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Enabling high-performance PLC communication through open standards: OPC UA PubSub

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The growing diversity of PLC models and brands in industrial controls systems is increasing the complexity of the communications at the supervisory (SCADA) and control layers. At CERN, the in-house framework UNICOS-CPC manages this diversity through the integration of proprietary and open communication protocols, as well as bespoke implementations at the SCADA level to manage the incoming process data received by different communication drivers, including Modbus, S7, and S7Plus. To reduce this complexity, this paper proposes unifying PLC-SCADA communications across all platforms using OPC UA PubSub, a lightweight and highly performant publisher-subscriber protocol specified in the IEC 62541 industrial standard. This approach simplifies integration with new vendors and technologies, while enabling direct communication between PLCs. It positions OPC UA once more as a homogenizing middleware layer on top of heterogeneous hardware, which has proven to be a reliable and scalable solution for other use cases at CERN, such as power supplies, powered crates and custom electronics. The paper outlines the design, prototyping and testing phases involved in integrating the OPC UA PubSub protocol into industrial applications. It also presents the challenges encountered in the integration process, and concludes with the promising results achieved in both PLC-PLC and PLC-SCADA communication setups.

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Footnotes

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