBRV – Research integrity (3/3/2021, 6.67)
- 01SWQRV – Responsible research and innovation, ... (19/3/2021, 6.67)
- 01QORRV – Writing Scientific Papers in English (20/2/2020, 20.00)