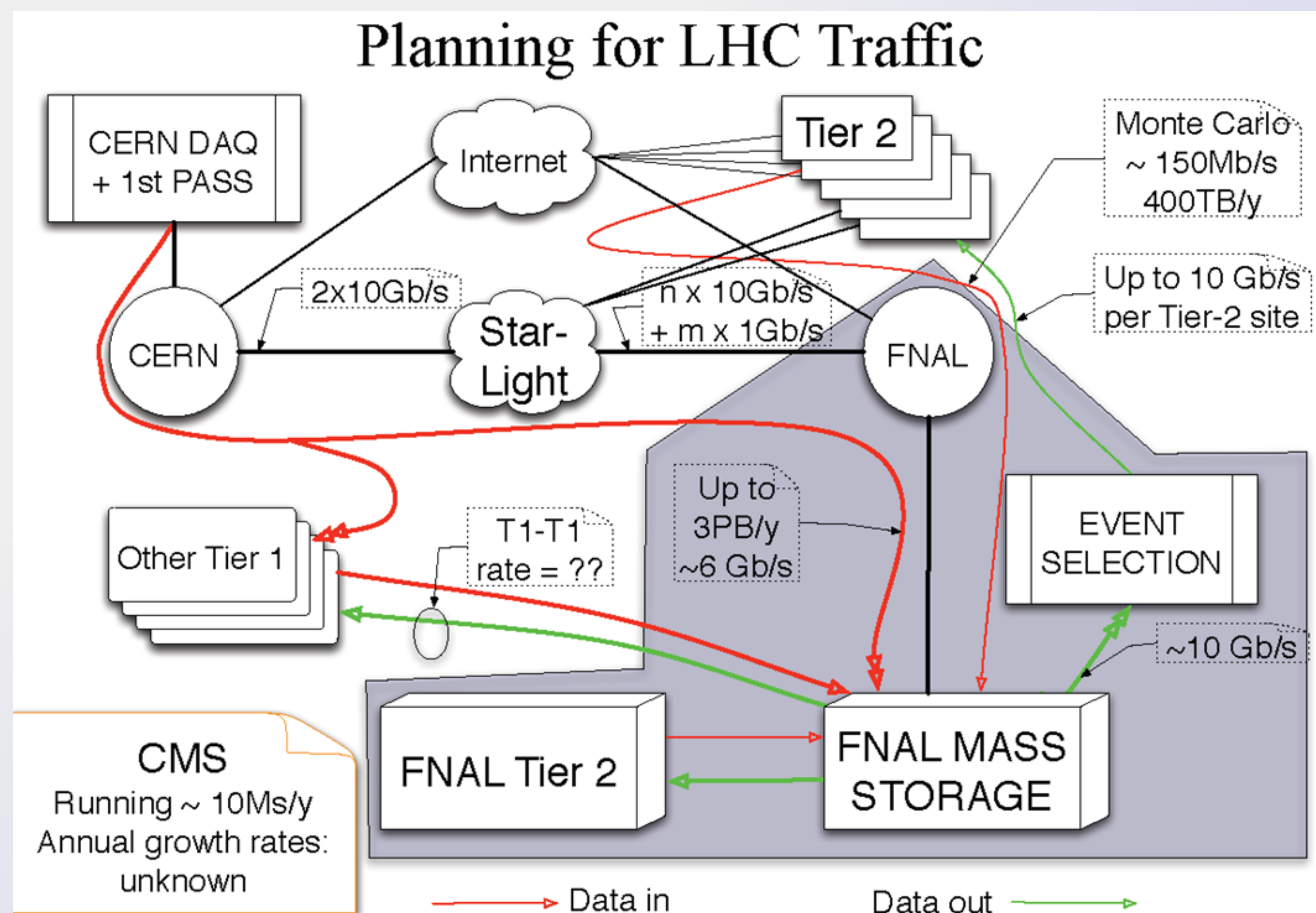


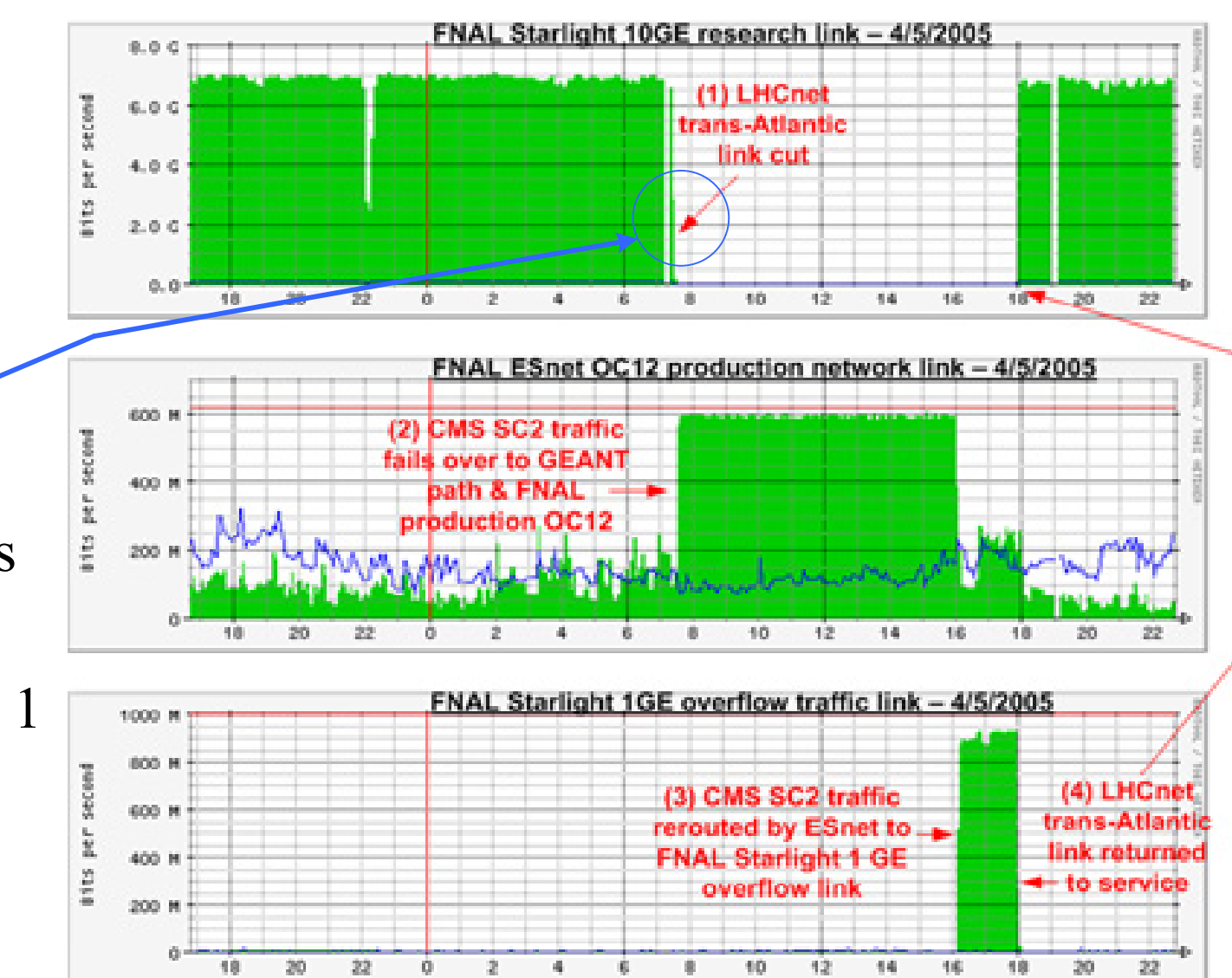
# UltraScience Net Wide Area Systems R&D Enabling LHC Physics



## CMS Robust Service Challenges: Moving Pre-Production Data in Preparation for LHC

### Service Challenge II (April, 2005)

- Sustained ~7 Gb/s for 3-4 days
- Again, storage system to storage system transfers
- CERN <-> StarLight link failed during test
  - Traffic failed over to alternate path, saturating 622Mb/s production network link
  - Network path manually rerouted onto FNAL StarLight 1 Gb/s channel
  - Restoration of CERN <-> StarLight link resulted in resumption of 7 Gb/s throughput



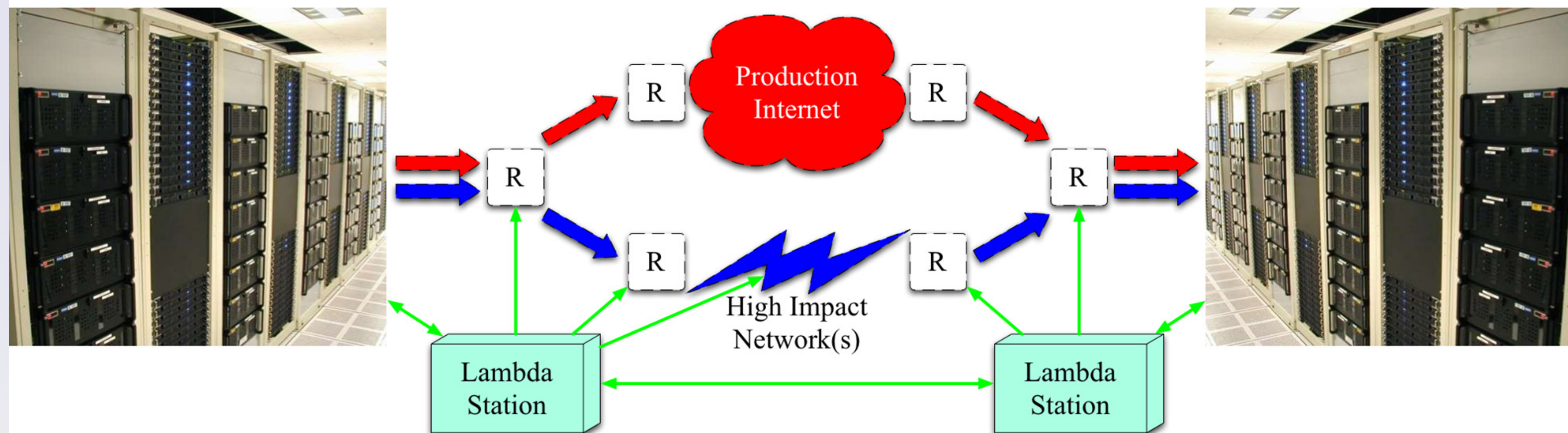
## Lambda Station Project

### Problem space:

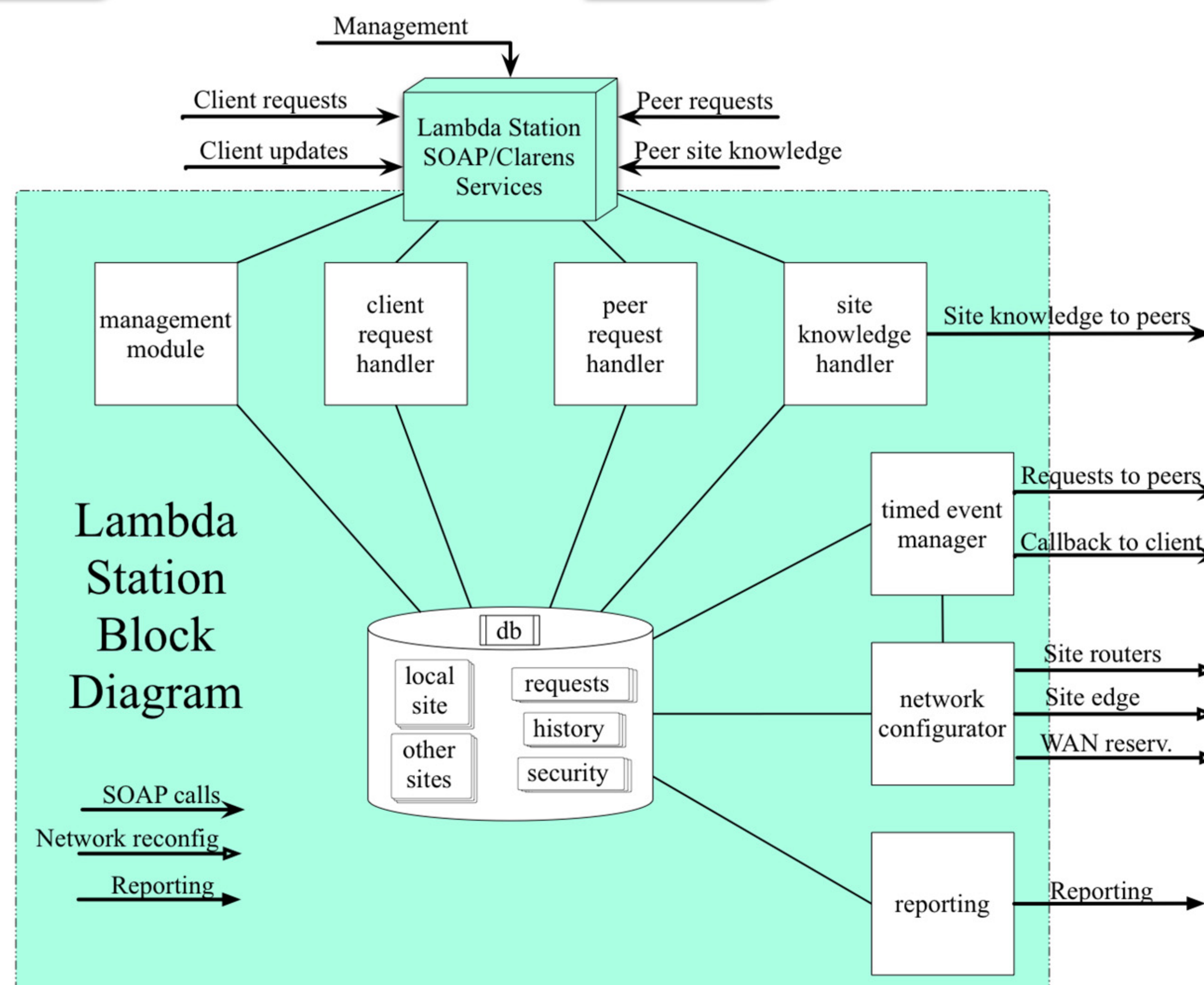
- "High impact" data movements benefit from special WAN links
- Other traffic should not be disturbed
- Hosts should not have to know network details
- Network administrators must retain control

### Lambda Station's function:

- Allocate network paths for high-impact applications
- Adjust internal site routing and site-edge routing
- Perform any required WAN reservation & setup actions
- Steer selected flows on the most granular possible basis



Lambda Station has a service-oriented architecture with grid security methods. It is built on the Clarens web services (SOAP) middleware.



## Effect of Lambda Station path changes on established TCP data flows

The figure below is a record of traffic sent from a single computer at Fermilab to a computer at Caltech. The traffic was a single TCP stream sourced from a dual 3GHz Xeon server with a 10 gigabit/second network interface.

The network configuration is similar to the diagram to the left, with the red network being ESNET and the blue network UltraScience Net.

One of the requirements on Lambda Station is that data connections must survive a change in the network path. In this test, the wide-area path was switched from the production network (ESNET) to the dedicated network (UltraLight) and back again. Corresponding changes in internal site routing were also made.

Lambdastation: Switching of path between ESNet and UltraScienceNet for traffic from Fermilab to Caltech by using DSCP tagging Men-to-Men iperf test, 1 stream, 10MB buffer. Date: 06/14/2005

