Title: Next Generation Data Transfer Nodes (DTNs) For Global Science: Architecture, Technology, Enabling Capabilities

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Presentation Description

Increasingly, global collaborations of science research communities must transport large capacity streams of data among sites across the world. Traditional WAN network services, architecture, and technology cannot provide the capabilities required to support many emerging scientific applications. In response to this need, innovators are creating new highly distributed fabrics for data intensive, highly distributed, large scale scientific research, including those that can support multiple 100 Gbps flows approaching 1 Tbps. This presentation describes one component of this fabric, the Data Transfer Node (DTN), a network appliance that has proven to provide exceptional support for large scale, high performance, high capacity transport across WANs, including flows transported over thousands of miles around the globe.

This presentation will briefly discuss the origin of DTNs, their current deployment, and their basic and expanded architecture, core technologies, and capabilities. Today, there is no standard DTN. Many forms and configurations of DTNs exist. The primary focus of the presentation will be recent developments in DTN architecture and technology, including exceptional results achieved through recent experiments and demonstrations, such as 380 Gbps transported E2E over WANs, enabled by custom DTNs

This presentation will also describe future directions for DTNs -- the major technology innovation trends that are leading to the design of next generation DTNs, which, in part, anticipate ultra high capacity WAN transport, for example, capabilities for supporting high performance Tbps streams E2E over WANs. Topics will include fundamental architecture, expanded architecture, SDN based orchestration of flows to, from and through DTNs, basic platforms, backplanes, NICs, including 400 Gbps NICs, hardware configurations, software configurations, NVMe PCI-e drives, optical interfaces, including OSFP-28, 400 Gbps optical transceivers, memory structures, storage management techniques, and switch-DTN integration.

It is notable that the capabilities of DTNs have also demonstrated implications for supporting services and applications beyond data intensive science, for example, digital media and general Big Data applications.