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ESnet On-Demand Secure Circuits and Advance Reservation System (OSCARS)

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Motivation:

- Service sensitive applications (such as remote controlled experiments, time constrained massive data transfers, video-conferencing, etc.), require network guarantees.

Objective:

- To develop and deploy a new service that can provide secure guaranteed bandwidth circuits within ESnet.

Application:

- Primary focus of OSCARS is to facilitate data transfers for experiments that require more stringent network characteristic, e.g. ATLAS, and Fusion DIII-D.

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Issues That OSCARS Must Address (1/3)

- 1. Adopting The Appropriate Service Model**
 - The use of industry standard protocols will promote rapid deployment and interoperability. The goal is not to create new protocols, but to integrate existing ones.
- 2. Configuring Acceptable Availability Levels**
 - ESnet is a shared network resource. To prevent dedicated bandwidth paths from severely impacting other production traffic, appropriate limits on resource reservations must be set.
- 3. Scheduling Bandwidth Reservations**
 - The network can report on instantaneous usage, but a reservation scheduler is needed to provide a virtual future view of bandwidth availability.

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Issues That OSCARS Must Address (2/3)

4. Tracking Network Outages

- In the event of a planned network outage, resources required for the existing reservations may be re-allocated on backup paths if available.
- Unplanned outages may cause configured (active) circuits to change to alternative routes (if not setup as strict). This may be necessary if the backup path does not have sufficient bandwidth available.

5. Having Appropriate User Interfaces

- The interface used for manual reservation requests must be simple and intuitive (e.g. web-page).
- Interface for automated reservations by user applications should utilize well known mechanisms (e.g. signed SOAP messages).

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Issues That OSCARS Must Address (3/3)

6. Securing The System

- The impact of an abuse could potentially be very large. A DoS attack could prevent reservations from being processed. If the service is compromised, the WAN may be disabled.
- The administration of end-to-end circuits must conform to security models of all entities along the path.

7. Monitoring Usage

- Monitoring the usage of the service is needed to ensure that it is not being abused.

8. Usage Policies

- Usage of services may be constrained by policies to prevent monopolization.
- Policies will also dictate if pre-emption of an existing reservation is possible. This is necessary for resolving resource reservation conflicts due to network outages.

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Status:

- MPLS, RSVP, and QoS parameters were tested in a developmental environment and subsequently deployed into the ESnet backbone.
- First test LSP was configured between BNL and FNAL to examine the characteristics of a guaranteed bandwidth path and its interaction with applications.

Collaborations:

- TeraPaths: A QoS Enabled Collaborative Data Sharing Infrastructure for Peta-scale Computing Research
(Dantong Yu, Brookhaven National Lab)
- Network Quality of Service for Magnetic Fusion Research
(David Schissel, General Atomics)
- Bandwidth on Demand (GN2-JRA3)
(Maarten Büchli, Michael Enrico, DANTE)
- Bandwidth Reservation for User Work (BRUW)
(Bob Riddle, Internet2)

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