

# Demonstration of LLM-based AI-Agent for Optical Network Management and Automation

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**Abstract** We deployed an LLM-based AI-agent on a commercial product testbed for optical network management and automation. This demonstration showcases how the AI-agent interacts with controller APIs to implement service establishment, QoT estimation, and power optimization. ©2024 The Author(s)

## Overview and Innovation

Generative AI (GenAI) has been rapidly advancing in recent years, with Transformer-based large language models (LLMs) becoming a hot topic. These advancements provide a promising opportunity to build AI-agents for automating the management and operations of optical networks. An LLM-based AI-agent possesses several critical capabilities:

**Natural Language Processing:** The ability to understand and respond to human queries in natural language, facilitating seamless interaction between network operators and the AI-agent.

**Data Analysis:** Real-time analysis of network data for effective monitoring and troubleshooting, enabling quick identification and resolution of issues.

**Automation:** Automating routine tasks such as configuration changes, fault detection, and performance optimization, thereby reducing the need for manual intervention.

**Decision Support:** Providing intelligent recommendations for network optimization and proactive maintenance, enhancing the overall efficiency and reliability of the network.

Although there have been publications discussing the applications of LLMs in network management, there has yet to be a practical

demonstration at any conference. This proposal aims to deliver the first-ever demo showcasing the application of LLMs to automate optical networks. This demo will highlight the potential of LLM-based AI-agents to transform network management and to enable the automatically driven optical networks.

## ECOC Relevance

An increasing number of optical communication researchers are focusing on the applications of LLMs and GenAI. The proposed demo will captivate not only researchers but also network operators, fostering valuable discussions on the integration of GenAI in optical networks.

## Content of the Demo

The architecture is illustrated in Fig. 1. We deployed open-source LLMs, such as Mixtral 7x8B from Mistral AI, on GPU servers. The AI-Agent comprehends user intent with the assistance of these LLMs and manages the network using pre-defined application programming interfaces (APIs). The demo highlights the AI-Agent's capabilities through automated operations on a commercial product testbed, such as, physical layer re-optimization.

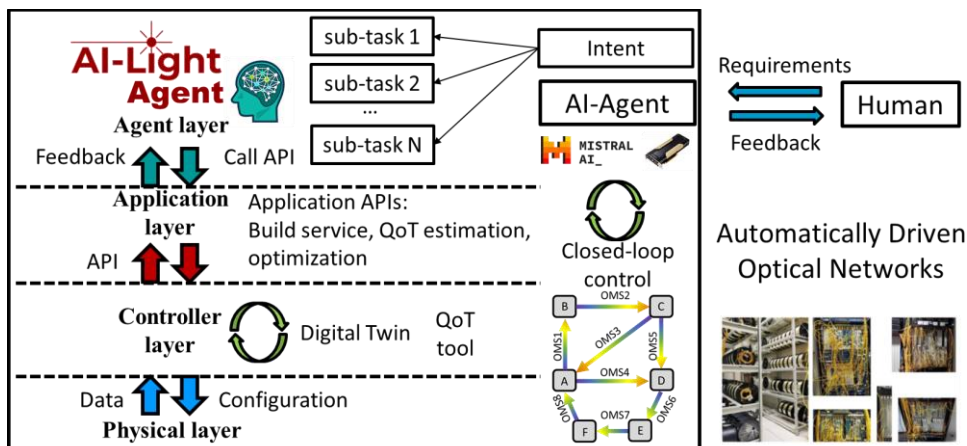


Fig. 1: Workflow and experimental setup.