



Enabling Grids for E-science

## Advanced Network Services

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- **Introduction**
- **EGEE-II**
- **EGEE III**



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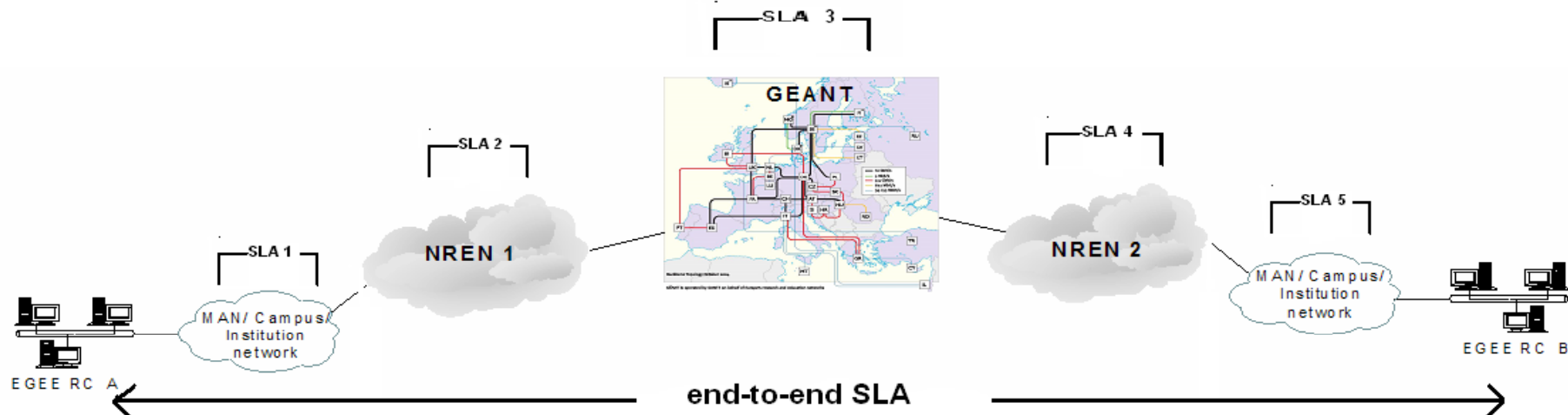
# Work in EGEE II

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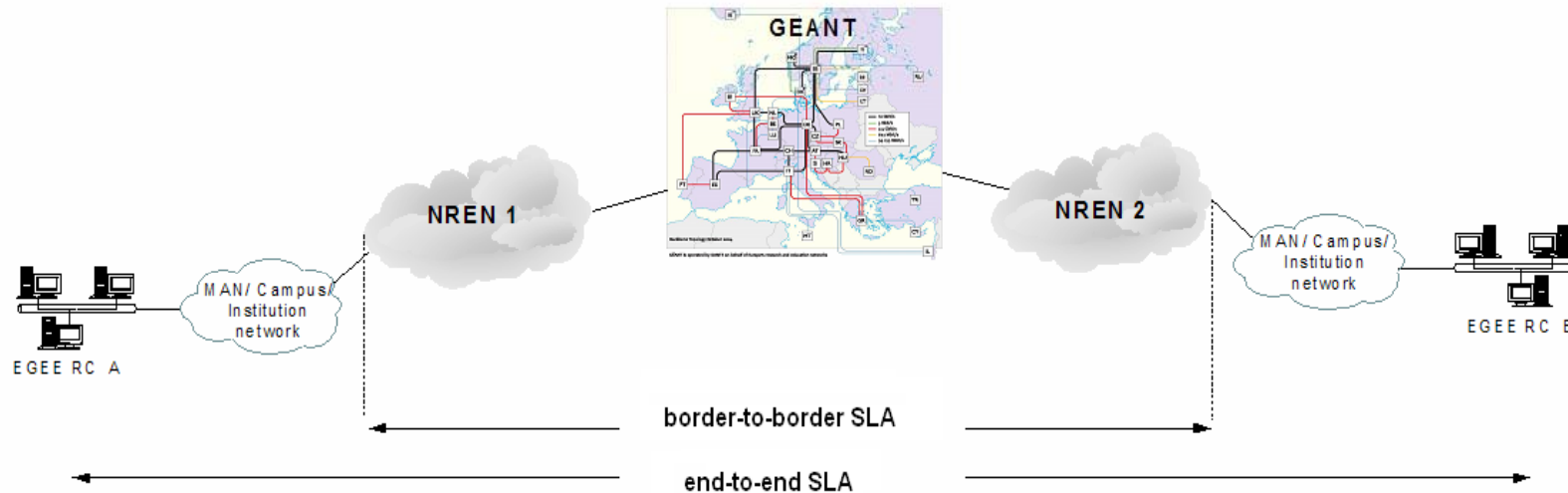
- **Model of SLA establishment**
- **Monitoring of SLAs**

- Defined network SLAs for e2e paths between EGEE Resource Centres
- Network SLAs provide technical and administrative details to perform:
  - Maintenance, Monitoring, Troubleshooting
- Synthesis of end-to-end SLA based on individual domain SLAs



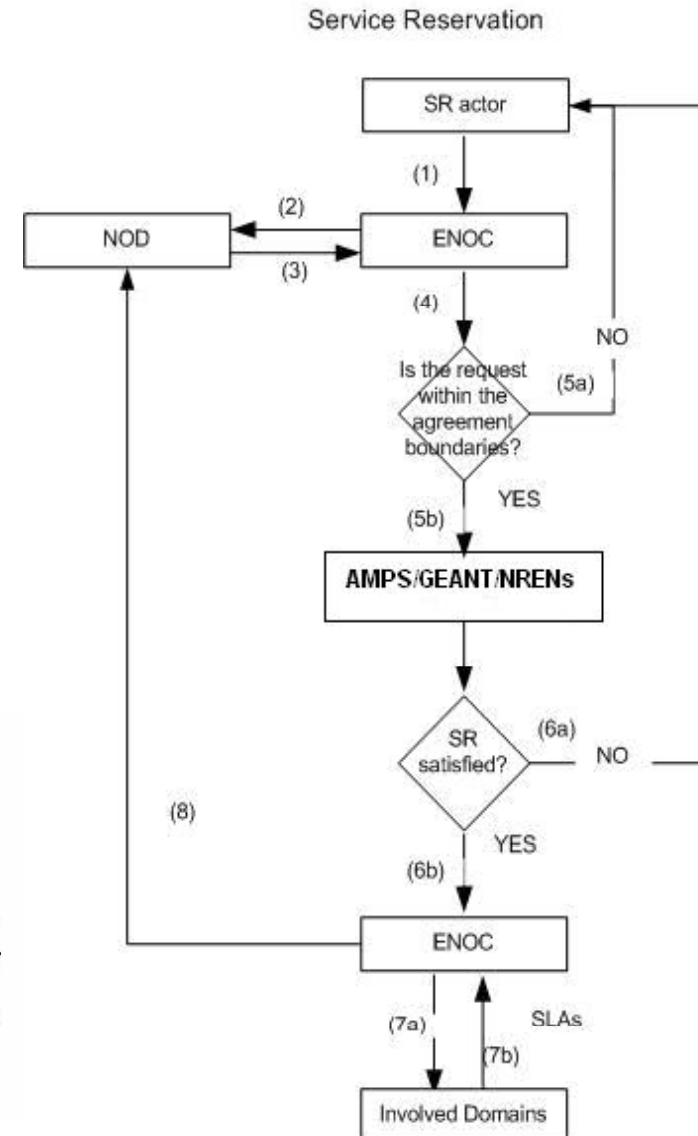
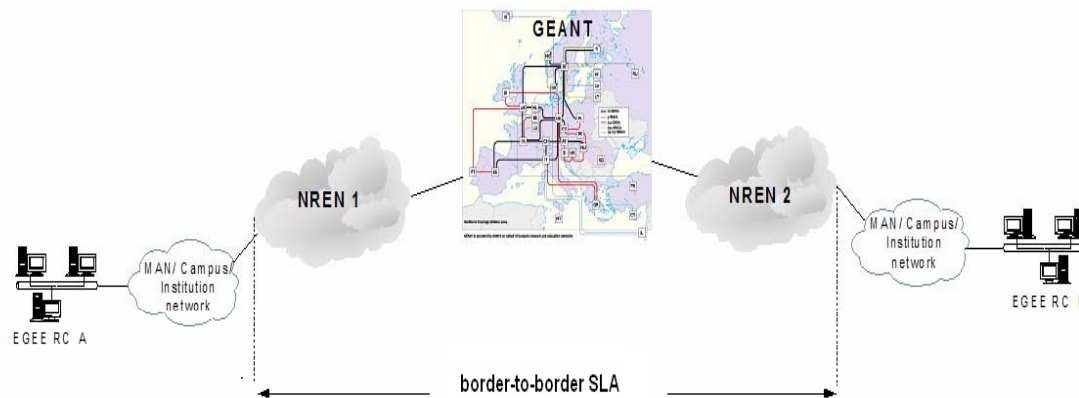
- **ALO (Administrative Level Object)**
  - Contacts
  - Duration
  - Availability
  - Response times
  - Fault handling procedures
- **SLO (Service Level Object)**
  - Service instance scope
  - Flow description
  - Performance guarantees
  - Policy profile
  - Excess traffic treatment
  - Monitoring infrastructure
  - Reliability guarantees: max downtime (MDT), time to repair (TTR)

- **Stage 1: In the Service Reservation (SR) stage:**
  - Service reservation in extended QoS network
  - border-to-border SLA (GEANT/NRENs SLAs)
- **Stage 2: In the Service Activation (SA) stage :**
  - Configuration of the routers in the last mile network
  - end-to-end SLA (b2b SLA + NREN client domains' SLAs)



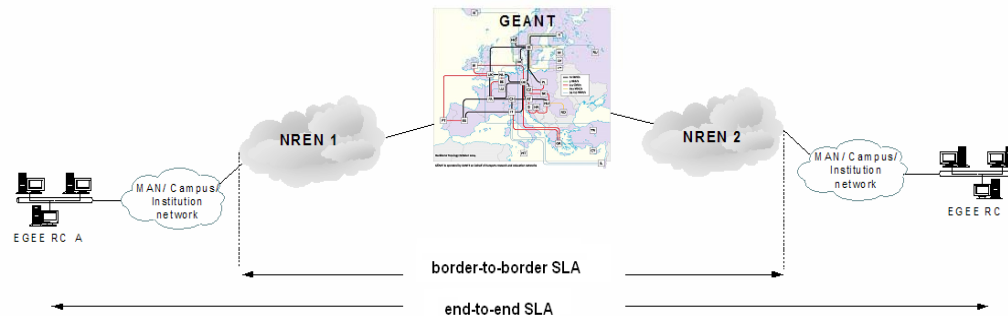
# Stage 1: Service Reservation (SR)

- Automatic service reservation via AMPS (Advanced Multi-domain Provisioning System)
- If no AMPS available : ENOC initiates manual requests to the involved domains
- If service reservation is successful, ENOC asks from involved domains to provide individual SLAs
- Synthesis of b2b SLA: performed by ENOC based on reported GEANT/NRENs SLAs

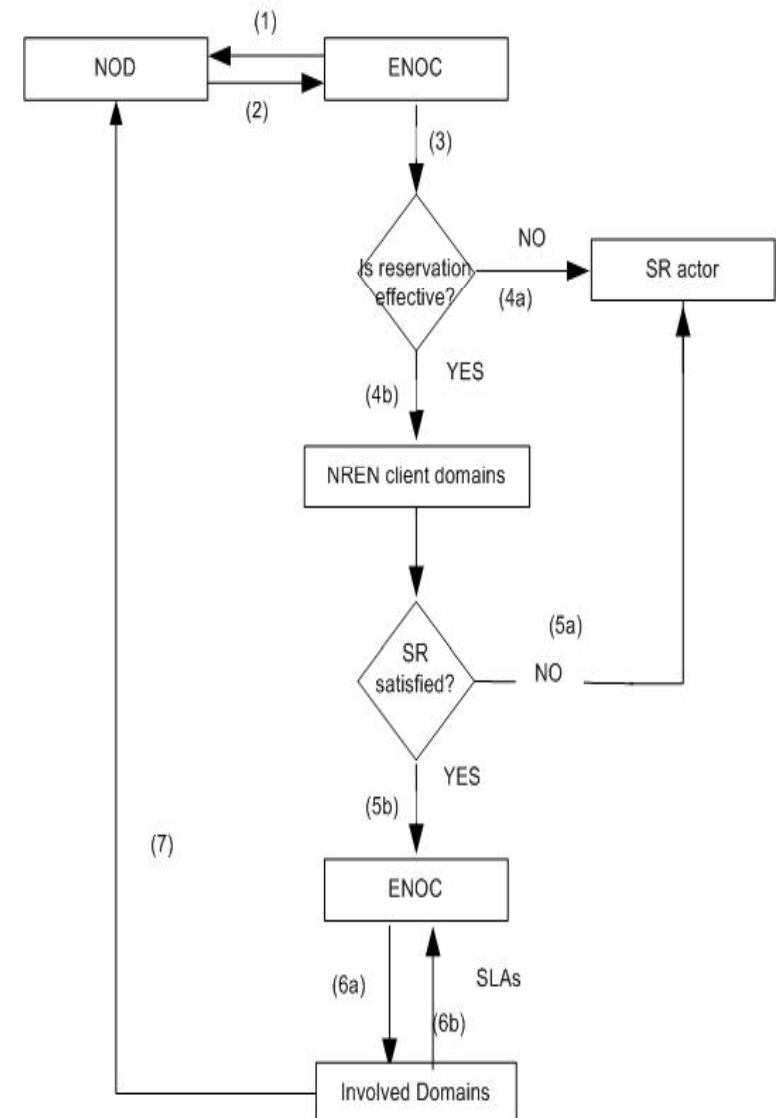




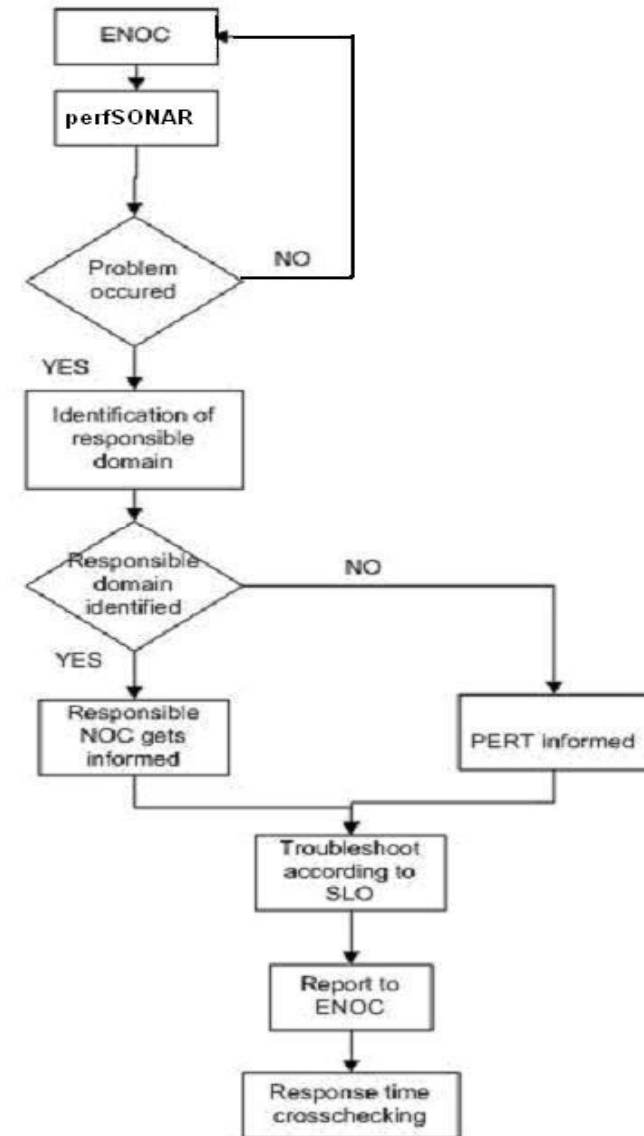
- ENOC verifies that the reservation in the extended QoS domain is still effective and retrieves it
- Checks if NREN client domains (MAN/campus/institution) can support the request
- NREN client domains provide their SLAs
- ENOC produces e2e SLA based on:
  - reported NREN client domains' SLAs
  - b2b SLA from stage 1



Service Activation



- **ENOC queries perfSONAR monitoring tools (BWCTL, OWAMP application)**
  - BWCTL: BandWidth ConTrolLer
  - OWAMP: One Way Active Measurement Protocol
- **Fault Identification/Notification**
  - Case 1: ENOC identifies & notifies responsible domain
  - Case 2: ENOC (not able to isolate the problem) informs GEANT PERT (Performance Enhancement Response Team)
- **Reaction-Repair according to SLAs**
- **ENOC checks SLA compliance**

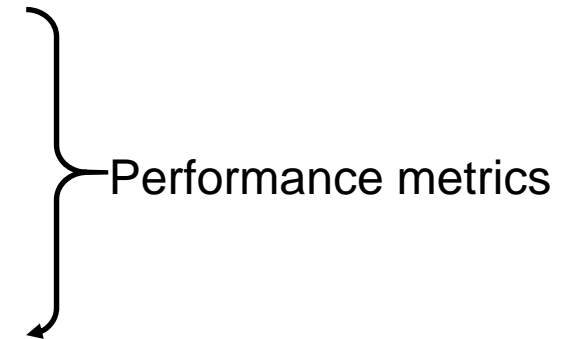


- **A Grid application scenario from the GRIDCC project was realized to test the SLA establishment and monitoring procedures**
- **Scenario targeted at remote control of grid instruments**
- **The assessment of this work was presented in the EGEEII DSA2.2.**

- Automatic service reservation through AMPS
- Manual SLA gathering from involved domains
- SLA monitoring:

- e2e Metrics:

- OWD (One Way Delay)
    - IPDV (IP Packet Delay Variation)
    - RTT (Round Trip Time)
    - Packet Loss
    - Bandwidth



- Monitoring procedure

- Frequent e2e monitoring of performance metrics (e.g. every 10') in agreed service availability period
    - Measurements gathered in RRD diagrams
    - Checking of RRD diagrams for metric violation

# Work in EGEE III

- **SLA automation through AMPS**
- **Pose of SLA Monitoring Requirements**
- **Web interface for SLA service usage**
- **Categorization of GRID application requirements**
- **Evaluation of SLA in GRID applications (projects)**
- **Dissemination Work**

- The SLA establishment procedure in the EGEEII tests was not so effective due to the lack of automated mechanisms
- SLA mechanisms are being implemented in AMPS in a multi-domain environment
  - Use these mechanisms to make the SLA procedure more automatic
  - Integrate EGEE SA2 SLA with SLA module of AMPS
  - In case AMPS is not available in all domains in e2e path
    - Merge SLA of AMPS with individual per domain SLAs

- **SLA monitoring in EGEE 2 through the perfSONAR**
- **Lack of triggering mechanisms to automate the procedure and generate alarms**
- **Need for development of automatic mechanisms to :**
  - Set thresholds on metrics
  - Generate violation alarms



- **Creation of a web interface for SLA service usage**
  - Description of SLA service
  - Procedure for SLA reservation
  - 2 parts: user and admin
    - User part: Form that the user will fill in his data and request an SLA
    - Admin part: Gathering of user data, storing to a DB and forwarding the user SLA request to the AMPS clients or respective domains for the SLA reservation

- **Collaborations with various projects**
  - Clermont (User Forum)
  - ArguGRID
- **Interest for SLA service**
- **Categorize their requirements for SLA metrics**

- **Collaboration with other projects**
- **Test of SLA service in project applications**
- **SLA evaluation for different application scenarios**

- **Past dissemination work in EGEEII**
  - EGEE '07 session “what the network can do for you?”
  - EGEE User Forum '08, Clermont
- **Future dissemination work in EGEEIII**
  - Advertise to projects what the network can offer to their applications
  - Web page with SLA description in EGEE SA2 site
  - Participation in relative conferences

- **Collaboration with AMPS SLA development team**
- **AMPS in bug fixing mode. Delayed till 2/09.**
- **Dissemination of SLA work in OGF and other conferences**
- **Search of applications interested in network SLAs**
  - Collaboration with RedIRIS
- **First design of the requirements of the SLA site**

- **Issues**

- SLA module of AMPS works only inside AMPS cloud
  - If e2e SLA comprises of campus domains then e2e SLA will be derived from merging of AMPS SLAs+campuses SLA
- Currently AMPS provides BW measurements
  - NRENs do not wish to expose their network data
  - RTT, OWD, Jitter will have to be taken by the IPPMs

- **Collaboration with other projects to find applications needing network SLAs**
- **Gathering of application requirements**
- **SLA Monitoring requirements to be discussed with perfSONAR team**
  - For SLA monitoring to become more automatic
- **Evaluation of SLA through application testing**
- **Investigation of new advanced network services (AutoBHAN) for BoD in GEANT**

