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Press release

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Fraunhofer HHI and NICT Unveil Groundbreaking International Optical Testbed Data Space to Enable AI/ML-Driven Networks

In a bold step toward revolutionizing network technologies, the Fraunhofer Heinrich-Hertz-Institut (HHI) and the National Institute of Information and Communications Technology (NICT) of Japan launch the Optical Testbed Dataspace (OTDS). OTDS is a pioneering platform designed to accelerate the development and testing of Artificial Intelligence (AI) and Machine Learning (ML) models for optical networks. It fosters global collaboration by enabling international partners to securely share and aggregate testbed data from diverse environments, pushing the boundaries of network optimization and automation.

Dataset availability is a significant challenge in advancing networks with AI/ML research. Network data is typically classified by operators and regulatory bodies, while vendors restrict access to specific equipment telemetry. Alternatives, such as experimental or synthetic data, often result in overfitting and poor generalization performance.

To address this, optical network testbeds are evolving to play a crucial role in delivering big data — specifically, telemetry data for rare and abnormal events, such as network failures. This data is essential for training and validating AI-assisted network functions. However, assembling a comprehensive dataset, particularly for the emerging disaggregated, multi-vendor environments, remains a challenge for a single testbed while maintaining cost-effectiveness.

Optical Testbed Dataspace: Innovations Meets Security

The new collaboration between Fraunhofer HHI and NICT addresses this gap through the launch of the Optical Testbed Dataspace (OTDS).

"Our mission is to design state-of-the-art innovations without compromising on data privacy or safety. OTDS enables the secure exchange of network data, fostering the development of innovative AI models that comply with strict data privacy and export control regulations," says Dr. Johannes Fischer, Head of the Digital Signal Processing Group at Fraunhofer HHI.

"The data sovereignty framework, such as OTDS, is essential to enable open innovation in AI-driven network according to today's global context. OTDS would also further enhance the importance of the network testbeds operated by the respective institutions." says Dr. Yoshinari Awaji, Director General of Photonic ICT Research Center at NICT.

OTDS, based on the Eclipse Dataspace Components Connector (EDCC) and aligned with the principles of the International Data Spaces Association (IDSA), provides a framework for testbeds to securely share their data while ensuring compliance with data sovereignty and export control requirements. This allows research institutions, network operators, and vendors to exchange valuable data with defined access and usage controls, without sacrificing control or

breaching regulatory guidelines.

"Real-time data exchange from testbeds generates diverse datasets that are crucial for training and validating AI models, facilitating the automation and optimization of network functions," explains Dr. Behnam Shariati, Head of the "AI for Photonics" division at Fraunhofer HHI. "OTDS lowers the barriers to data access and fosters an open research environment, paving the way for the rapid validation of cutting-edge network automation solutions."

"With OTDS, we can strengthen global research collaboration and accelerate the development of the next generation of AI-powered optical networks, improving mobile connectivity for remote areas and network resiliency, or support real-time data processing in industry and critical infrastructures," says Dr. Yuki Yoshida, Research Manager of Photonic ICT Research Center at NICT.

OTDS Validation Process: Strengthening Germany-Japan Collaboration

Fraunhofer HHI and NICT have successfully demonstrated the technology, creating a prototype for international data exchange between optical testbeds in Berlin, Germany and Sendai, Japan. The partners showcased a live demonstration of this data transfer at Tohoku University in Japan during the "5th Germany-Japan Beyond 5G/6G Research Workshop", supported by the Federal Ministry of Education and Research (BMBF) and the Ministry of Internal Affairs and Communications (MIC) of Japan.

The demonstration was extended for validating AI/ML models for network failure analysis using data points of the different testbeds and will be showcased live at the Optical Fiber Communications Conference and Exhibition (OFC), in San Francisco, California, USA.

All details are published in a new paper "International Testbed Data Sharing Framework with Data Sovereign Features for Network AI/ML Empowerment"
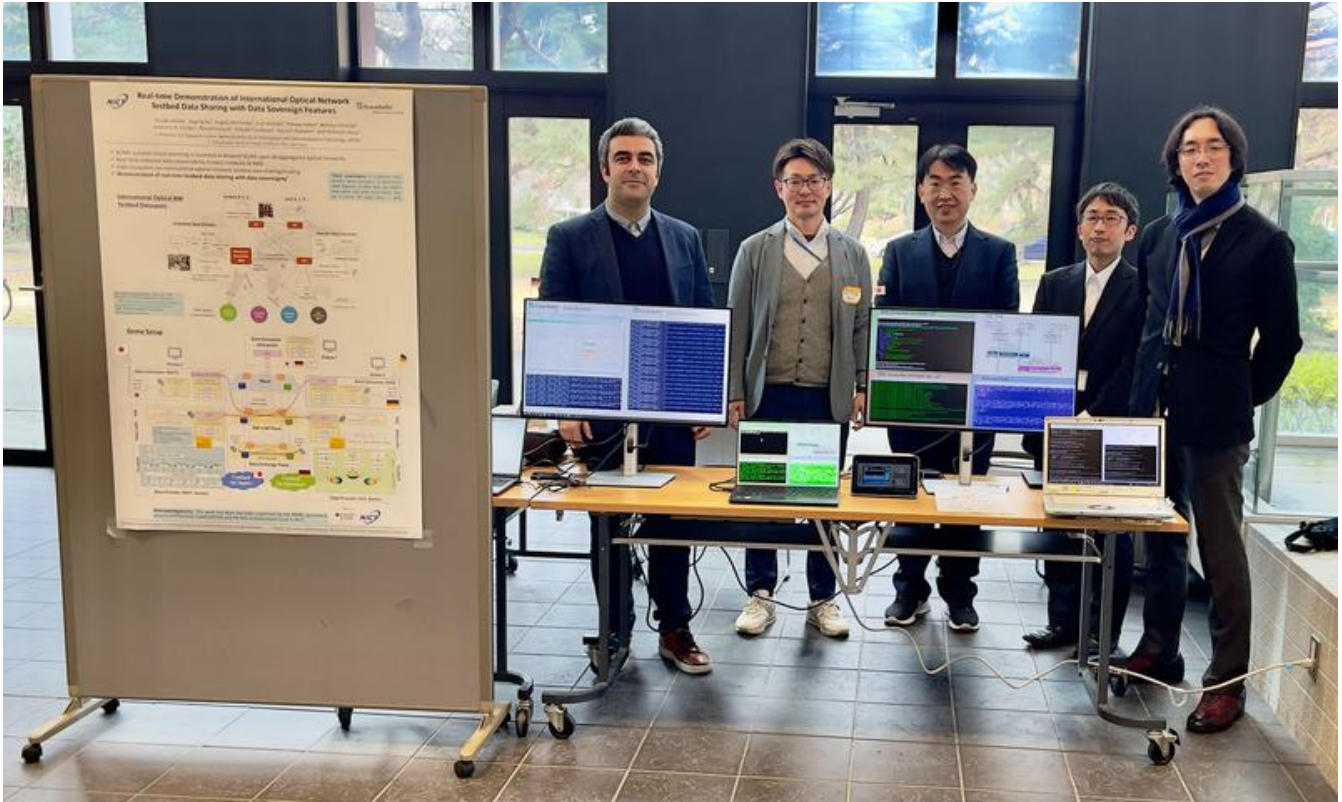
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