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Possibilities for Named Data Networking in HEP

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Named Data Networks (NDN) are an emerging network technology based around requesting data from a network rather than a specific host. Intermediate routers in the network cache the data. Each data packet must be signed to allow its provenance to be verified. Data blocks are addressed by a unique name which consists of a hierarchical path, a name and attributes. An example of a valid address could be "/ndn/uk/ac/imperial/ph/hep/data/somefile/1".

The provision for in-network caching makes NDN an ideal choice for transferring large data sets where different endpoints are likely to make use of the same data within close succession. The naming of data rather than nodes also means that a data request could potentially be satisfied by multiple geographically disparate sites allowing for failover and load-balancing.

We believe that the delegation of robustness and reliability to the network itself offers significant possibilities for computing in HEP. For example, the LHC experiments currently pre-place data and have more recently started making use of storage namespace federation and caching through the xrootd protocol. NDN offers interesting possibilities to simplify many of the the experiments' data placement systems and to extend the data caching approach. Another advantage is that in the future it is likely that large commercial content delivery providers will be using NDN and will contribute effort into developing and maintaining the technology. The deployment of NDN will be a slow process, however it can run over the existing IP infrastructure allowing for a phased, non-disruptive parallel rollout.

We will discuss results from an HEP NDN testbed, prototype *GFAL 2* and *root* NDN plugins, aspects of packet signing and security and implications for the LHC computing models.

Authors: Dr COLLING, David (Imperial College Sci., Tech. & Med. (GB)); RAND, Duncan (Imperial College Sci., Tech. & Med. (GB)); FAYER, Simon (Imperial College Sci., Tech. & Med. (GB))

Presenter: RAND, Duncan (Imperial College Sci., Tech. & Med. (GB))

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