

# BNL Wide Area Data Transfer for RHIC and ATLAS: Experience and Plan

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We describe two illustrative cases in which Grid middleware (GridFtp, dCache and SRM) was used successfully to transfer hundreds of terabytes of data between BNL and its remote RHIC and ATLAS collaborators. The first case involved PHENIX production data transfers to CCJ, a regional center in Japan, during the 2005 RHIC run. Approximately 270TB of data, representing 6.8 billion polarized proton-proton collisions, was transferred to CCJ using GridFtp tools. The local network was reconfigured and tuned to route data directly from the online data acquisition system to the BNL public network, thus avoiding the use of tape storage as an intermediate buffer and preserving the scarce resource of tape I/O bandwidth. A transfer speed of 60 MB/s was achieved around the clock, sufficient to keep up with the incoming data stream from the detector. The second case involved transfers between the ATLAS Tier 1 center at BNL and both CERN and the US ATLAS Tier 2 centers, as part of the ATLAS Service Challenge (SC). This demanded even larger data transfer rates, with the goal of validating the current computing model. We were able to demonstrate 150 MB/s wide area data transfer rates using the SC infrastructure with our dCache configuration. We describe the deployment of the major components of this infrastructure, including the ATLAS Distributed Data Management System, File Transfer Service and dCache/SRM and its connection to the mass storage system. The operational model and various monitoring tools are also described. These exercises demonstrated the current level of maturity of Grid tools being used by large physics experiments to satisfy their data distribution requirements. Future work will focus on applying this dCache/SC experience to large scale RHIC data transfers and improving the stability and performance of data transfers as the BNL backbone is upgraded to multiple 10 Gbps bandwidth.

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