Less-than Best-Effort Services

T.Ferrari

Tiziana.Ferrari@cnaf.infn.it

Overview

- The phylosophy behind LBE
- LBE for which applications?
- Implementation and configuration examples
- Deployment scenarios
- Work programme

The phylosophy behind LBE

- *A very small percentage of network capacity is allocated to LBE so that under congestion best-effort traffic and any higher-priority traffic class is protected from LBE traffic, in other words, the large amount of remaining network capacity can be allocated to non-LBE traffic*

- Result 1: LBE is more penalized than best-effort under congestion
- Result 2: performance of best-effort and higher classes should be better under congestion in comparison with the performance experienced with a *flat* service model

- QBone Scavenger Service: based on the LBE phylosophy

LBE for which applications?

- LBE is suitable for applications tolerant of large
  - Packet loss
  - High delay
  - Jitter
- Not suitable for high-performance TCP-based applications (even if QBSS was succesfully tested at SC2001 with HEP high-performance TCP applications)
- Could be very helpful to protect production traffic from test bulk traffic (DataGRID project)
- For applications based on non-TCP compliant stack implementations (debatable application case)
- The community of potential users has to be clear

Implementation

- QBSS codepoint: 001000
- WRR and WFQ schedulers can be used to control the amount of link capacity assigned to LBE traffic
- Independent queue dedicated to LBE if possible
- deployment of WRED for differentiation between best-effort and LBE not sufficient, for example for its impact on delay and IPDV of best-effort packets
- No policing and scheduling issues
- Marking: performed by the end-system

Examples of LBE configuration (from QBSS)

- CISCO (WRR, DRR, WFQ):

```
class-map match-all qbss
     match ip dscp 8
!
policy-map qos-policy
     class qbss
          random-detect
          queue-limit
          bandwidth percent 1
class class-default
          random-detect
```

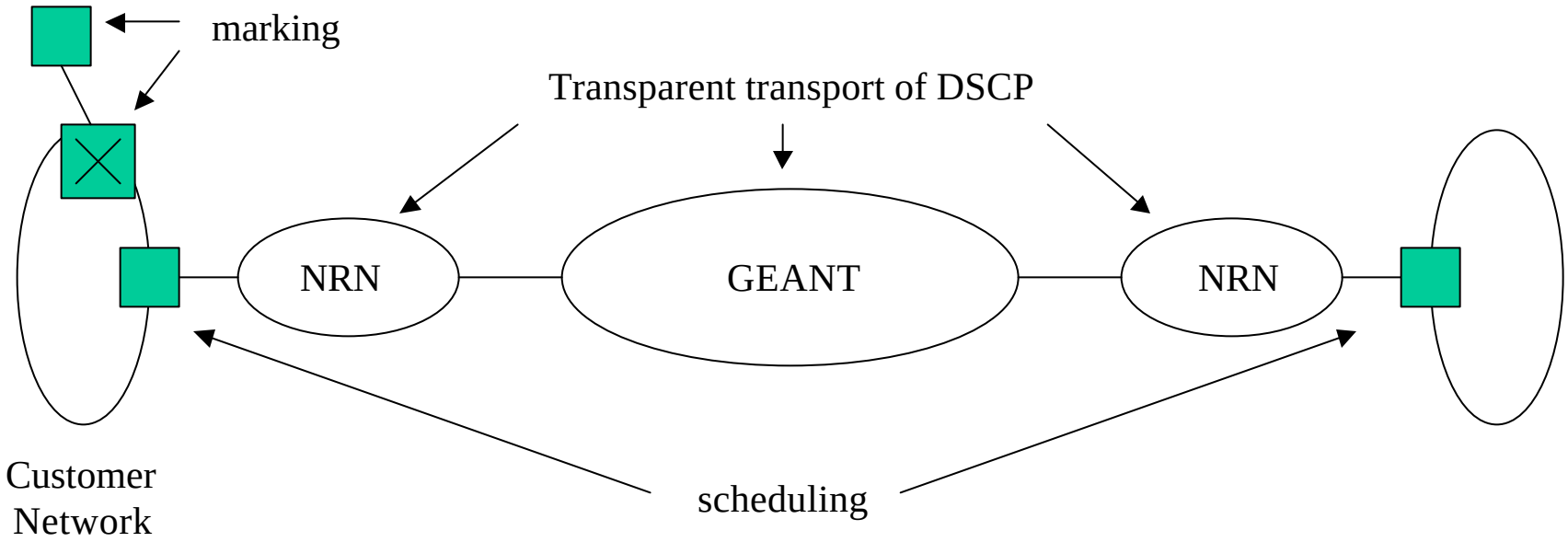
Examples of LBE configuration (from QBSS) - cont

- JUNIPER (WRR):

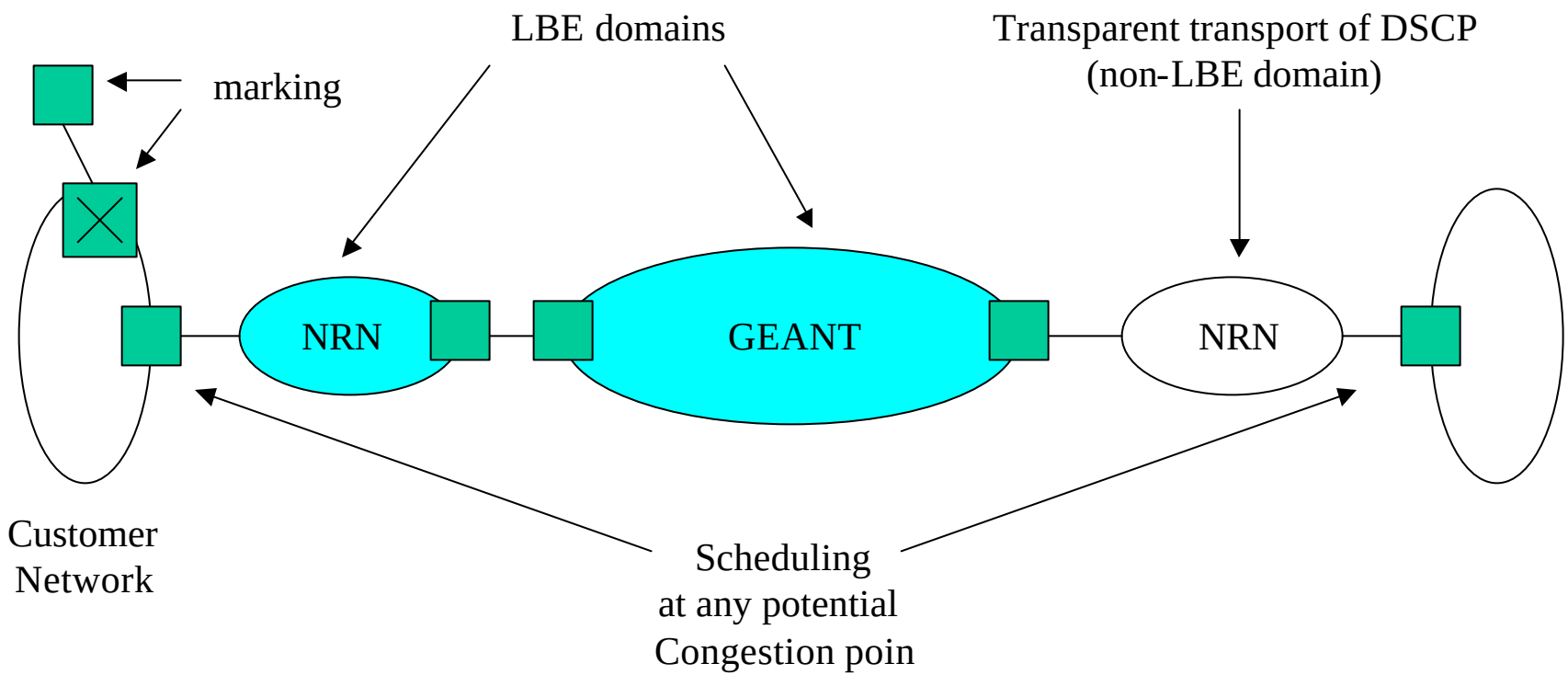
```
class-of-service {
      input {
         precedence-map qbss {
            bits 000 queue 1;
            bits 001 queue 0;
            bits 010 queue 1;
            bits 011 queue 1;
            bits 100 queue 1;
            bits 101 queue 1;
            bits 110 queue 3;
            bits 111 queue 3;
         }

         fpc 1 {
            precedence-map qbss;
         }

         interfaces {
            ge-1/0/0 {
               inet-precedence-map;
            }
         }
      }
```

```
      output {
            interfaces {
               so-1/0/0 {
                  weighted-round-robin {
                     output-queue 0 weight 1;
                     output-queue 1 weight 94;
                     output-queue 2 weight 0;
                     output-queue 3 weight 5;
                  }
               }
            }
         }
   }
```

Deployment scenarios (1): customer-based



Deployment scenarios (2): customer and NRN/GEANT-based



Work programme

- Identification of interested NRNs and end-users

- Phase 0: service specification
- Phase 1: baseline testing of implementation, study of LBE implementation feasibility (in GEANT and NRNs)
- Phase 2: performance analysis in user-based scenario (test cases to be identified, DataGRID testbed sites?) *supported by the production network*
- Phase 3: implementation of user and GEANT/NRN-based scenario, on *production network* if possible, preliminary lab tests where needed
- Experiments with USA partners (QBSS)