Panel

EtherNET vs. EtherNOT

Wu Feng
feng@lanl.gov

Research & Development in Advanced Network Technology (RADIANT)
http://www.lanl.gov/radiant

Computer & Computational Sciences Division
University of California, Los Alamos National Laboratory
HotI Background:
EtherNET and EtherNOT

Current Perceptions?

- **Performance → EtherNOT**
  - Better end-to-end latency and throughput.
- **Cost → EtherNET (GigE), EtherNOT (10GigE)**
  - Gigabit EtherNET virtually free!
  - 10-Gigabit EtherNET: $795/NIC, ~$1000/port
- **Features → EtherNOT (or maybe EtherNET)**
  - Support for one-side & collective communication
  - On-demand pinning of buffers & on-demand memory registration support
  - (Off-loaded TCP/IP)
- **Compatibility & Ubiquity → EtherNET**
Current Customer Perceptions?

- **HPC Customer**
  - See previous slide
- **Mainstream Customer**
  - Jeopardy! answer to “Quadrics and InfiniBand”:
    - “What are the alpha & beta codenames for XM radio?”
- **Relative to Market Share & Customer Needs**
  - **EtherNOT**
    - The Formula One Racecars of Networking.
    - Exception: Myricom’s Myrinet-2000 and now Myri-10G
      - The High-End Sports Car of Networking :-)
  - **EtherNET**
    - The Honda Accord of Networking
Is It Really EtherNET vs. EtherNOT?!

• Maybe 5-10 years ago …
• Today: General convergence of EtherNET & NOT
  - EtherNOT working to deal with …
    • Congestion control (see HotI’05 and OpenIB’04 & ’05)
    • More generally, TCP/IP support?
  - EtherNET working to deal with …
    • General protocol offload engines (POEs): RDDP, iWARP, uDAPL
      - “Connectionless” iWARP, on-demand pinning of buffers for ESDP & iWARP.
      - PCI-X → PCI-Express
    • Routing: Virtual cut-through (SAN), store-and-forward (WAN)
• Divergence: Congestion control resides where?!
Current Observations

• Identifying Trends
  - EtherNET sustained halving of prices every 12 months (or less) while enhancing feature set, e.g., virtual cut-through, better support for iSCSI, iWARP, uDAPL, and so on, while maintaining compatibility.
  - Target markets: HPC, which is a TINY market.
    • Exceptions: EtherNET, and perhaps EtherNOT’s Myri-10G
  - EtherNET controller may become more EtherNOT-like, or perhaps the other way around (LANai on the motherboard?)
    • Comment: HPC will not drive this. Commodity market has to.
Ethernet Trends

• Top500 Supercomputer List
  - 2001: 0% of Top500 is Gigabit Ethernet
  - 2005: 42.4% of Top500 is Gigabit Ethernet

  70.6% of Top500 is EtherNET+Myrinet
  • And now that Myricom has Myri-10G ...

• Ethernet Everywhere
  - Suspect that 100% of Top500 has an Ethernet network.

• Price/Performance of EtherNET
  - Reasonable performance at low cost and complexity.
• Disturbing trend in reporting performance
• Virtually all BW (e.g., 9+ Gb/s / stream) and end-to-end (e.g., 2 us) latency numbers are produced in isolation. These numbers are generally not achieved without exhaustive tuning and with an application.
EtherNET vs. EtherNOT: Latency/Bandwidth (circa July 2005)

**Ping-pong Latency**

- 10GigE TOE
- SDP/IBA (Event)
- SDP/IBA (Poll)
- SDP/Myrinet (Event)
- SDP/Myrinet (Poll)

**Uni-directional Bandwidth**

Recent SDP/Myrinet (Poll): 4.5 μs
EtherNET vs. EtherNOT Paper

Exponential Drop in Pricing
Exponential Drop in Pricing

Switch Port: SR
Switch Port: CX-4
NIC Cost: SR
NIC Cost: CX4
Concluding Remarks

• I don’t know what the next programming language will look like, but it will be called Fortran ...
• I don’t know what the next transport protocol will look like, but it will be called TCP/IP ...
• I don’t know what the next interconnect technology will look like, but it will be called Ethernet ...
  - 80% of all networks are Ethernet.
  - 99.9% of all Internet traffic is over Ethernet
• What is the point that I am trying to make? Inevitably, the above ubiquitous technologies adopt the best features of non-ubiquitous solutions. Latest for 10-Gigabit Ethernet:
  - Network processors on adapters. TOE. RDDP/iWARP/iSCSI.
  - Next, virtual cut-through routing for 10-Gigabit Ethernet in system-area networks.
    • Problem: Eliminates the advantage of ubiquitous deployment (for now).
Concluding Remarks

• Performance
• Cost
• Features
• Compatibility & Ubiquity

• Differentiator:
  - Target Markets

• A final pet peeve ...