

Modeling

The DAQ-1 Event Builder

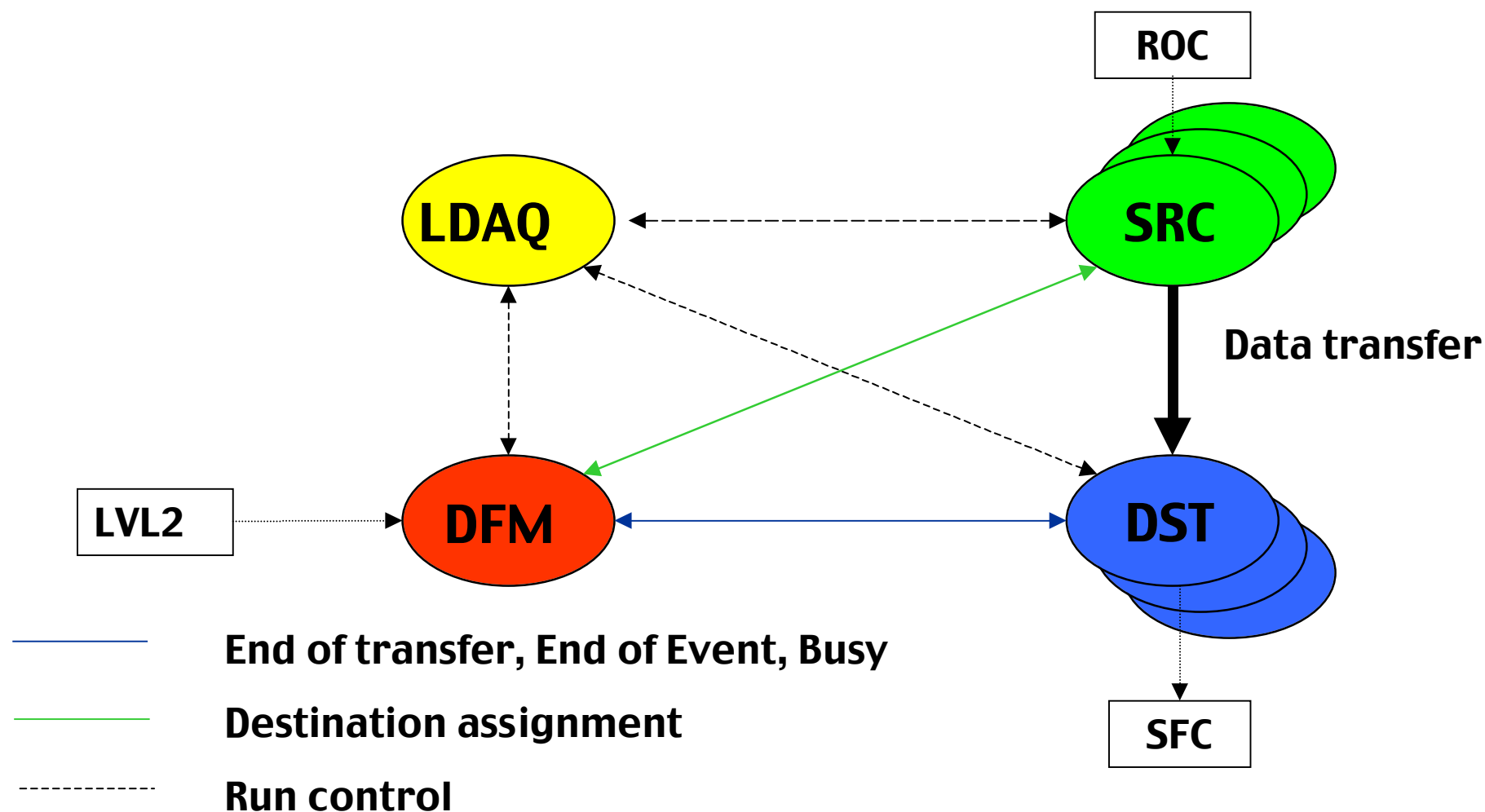
EB modeling: Objectives

- **Detailed study of the EB high level protocol as designed within the DAQ-1 prototype:**
 - **functionality**
 - **performance**
 - **robustness**
- **Address scalability issues**

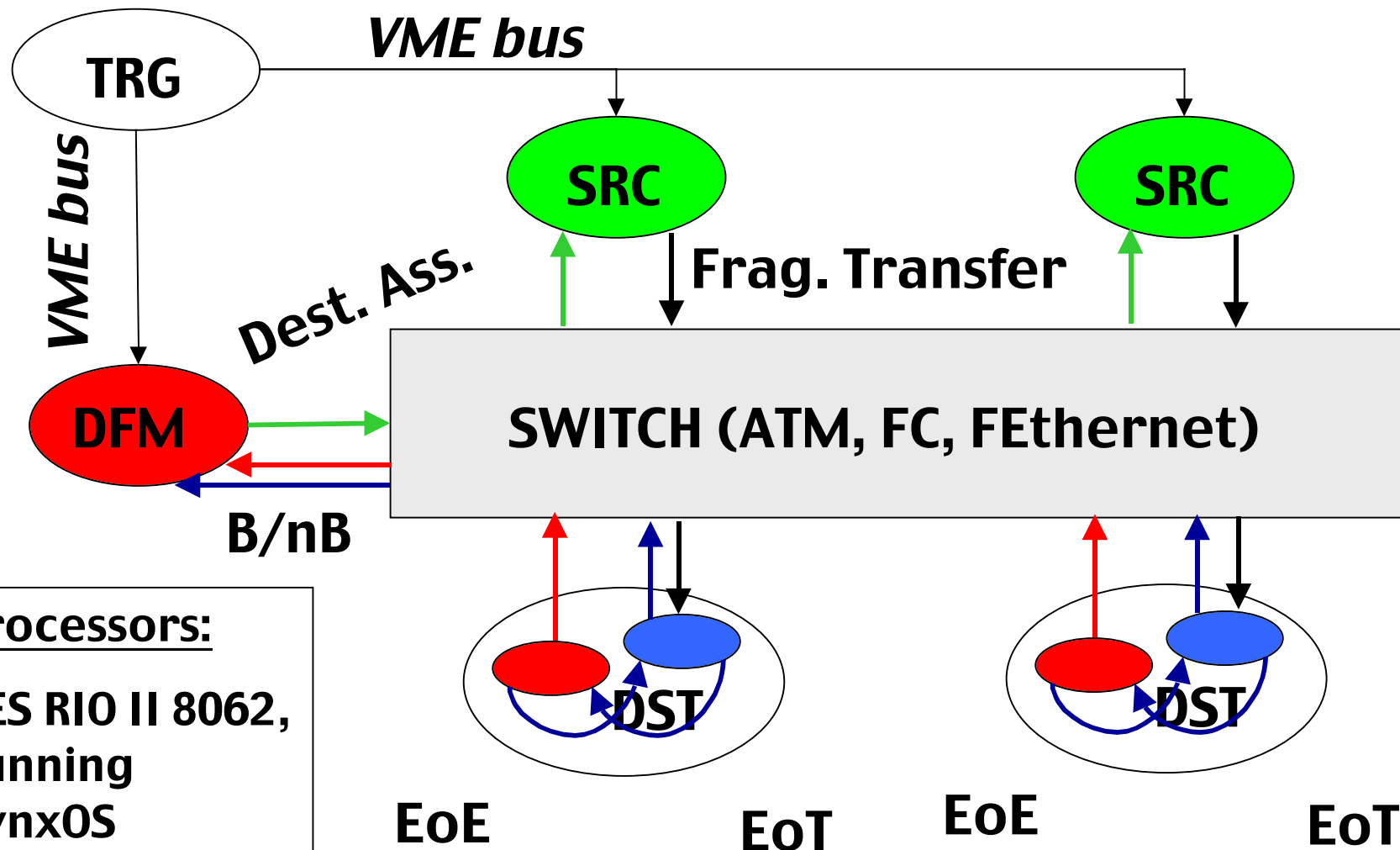
EB modeling: Method

- **Parametrization of the technology specific aspects of the Event Builder**
 - **prototype to measure processing times**
 - **simple test programs to measure driver and network performance**
- **Utilization of a Tool providing a “discrete event simulation scheduler” and basic networking + processing elements (queues, servers, routers, ...)**
 - **PTOLEMY**

Event Builder: Logical Model

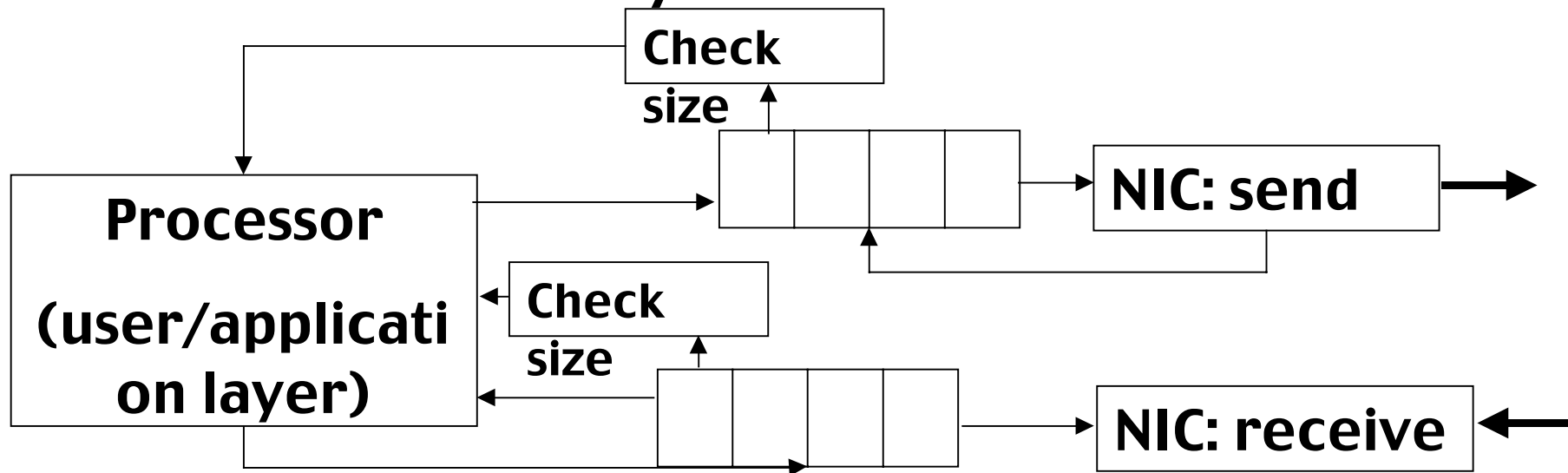


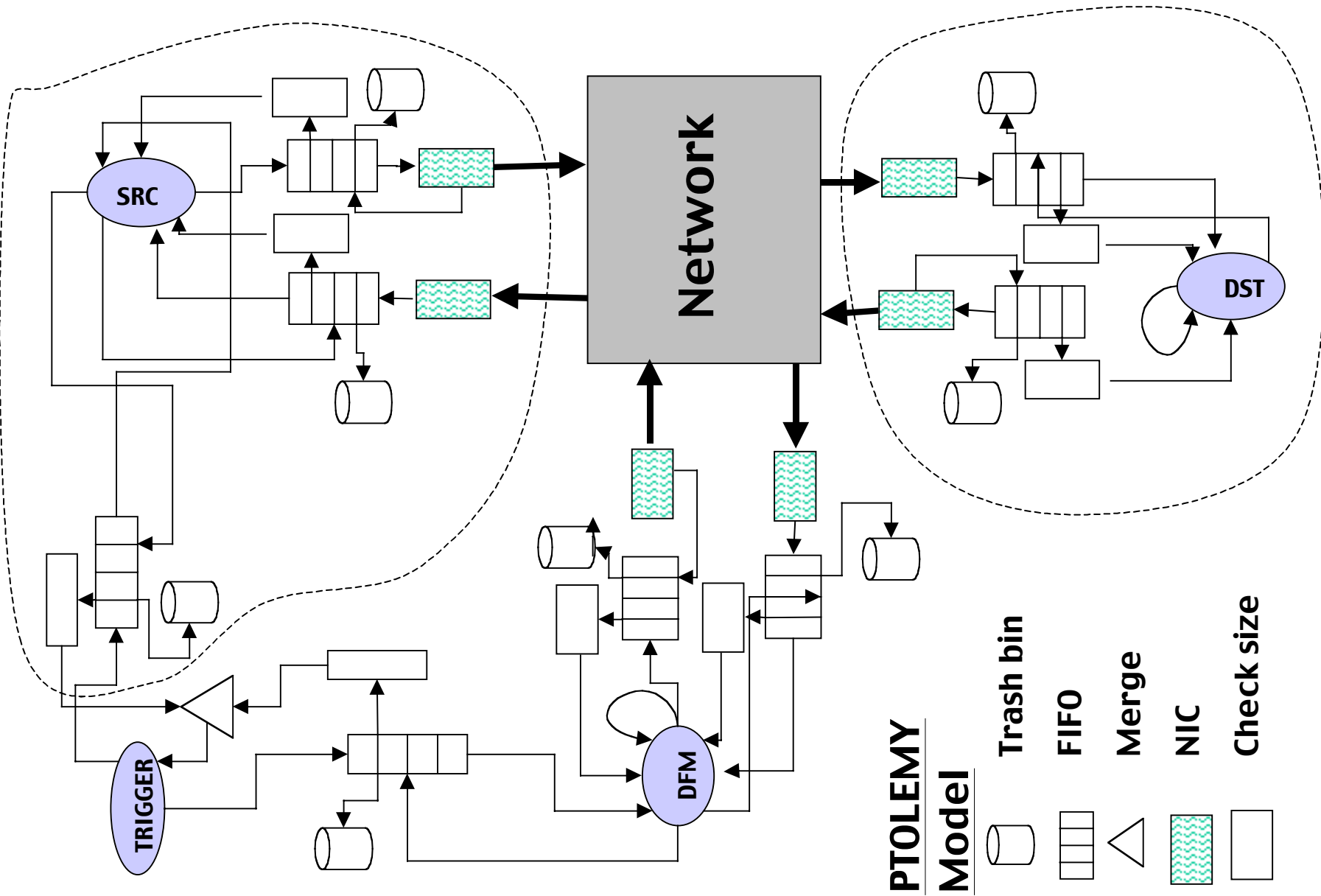
EB: Implementation



EB: The model

- The model, as the prototype, is built in two layers: application layer --- technology layer
- Network node layout:





Model: Parameters

- **Network:**
 - Bandwidth, latency
- **Processors:**
 - time to send/receive (overhead, network bandwidth, memcpy bandwidth)
 - time for polling (IOM)
 - time for performing the different tasks

All measured times have been introduced as mean values in the simulation

Where appropriate, the processing times have been expressed as linear functions of Nnodes and/or message size

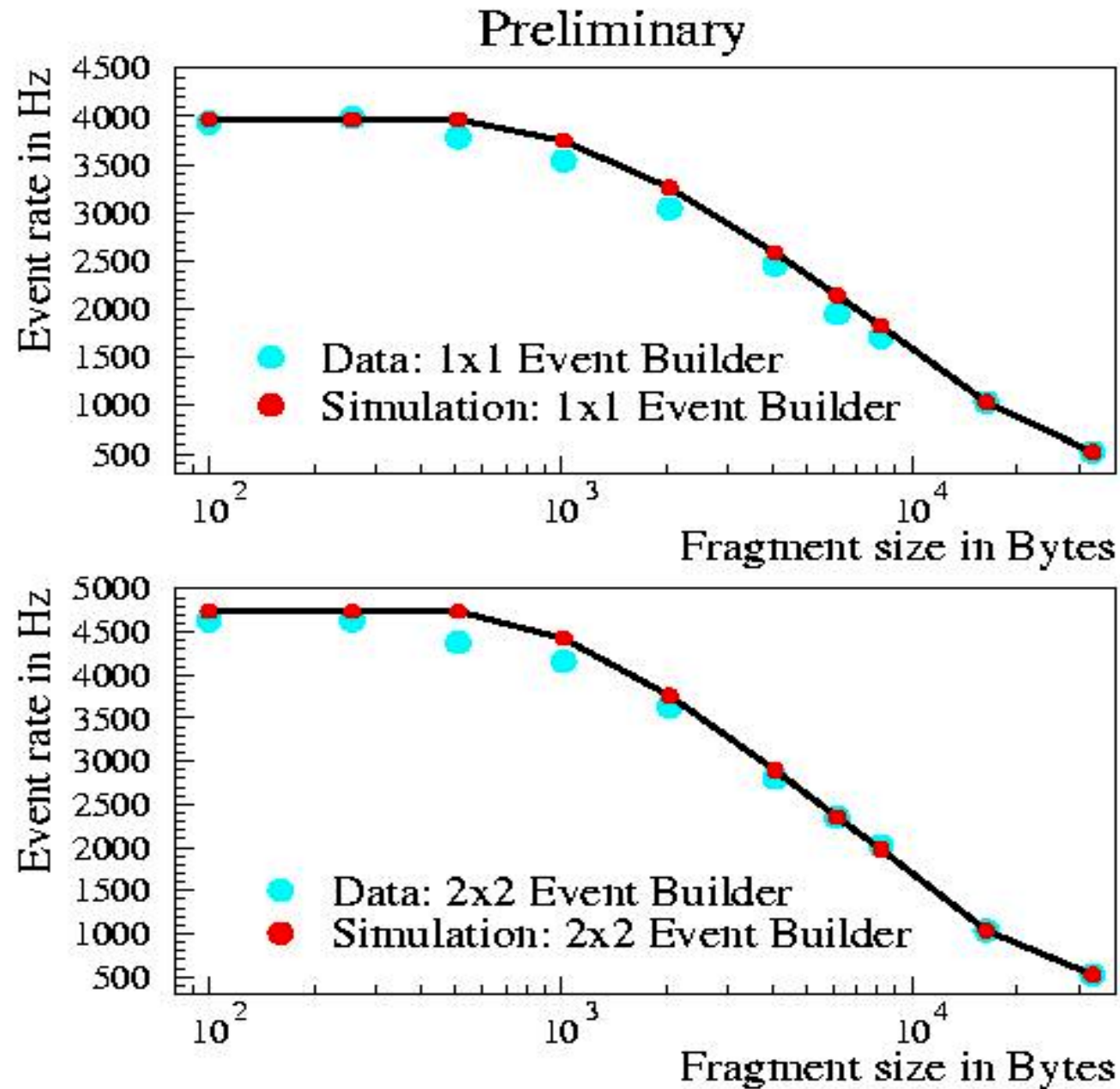
Model: Running the Simulation

- **C program accepting as parameters NSrcs, NDsts, trigger rate, fragment size**
 - **generation of a Ptcl script**
- **run simulation**
 - **sustained rate**
 - **buffer occupancies**
 - **mean list length**
 - **throughput at destination**
 - **number of timeouts, busy signals, ...**

Model: Results

- **The simulation has been run for the parameters of the ATM/AAL5 technology**
- **The ROC fragment's size has been scanned between 100 B and 16kB**
- **Different configurations of the EB prototype have been measured (2x2, 1x1, 2x1, ...)**
- **The simulation matches within a few % the prototype results**

EB prototype with ATM technology



Modeling: Status & Outlook

- **It has been possible to reproduce within a few % the behavior of the DAQ-1 EB prototype (with ATM/AAL5) in several configurations with a single set of parameters**
- **Measurements of some aspects of the prototype are still ongoing**
- **The documentation of the modeling work done so far as well as of the measurements performed is not yet available**

Modeling: Outlook

- **Validate the model with analytic solutions of simple cases and with a bigger prototype**
- **Search documentation on networks performance for big systems, in order to include a better parametrization of the switch**
- **Study the behavior of the EB in presence of anomalies and errors (functionality and robustness of the EB protocol)**
- **Perform scalability studies**