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Belle II Network Performance Analysis in the Context of the WLCG Data Challenge 2024

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The Belle II experiment relies on a distributed computing infrastructure spanning 19 countries and over 50 sites. It is expected to generate approximately 40TB/day of raw data in 2027, necessitating distribution from the High Energy Accelerator Research Organization (KEK) in Japan to six Data Centers across the USA, Europe, and Canada. Establishing a high-quality network has been a priority since 2012 to address the challenge of transferring data across long distances in high-latency environments. This effort has included joining LH-CONE and conducting periodic Data Challenges to assess network performance following significant changes in infrastructure or experiment schedules.

In February 2024 Belle II joined the WLCG Data Challenge, performed together with LHC experiments with the goal to test network performance under stress, particularly due to the anticipated increase in traffic from the experiments with the High Luminosity LHC program at CERN.

In this work, we will present a comprehensive overview of the tests conducted by Belle II. We will start with the test design, define the goals, and outline the preliminary steps taken. We will then describe the working environment, the tests performed, and the tools employed. Furthermore, we will discuss the results achieved in detail. Finally, we will outline the future steps for subsequent tests.

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