

ROB_{IN} Performance Measurements

I. Mandjavidze

CEA Saclay, 91191 Gif-sur-Yvette CEDEX, France

ROB Complex Hardware Organisation

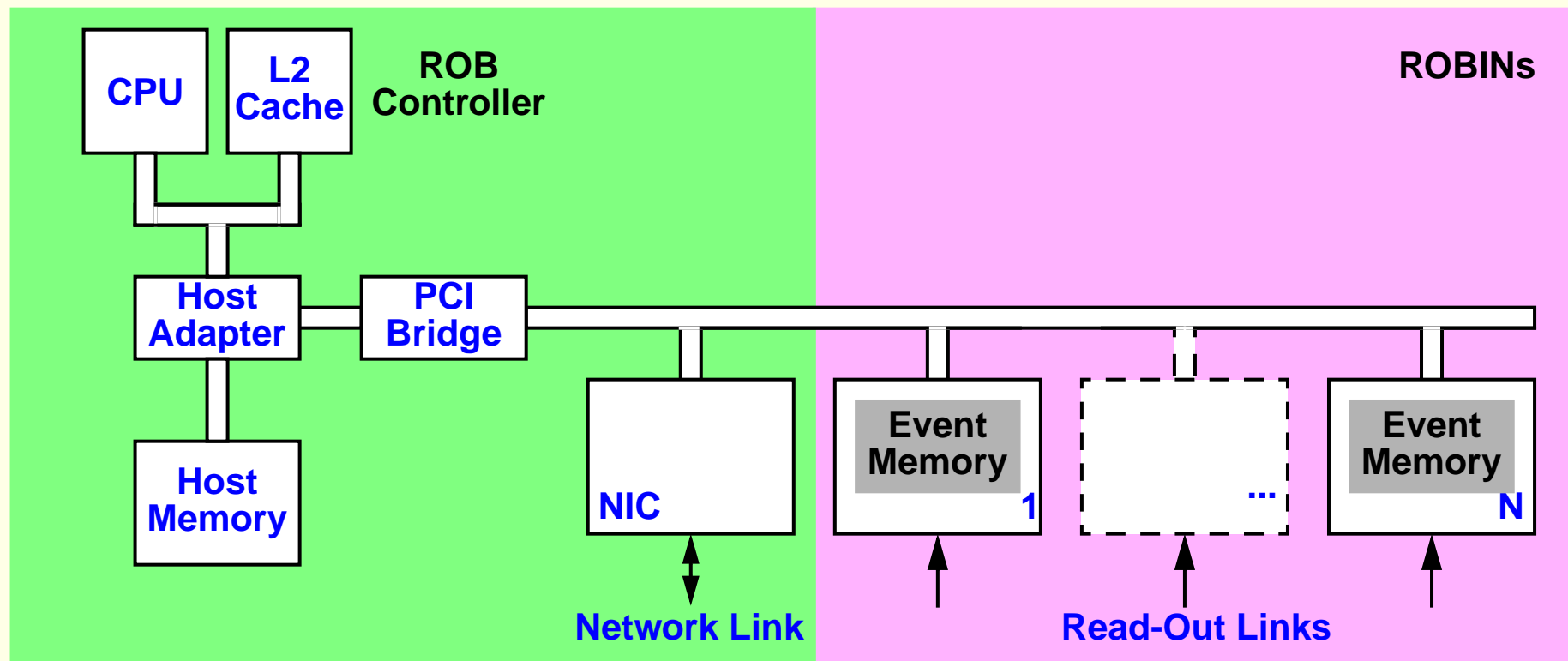
Mode of Operation

ROB Complex Software Organisation

Performance Measurements

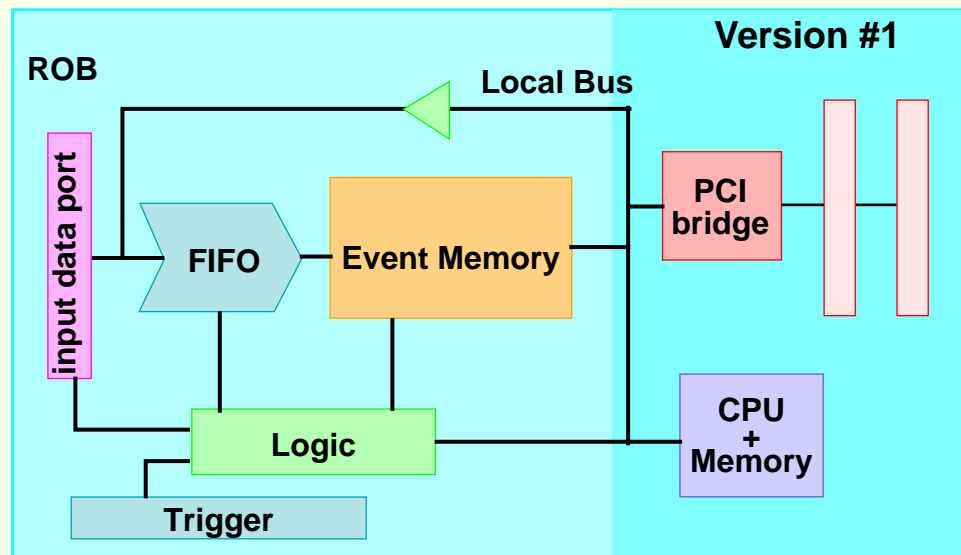
Discussion

Saclay ROB Complex Hardware Organisation



- ROB Controller is based on either PowerPC VME/CompactPCI SBC, or on PC
- Same network connection serves for L2 / DAQ dataflow, run control and monitoring
- Host memory and ROBINs event memories are directly accessible to NIC

Saclay ROB_{IN}

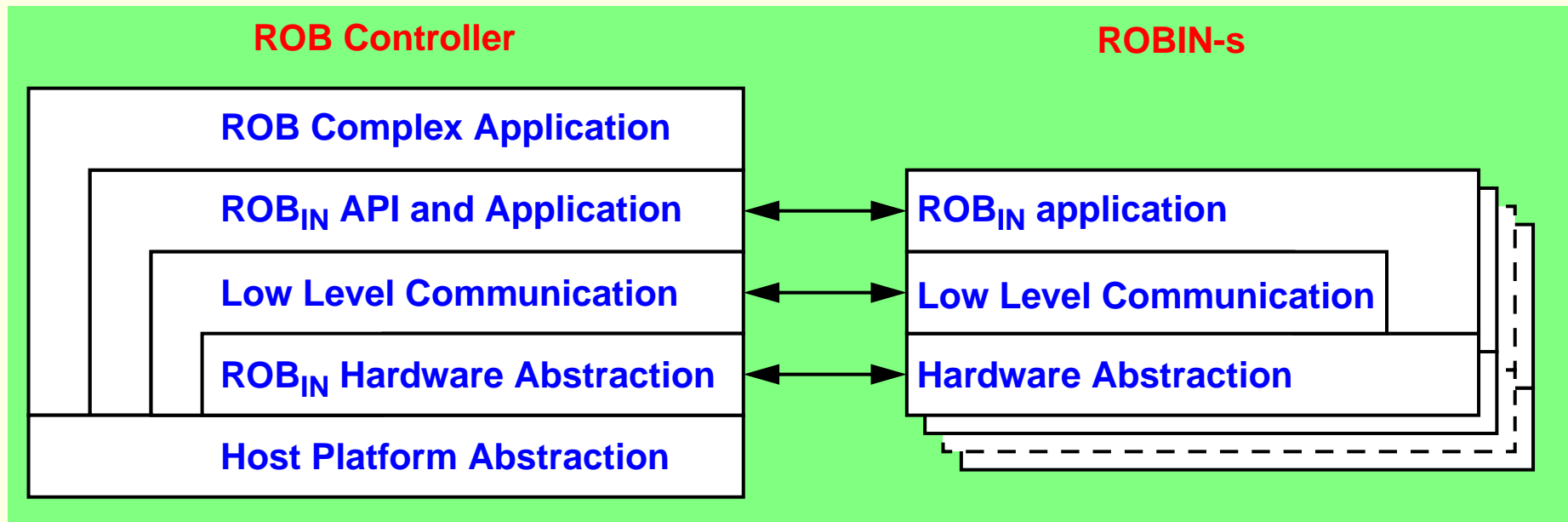


Version #1

- PCI Mezzanine Card
- I960Jx at 33 MHz
- PLX9080 PCI bridge
- 32-bit Local Bus
- 512 kByte CPU memory

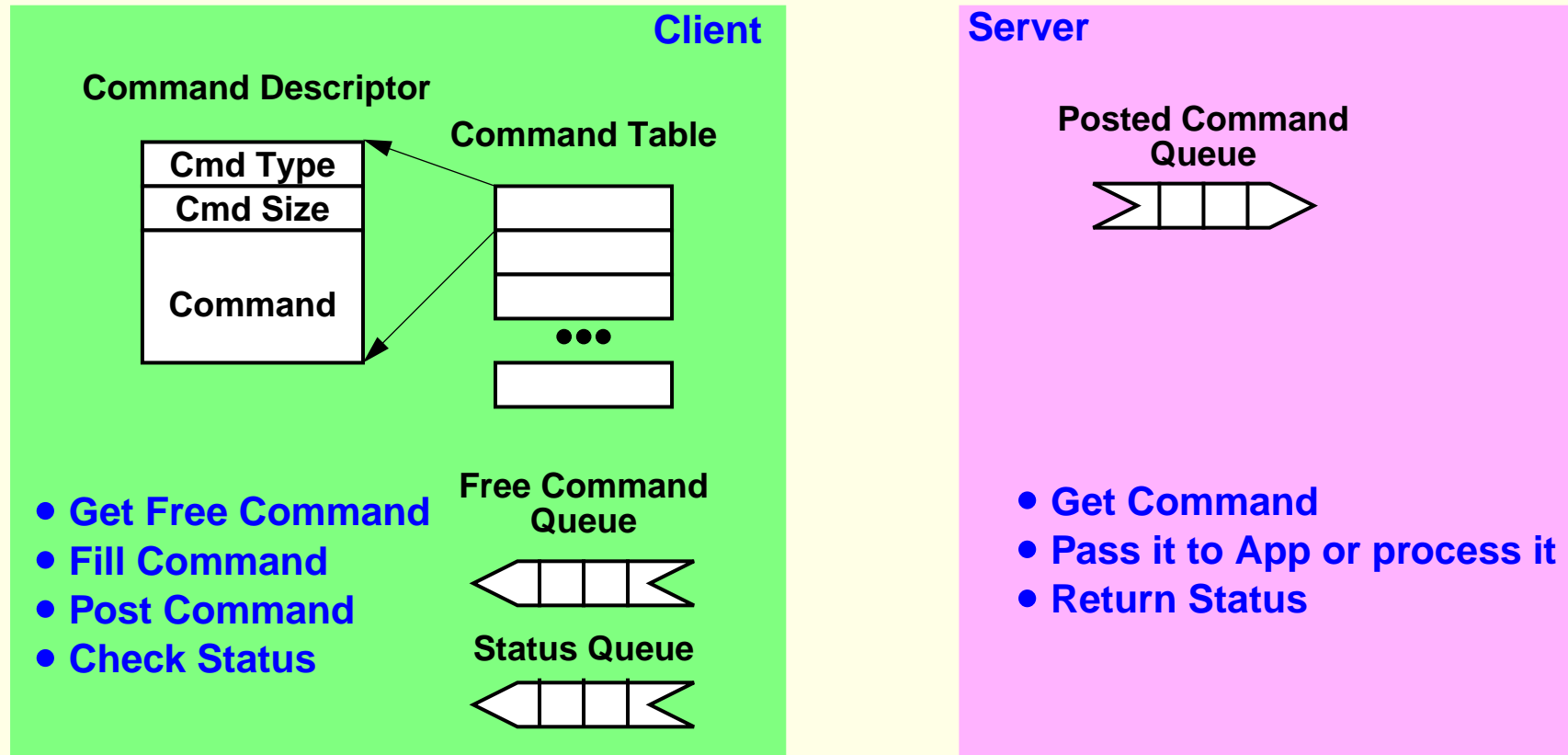
- 3 PMC-s of Version #1 available
- Version #2 with 100 MHz I960JT CPU and 8 MByte Event Memory under development

ROB Complex Software Organisation



- Host Platform and ROB_{IN} hardware are hidden
- ROB_{IN} hardware abstraction performs basic operation: Load Code, Start, Reset, Halt...
- Low Level Communication performs message passing and allows for debugging
- Simplified ROB_{IN} Application: no data input
- C code for:
 - Saclay ROB_{IN}, LynxOS / PowerPC VME/CompactPCI SBCs, Linux / PC
 - Transtech Sharc PMC, WinNT / PC

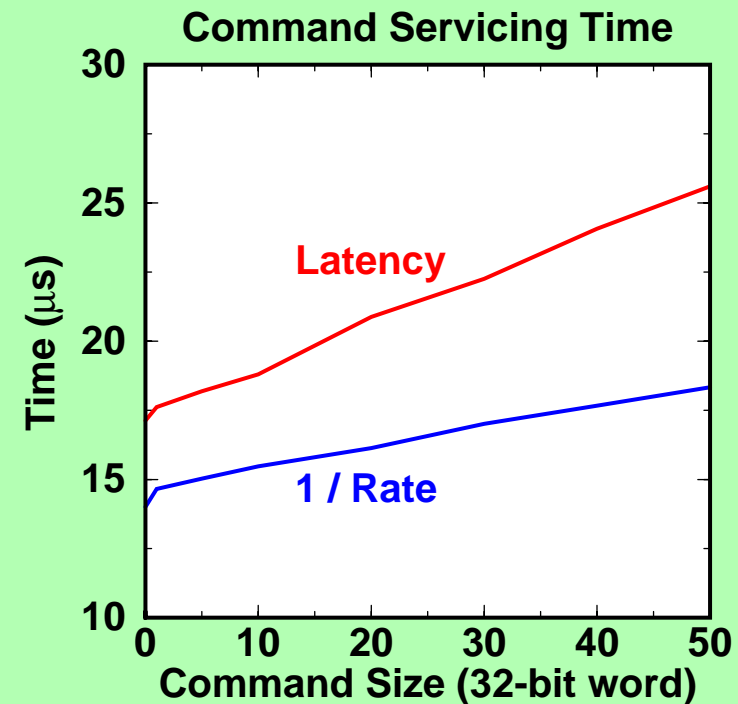
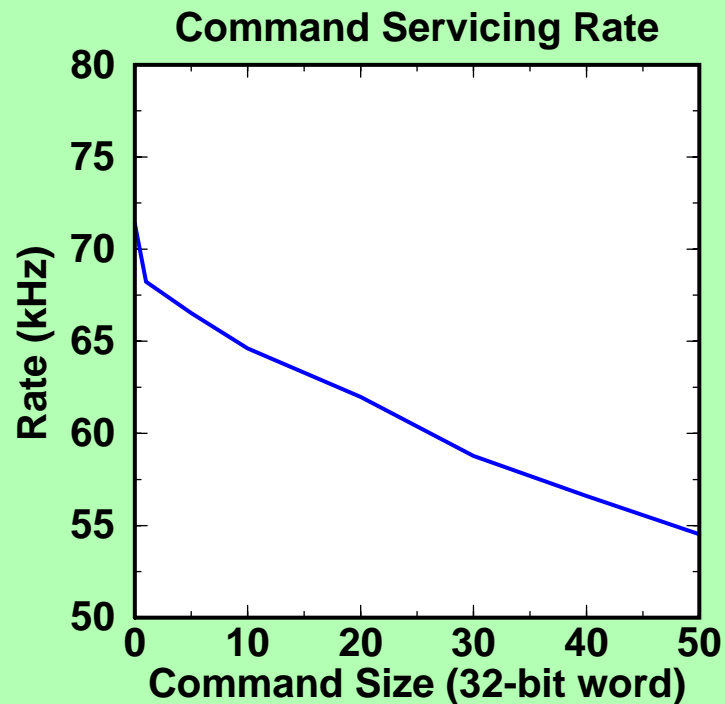
Low Level Communications



- Bi-directional communications
- Synchronous and asynchronous commands
- Minimal use of PCI bus for implementation on PLX9080

ROB_{IN} Low Level Communication Performance

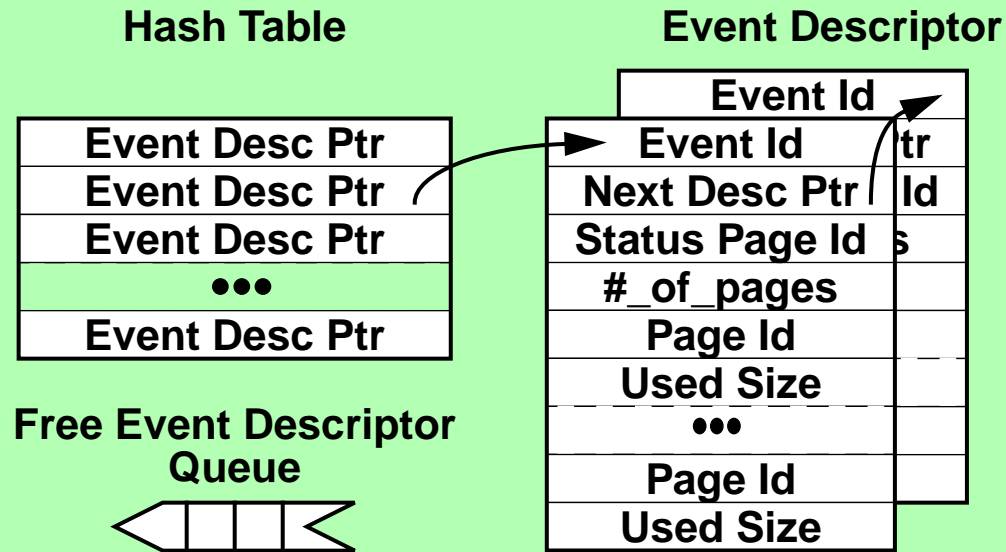
- Dummy asynchronous commands immediately acknowledged by ROB_{IN}



- Data Request command size: 4 32-bit words
- Event Clear Request command size: 50 32-bit words (50 events to clear)

Event Management in ROB_{IN}

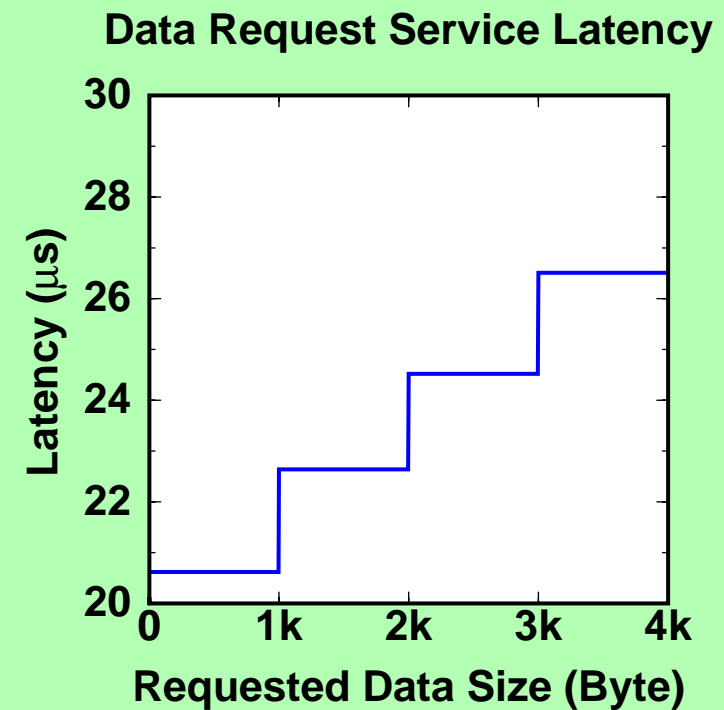
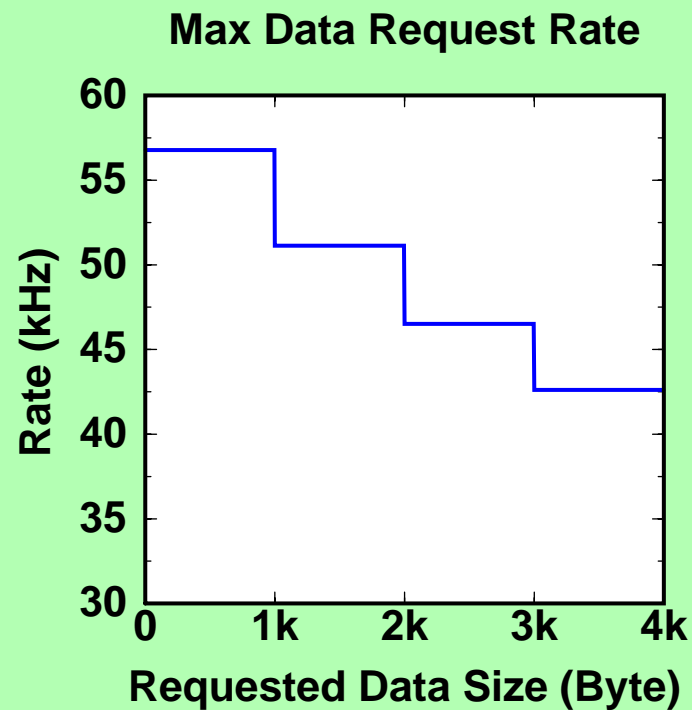
- Hashing mechanism for incoming events has been added



- For data request:
 - > Find entry in the hash table: $\text{event id \% hash_table_size}$
 - > Find event descriptor in the corresponding chain
 - > Return event pages
- For event clear request:
 - > Find event descriptor in the hash table and remove it
 - > Free event resources
 - > Return event descriptor to the free queue

ROB_{IN} Data Request Performance

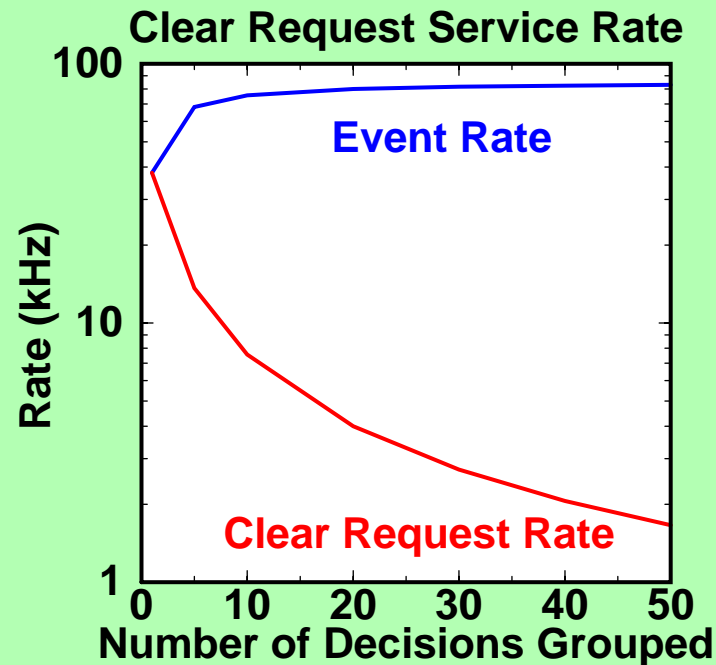
- Event Memory Page Size: 1 kByte



- Performance at Low Level Communication
 - > Rate ~68 kHz; Latency ~18 μ s
- For 2 kByte events
 - > Rate ~51 kHz; Latency ~23 μ s

ROB_{IN} Event Clear Request Performance

- Event Memory Page Size: 1 kByte
- For each cleared event a new event is generated

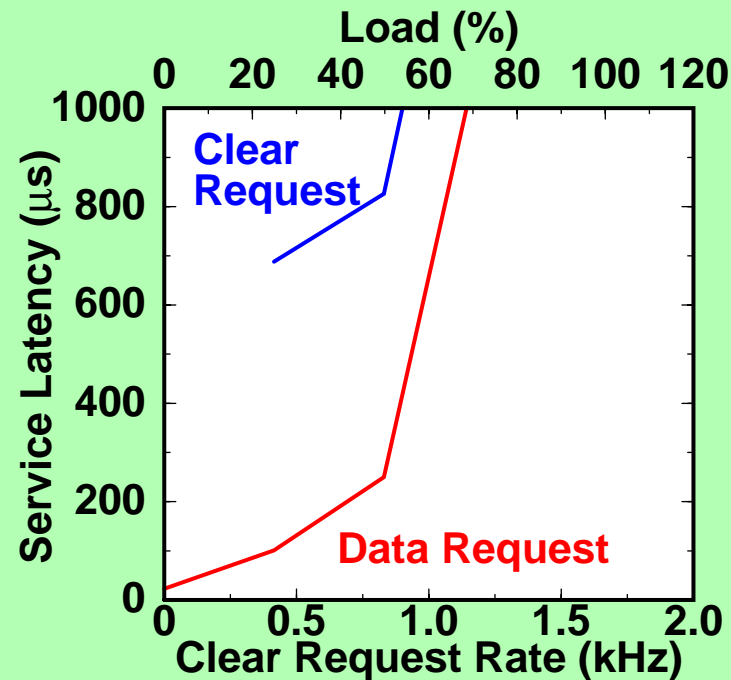


- Performance at Low Level Communication for event grouping factor of 50
 - > Rate ~55 kHz; Latency ~25 µs
- For 2 kByte events
 - > Together Event Clear and Generation take ~12 µs per event
 - > Sustained event rate equals ~83 kHz

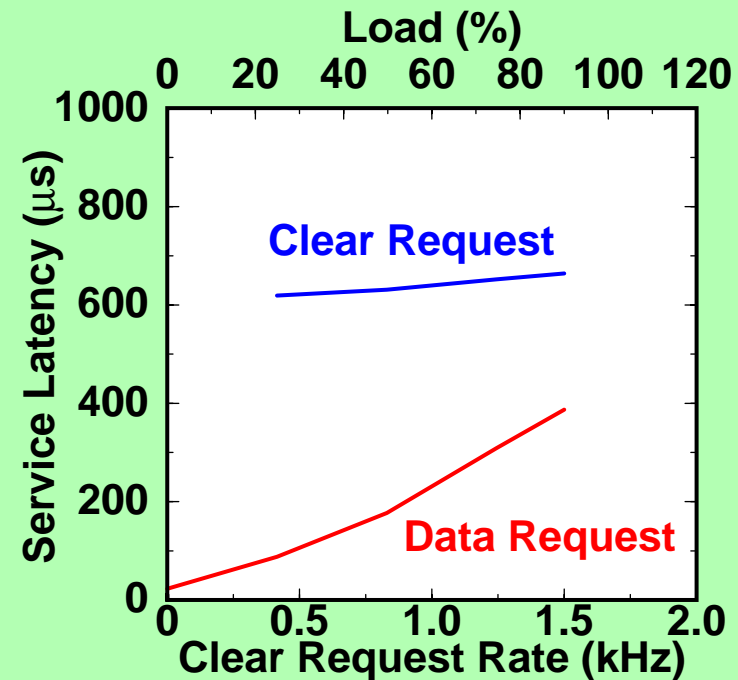
Mixing Data and Clear Event Requests

- Event Size: 2 kByte
- Selection Request: 3 kHz
- Event grouping factor of 50 for Clear Requests
- Event Filter Request: 2 kHz

- No Flow Control on Clear Requests



- Pipeline only one Clear Request at a time



- Flow Control: Deterministic Data Request Servicing
 -> Clear Request adds at most 700 µs

Discussion

- **ROB_{IN} Application**

- Event management using hash table has been added
- More realistic behaviour for Data Request and Event Clear commands

- **ROB_{IN} performance has been measured with stand-alone program**

- ROB Complex Platform: 400 MHz Pentium || PC running Linux
- Saclay ROB_{IN}: Version #1 with 33 MHz I960 processor and 512 kByte system memory
- Data Request service rate: up to 40 kHz and above; Event Clear rate: up to 83 kHz
- For Event Clear requests the necessity of Flow Control has been identified
- The Flow Control assures deterministic Data Request servicing times

- **ROB_{IN} Application is still under development**

- Waiting for the Version 2 of the Saclay ROB_{IN}
- More realistic event handling from input port will be added

- **ROB Complex has been integrated in the ATM testbed**

- New series of measurements foreseen at CERN this month