

# **QoS in GÉANT and the GN2 project**

## **Workshop 32**

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# Topics

- **QoS in GÉANT**
- **The Premium IP service in GÉANT**
- **End to End Quality of Service in GN2**

## Evolution of QoS in GÉANT

- **Nov 00** - Sequin project started
- **Jan 01** - H.323 Trial using Premium IP
- **May/Sep** - Four projects (multiple connection) have requested and used Premium IP on GÉANT
- **Aug 02** - LBE trial in collaboration with Datagrid project and with help from Spirent
- **Jan 03** - LBE and Premium IP on GÉANT
- **2004** - Premium IP reservation tool

# Quality of Service on GÉANT

- **GÉANT uses DiffServ to implement QoS**
  - Traffic is classified based on the DSCP in the IP header
  - Currently IPv4 only
- **QoS classes on the GÉANT network**
  - Premium IP (IPv4)
  - Best-Effort (IPv4, IPv6)
  - Less than Best-Effort (IPv4)

## Best effort

- **Packets marked with unassigned DSCP values are forwarded as best-effort**
  - DSCP value is forwarded transparently in GÉANT
  - Congestion in best-effort is transparent to Premium IP traffic
- **Applications**
  - Time insensitive applications: FTP, HTTP, etc. traffic

## Less than Best Effort

- **LBE uses the capacity unutilised by the higher priority traffic classes**
  - LBE congestion is transparent to BE and Premium IP
  - No advance reservations required
- **DiffServ CodePoint (DSCP) = 8**
  - Same as Internet2 scavenger service
- **Application scenarios**
  - Mirroring
  - Test traffic
  - Protection of research traffic from student dormitory traffic

# Premium IP (1)

- **Premium IP service**

- Advance reservation required (admission control)
- Maximum 10% of link capacity may be used by Premium IP
  - may be exceeded in case of circuit failures
- Destination aware service
  - reservation per source/destination pair

- **Performance metrics**

- one-way delay
- one-way delay variation ('jitter')
- packet loss

## Premium IP (2)

- **DiffServ CodePoint (DSCP) = 46**
  - Authorised traffic: policed at the ingress
    - In-profile traffic is sent to the expedited forwarding queue
    - Out-of-profile traffic is discarded
  - Un-authorized traffic: remarked and forwarded as best effort
- **Applications**
  - Support QoS research projects
  - Real-time applications (e.g. video conferencing)

# Requesting PIP Service in GÉANT

- **Potential users of PIP (applicants) contact their NREN**
  - Reason
  - Source & destination IP address prefixes
  - Technical points of contact
  - Duration of service, requested capacity
- **NREN considers application and checks that requested bandwidth is compatible with the user's path to GÉANT**
- **If NREN approves of application – contact DANTE**

# Bandwidth Reservation

- **Authorised applicants**
  - NREN makes the GÉANT PIP reservation
- **Current method**
  - E-mail form available on DANTE/GÉANT website
- **New method – On-line reservation tool**
  - Models the GÉANT network
  - Tracks all PIP requests
  - Refuses requests which would mean that PIP exceeded 10% of any given links capacity

# The Future of European QoS

# GN2

- **The Project**

- GN2 (an EU Framework Program (FP) 6 project) to start Sep 04

- **The Network**

- GÉANT replacement network to be delivered as part of GN2 project

- **The Service**

- GN2 Service Activity 3 - ‘End to End Quality of Service’

- **The Users**

- GN2’s PIP ‘users’ will include programs, such as middleware planned by the EGEE project

## SA3 – End to End Quality of Service

- GN2 will enable users to request a premium IP service across multiple domains (i.e. the core network and those NRENs who are compliant with the GN2 standards)
- PIP to be provided (initially) by Over Provisioning and DiffServ
- GN2 will be committed to giving users the network performance they require and helping them get the best performance from their equipment

# Reserving Bandwidth in GN2

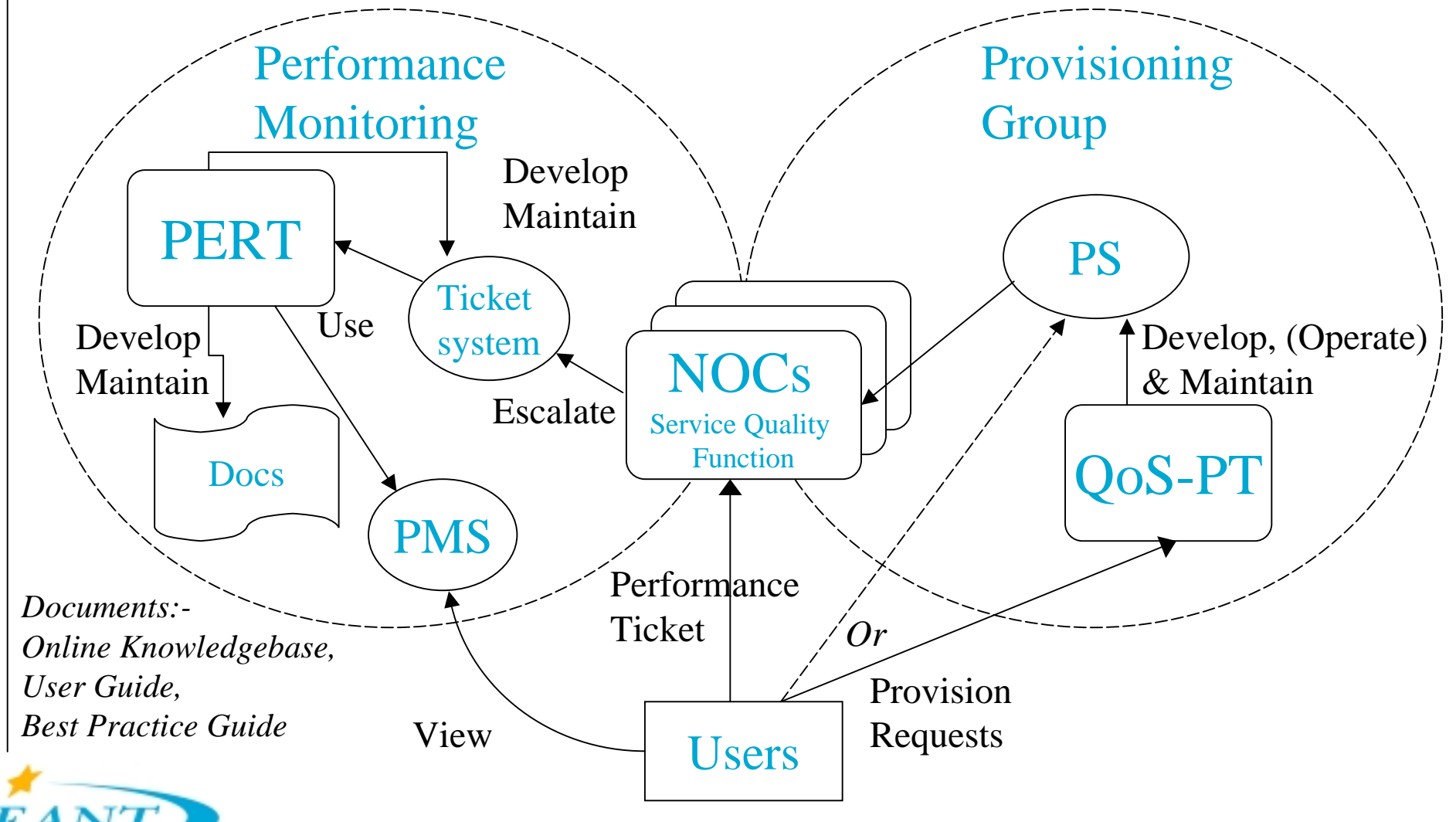
(As currently envisaged)

- For the PIP applicant, process similar to the current procedure
- Each SA3-compliant network will have a reservation system
  - Receive requests from PIP applicants
  - Check service availability
  - Reject request or forward request to next domain
- A policy will be developed to prioritise requests

## Performance Monitoring in GN2

- GN2 SA3 will guarantee levels of service, therefore service must be measurable
- To be SA3-compliant, networks will need to have an appropriate number of performance measurement points
- Measurement points should be capable of using a standard protocol (e.g. OWAMP) for tests, so that tests can be run between domains

# Proposed SA3 Organisation



# Questions?

# Queue configuration

- **The GEANT network uses Juniper M160 routers**
  - Weighted Round Robin (WRR) scheduling
  - Four queues per port
    - Premium IP has absolute priority
    - Best-effort is assigned 90% of the capacity
    - Less than Best-Effort is assigned 5% of the capacity
    - Network-control queue is assigned 5% of the capacity



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