# Trends in Wide Area Network Support for LHC

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The Large Hadron Collider (LHC) experiments are expected to move data across wide-area networks on an unprecedented scale, both in terms of rate and volume. Ensuring that there will be a network infrastructure capable of adequately supporting LHC data movement has been an integral part of the preparations for experiment startup. One of the strategic directions taken in provisioning the network infrastructure has been the deployment of end-to-end (E2E) data circuits specifically to accommodate some types of LHC data movement. To date, these circuits have largely been statically configured, permanent network infrastructure. Recently, the ability to provision dynamic E2E circuits that can be setup, utilized, and torn down as needed, has begun to emerge. This presentation will discuss Fermilab's experiences with deploying, managing, and utilizing E2E wide-area data circuits, both static and dynamic, to move LHC data. Particular emphasis will be given to developments in network monitoring infrastructure to support this emerging E2E circuit environment. The perfSONAR network monitoring tools are utilized to gather status, statistics, and performance measurements for E2E network circuits that tend to crossing multiple administrative domains. Discussion on the current state of PerfSONAR development, as well as its future directions, will be included.