

# LBE testing on GÉANT

Tiziana Ferrari

DataGRID – GÉANT Collaboration

# LBE testing in GÉANT PoPs

- Objectives:
  - correctness of the LBE configuration adopted in the PoPs
  - effectiveness of the protection of best-effort traffic from LBE traffic
  - LBE proof of concept
  - Effect of congestion in the LBE queue on:
    - BE and LBE round trip time (one-way delay?)
    - BE and LBE packet loss
    - BE and LBE throughput
    - performance of LBE TCP streams
  - SNMP-based monitoring of QoS parameters

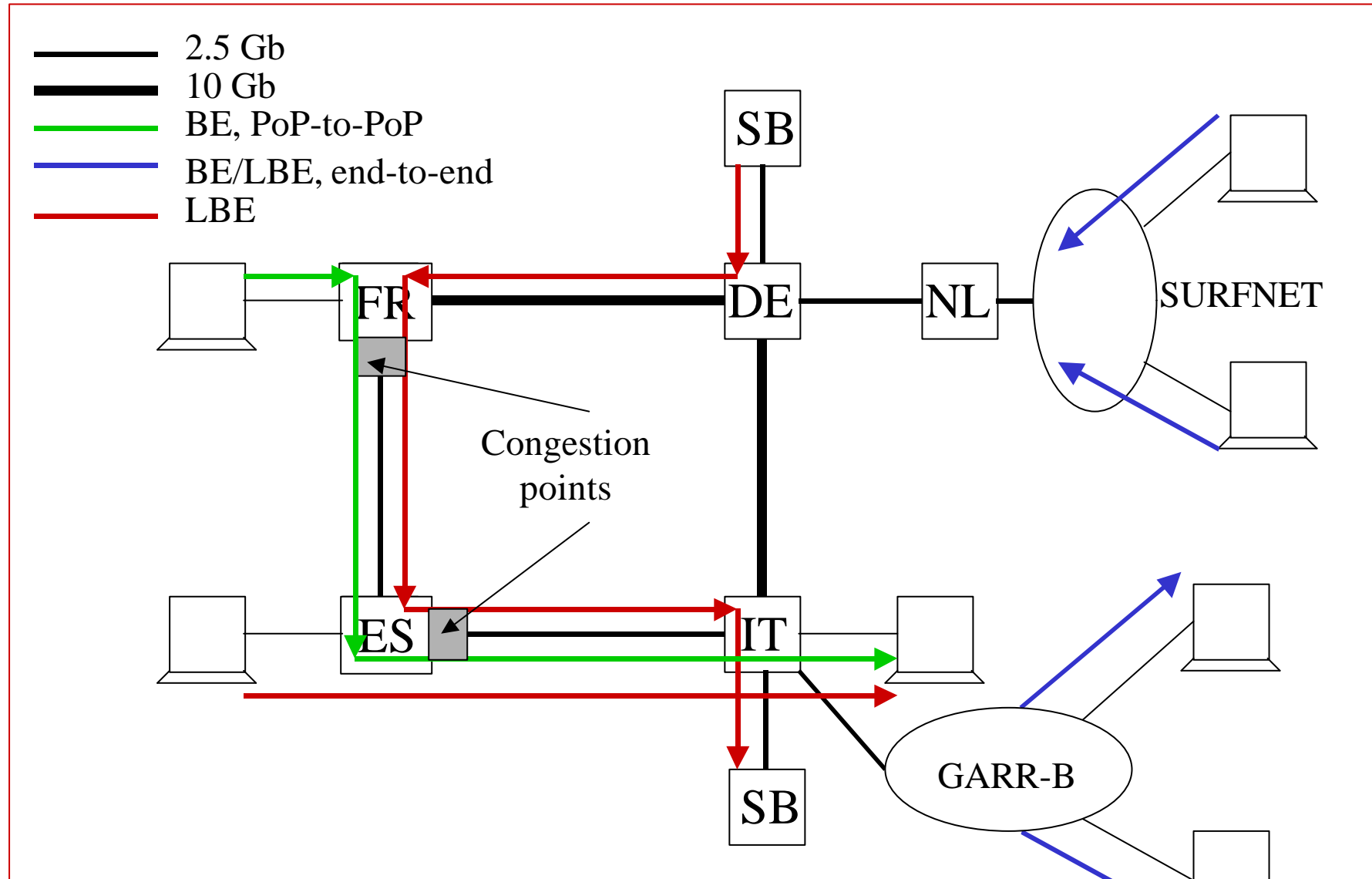
# Test traffic

- LBE:
  - UDP streams (one or more) generated by the SmartBits
  - Additional low-rate UDP stream generated by test workstation
  - Rate: 2 G or more when generated by the SmartBits, at a lower rate if generated by a workstations but sufficient to have an additional congestion point
- BE:
  - TCP streams (not necessarily at high speed) injected by workstations in PoPs
  - One or more TCP streams depending on test
  - Low rate
- PoP-to-PoP and/or end-to-end
  - End-to-end: in-depth analysis of TCP performance in real life scenarios
  - PoP-to-PoP: simpler to debug in case of problems (no interference with production traffic from/to edge customer networks)

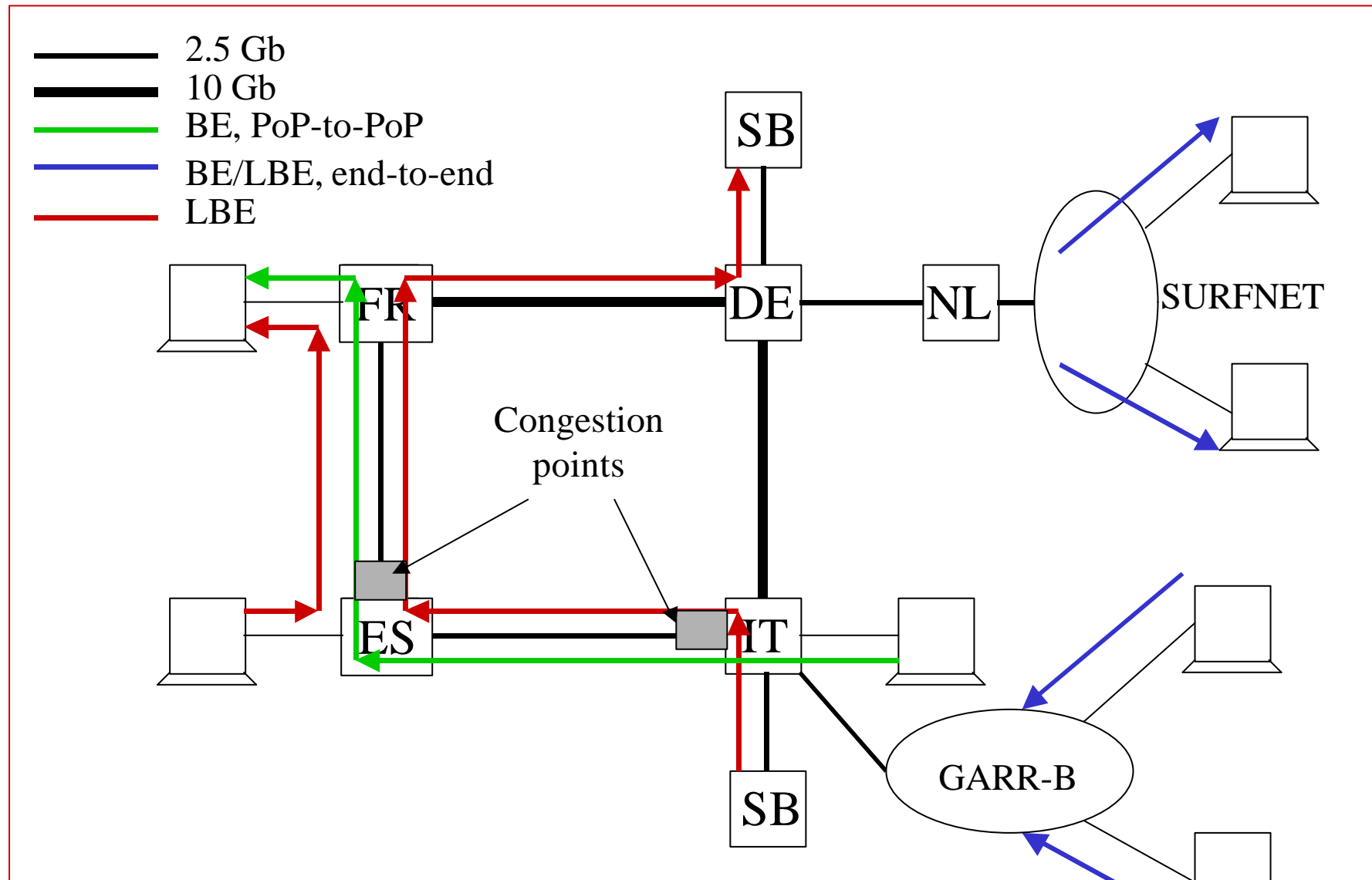
# LSPs

- Use of LSPs to force streams to follow a given data path and produce congestion in router interfaces where LSP is enabled
  - LSPs (one for each direction) between SmartBits (2.5 G interfaces)
  - LSPs between workstations in PoPs (secondary address needed ?)
  - LSPs for end-to-end BE traffic (?)

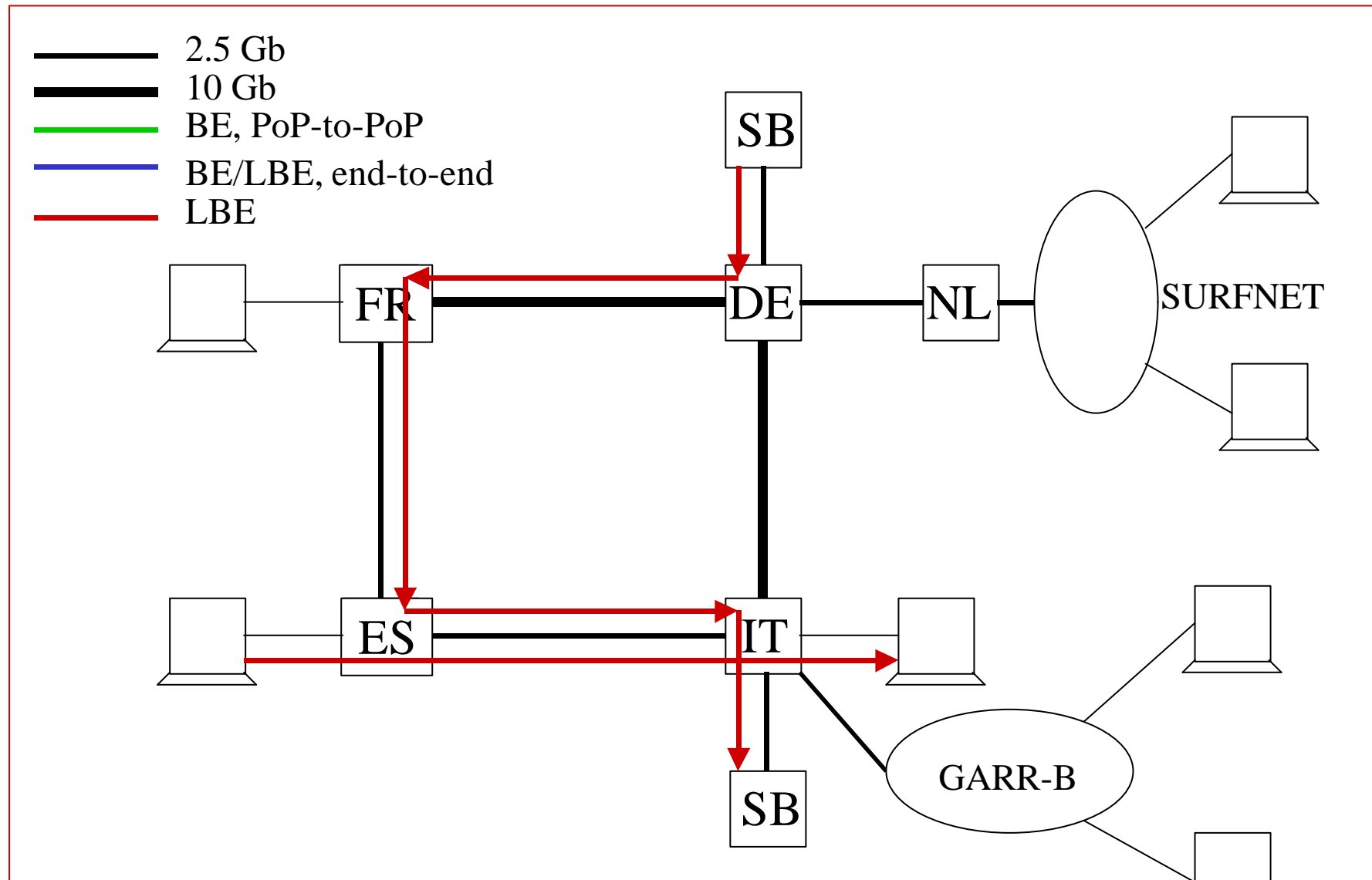
# Topology: DE → FR → ES → IT



# Topology: IT → ES → FR → DE



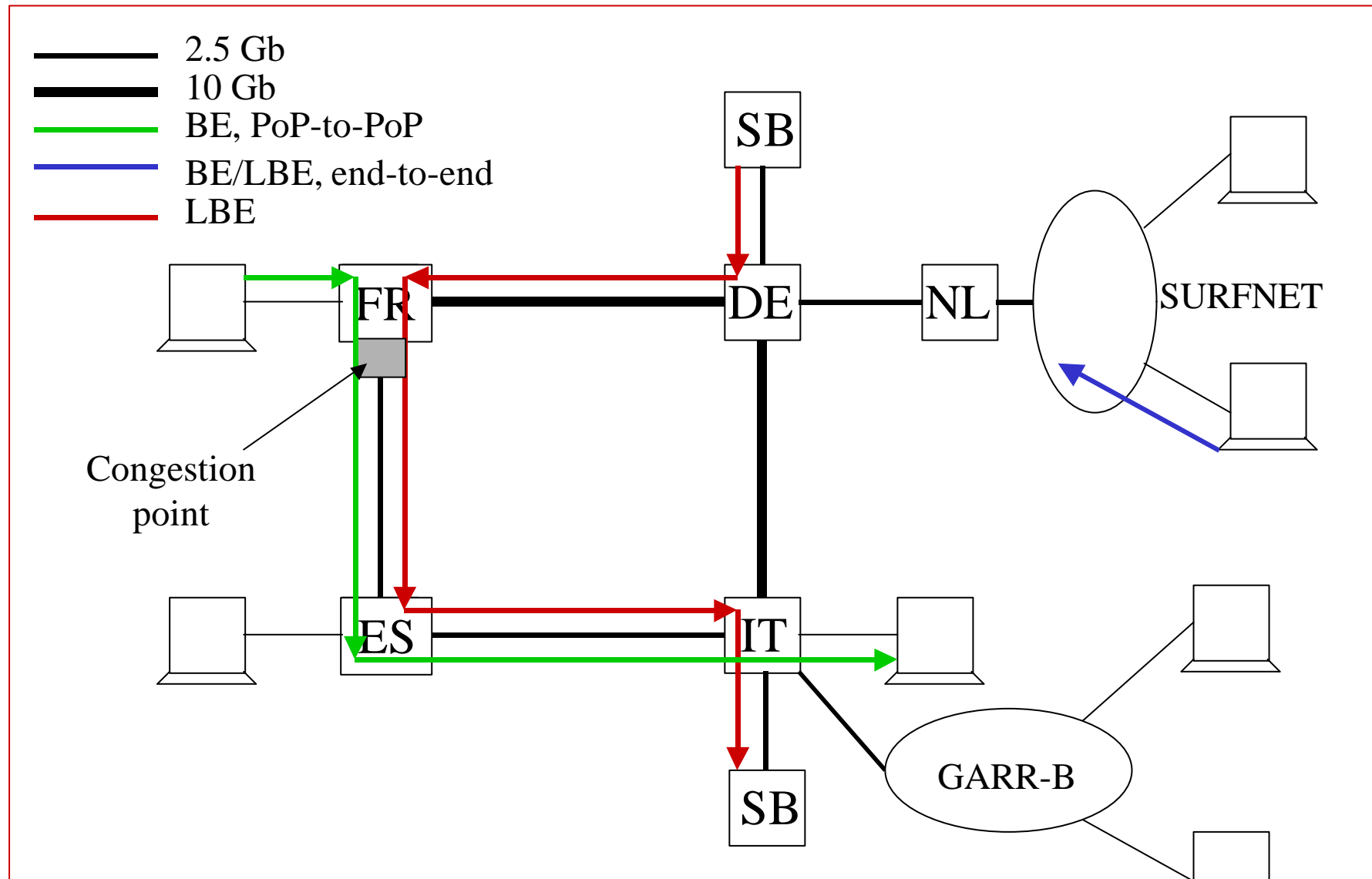
# Test 1: 1 and/or 2 UDP streams, no congestion



## Test 1: 1 and/or 2 UDP streams, no congestion

- To measure baseline UDP performance
- Parameters:
  - Number of UDP streams (1 and 2)
  - UDP rate [100, 2000] Mb/sec
  - Test 1.1: BE
  - Test 1.2: LBE
- Performance metrics:
  - Packet loss probability
  - Packet loss distance and length
  - throughput

## Test 2: 1 LBE stream, 1 BE stream - no congestion -



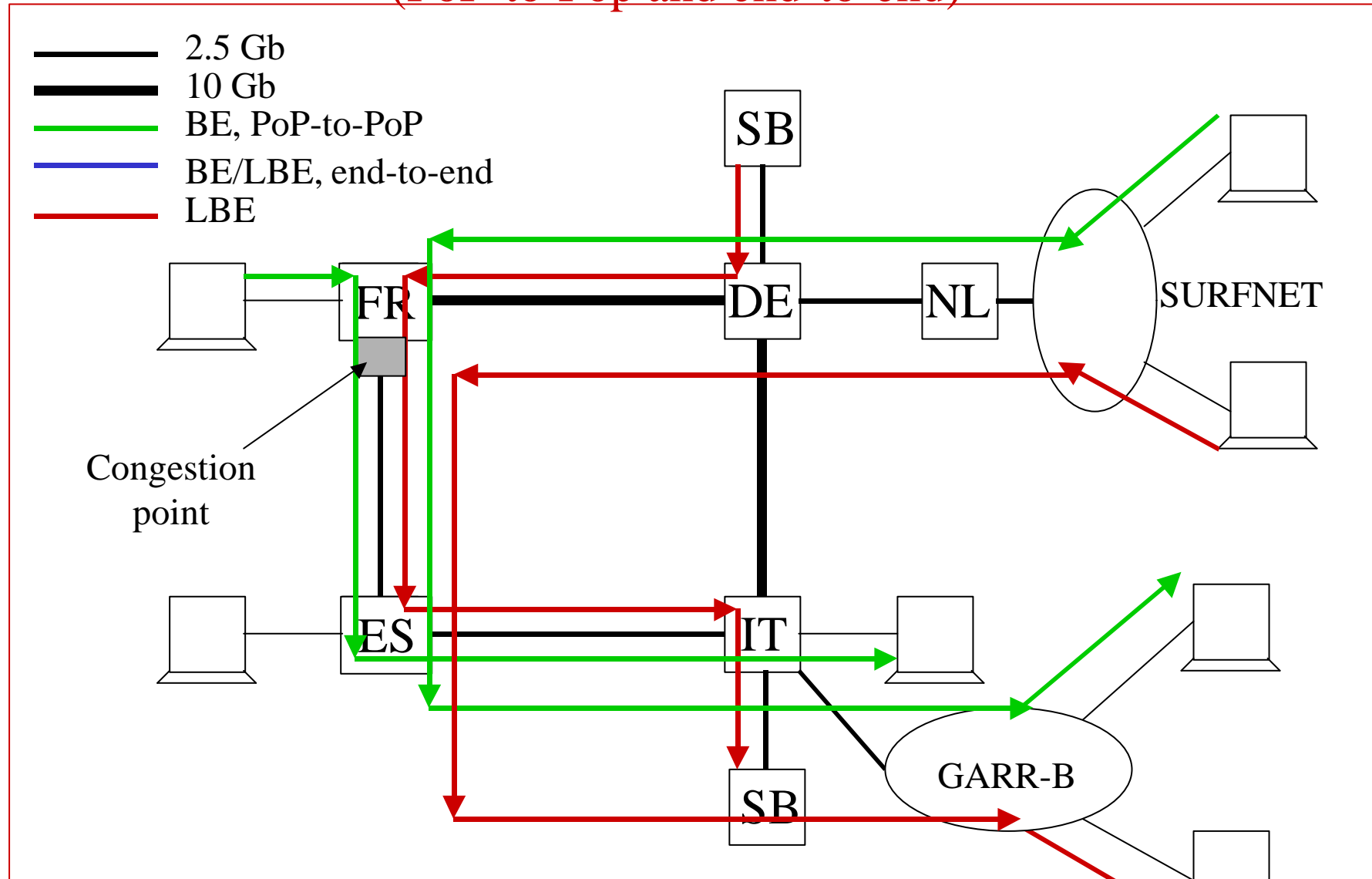
## Test 2: 1 LBE stream, 1 BE stream - no congestion -

- *To measure baseline UDP LBE and TCP BE performance without congestion*
- Parameters:
  - UDP rate [100, x] Mb/sec (x depends on average production traffic load, congestion has to be avoided)
- Performance metrics:
  - BE and LBE Packet loss probability
  - BE and LBE packet loss distance and length
  - BE and LBE throughput
  - On routers: LBE and BE packet loss rate, instantaneous queue length (?)

### Test 3: 1 LBE stream, 1 BE stream - with congestion -

- *To measure baseline UDP LBE and TCP BE performance with congestion*
- Parameters:
  - UDP rate [100, x] Mb/sec (x depends on average production traffic load, sufficient to cause congestion)
- Performance metrics:
  - BE and LBE Packet loss probability
  - BE and LBE packet loss distance and length
  - BE and LBE throughput
  - BE and LBE round trip time (tested in both cases between workstations)
  - On routers: LBE and BE packet loss rate, instantaneous queue length (?)

# Test 4: 2 LBE streams, 2 BE streams - with congestion – (PoP-to-Pop and end-to-end)



## Test 4: 2 LBE streams, 2 BE streams - with congestion – (PoP-to-Pop and end-to-end)

- *To measure baseline UDP LBE and TCP BE performance with congestion both from PoP to PoP and end-to-end (P2P, e2e)*
- Parameters:
  - Overall UDP rate = x Mb/sec (x depends on average production traffic load, sufficient to cause congestion)
- Performance metrics:
  - BE and LBE Packet loss probability (P2P, e2e)
  - BE and LBE packet loss distance and length (P2P, e2e)
  - BE and LBE throughput (P2P, e2e)
  - BE and LBE round trip time (tested in both cases between workstations) - (P2P, e2e)
  - On routers: LBE and BE packet loss rate, instantaneous queue length (?)