

Modeling of networking components

Basic aim:

To provide models of network interfaces, links
and switches

necessary to design and model large network
architectures required by ATLAS

Modeling environments for network studies

- OPNET

- rich library of detailed models of:
 - links (throughput, distance based delay, error rate)
 - network protocols (all levels: Ethernet, IP, TCP, Application)
 - traffic generators (free running, application: ftp, http, custom)
- heavy; useful for studies on network components

- PTOLEMY

- parameterised models of ATLAS LVL2 nodes with reference software based processing
- single link protocol: Ethernet (Fast and Gigabit)
- light and fast; useful for large architecture studies with

TDAQ workshop, 13th-17th Nov, 2000.

parameterised components

Modeling of networking components (K. Korcyl, CERN/Krakow)

Models of network components

- Network interfaces
 - OPNET: detailed model of Ethernet MAC (no flow control)
 - PTOLEMY: simple parameterized model of Ethernet MAC (with flow control)
- Links
 - OPNET: Fast, Gigabit Ethernet
 - PTOLEMY: Fast, Gigabit Ethernet
- Switch
 - parameterized model of store-and-forward switch with hierarchical architecture (differentiates between inter and intra-module transfers)

Parameterized model of switch

- Operation based on calculations with 10 parameters
 - values for parameters can be collected on existing device with simple ping-pong and streaming measurements
 - values can be extrapolated to the ones that we believe the technology will provide in the nearest future
- Modeling environment independent
 - the same code runs for OPNET and PTOLEMY
 - can be interfaced to other C++ based environments
- Model written in OO technology
 - easy to modify to implement new features and to adapt to evolving Ethernet standard

Parameterized model of switch - cont.

- Current status (implemented features):
 - multicasts/broadcasts
 - address based and port based Quality of Service
 - high and low priority queues for internal resources and for access to output ports
 - Virtual LANs (VLANs)
 - enables traffic separation within the switch
- Future developments:
 - complete QoS (add other policies: fair weighted queuing, ...)
 - trunking (link aggregation between switches - IEEE 802.3ad)

Models of networks and network components future work

- Network components (obligation):
 - validate parameterized model with larger and more powerful switches using multiport FE tester and intelligent NICs (Gigabit Ethernet)
 - validate parameterized model on cascaded switches setups
- ATLAS Dataflow DataCollection network (support):
 - look into alternative architectures for mixing of the LVL2 and EB traffic in the same network
 - provide parameterized but more accurate models of the Dataflow nodes (ROB/ROS, LVL2_PU, EB, DFM,...)
 - parameterization of the node with TCP/IP stack ?