

Hardware Offload

Up to 4-Way Arbitration of Market Data Feeds

CSPI's Myricom 10G-PCIE3-8D network adapters offload A/B arbitration of market data feeds. Financial markets provide two identical data streams, known as the A and B feeds. Some customers leverage this redundancy to recover lost packets. Others use it to improve latency, passing along the first packet seen. Offloading feed arbitration to the adapter reduces overall "tick to trade" latency and reduces latency jitter.

Lower Latency, Less Jitter

Offloading feed arbitration removes significant traffic from the servers' shared DRAM subsystems, the most common location for a performance bottleneck in a trading system, making the server a bit faster. It also halves traffic on the server's PCIe bus, significantly reducing latency jitter if that bus is shared with a second adapter (or any other device). In some cases, users can remove existing arbitration logic from their application's source code and free up a core.

Microwave

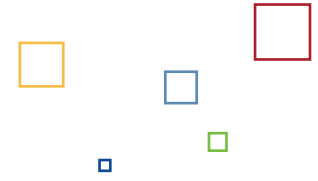
Microwave technology has recently emerged as a way to reduce transmission latency for market feeds. This latency benefit comes at the cost of a slightly larger percentage of packets lost in transmission. The higher loss rate drives customers to leverage feed redundancy over both microwave and back-up fiber links for a total of four-way redundancy -- microwave A/B and fiber A/B.

Algorithm

The Myricom arbitration algorithm works with any feed that puts batch and/or packet identification numbers into fixed locations. When connecting multiple market feeds into a single Myricom adapter, it can arbitrate all of them simultaneously. In each case it can arbitrate up to 4-way.

A/B arbitration performed by Myricom adapters is invisible to the trading application. The adapter provides an A feed that contains the first packets to arrive, be they from the real-world A side or B side. The application can query the adapter for a count of lost packets recovered or for real time information on individual feed status.

Adapters never wait for a lost packet. When the "next" packet is received, it is sent to the application immediately. If the lost packet later arrives, it is sent to the application on the adapter's otherwise silent B feed. Existing software that opens both the A and B feeds should recover from this situation without any code changes. Applications that currently open only a single feed will also still work, with more resilience and less latency than before Myricom.



KEY FEATURES

- Offloading feed arbitration reduces "tick to trade" latency and removes a load from the host server
- Up to 4-way arbitration for installations with identical microwave and fiber links
- Does not require any application software changes
- Supports many primary market data feeds and protocols

Hardware Specifications

| KEY SPECIFICATIONS | |
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| Latency | The latency cost of hardware A/B is zero because all latency benchmarks published by Myricom include the time needed to process 4-way A/B, even if A/B is turned off or not used as part of the benchmark. CSPi's implementation adds only 20 ns to the latency of all receives, compared to doing A/B in software on the host, which adds at least 150 ns for 2-way on a Haswell i7. This 130 ns advantage does not include the impact of cutting DRAM traffic in half which reduces tick-to-trade latency by speeding up all the other Haswell cores. It also does not include the reduction in latency jitter that many servers experience. |
| TCP Window | <p>The adapter tracks up to 32 separate, missing packets at any one time. It will ship them to the application on its B feed when they eventually arrive.</p> <p>The adapter passes through on the A feed any packets with a zero in the sequence number field. The adapter also automatically restarts feed arbitration if it detects a sequence number significantly outside the current pattern (a reset to zero, for example)</p> |
| Supported Market Data Feeds and Formats (as of March 24, 2015) | <p>BATS Multicast PITCH Chicago Board Options Exchange (CBOE) CME MDP 3.0 Market Data Direct Edge EDGA and EDGX NASDAQ BX TotalView-ITCH NASDAQ PSX TotalView-ITCH NASDAQ TotalView-ITCH 5.0 NYSE Arca XDP NYSE Arca Trades XDP NYSE OpenBook Ultra XDP</p> <p>The Myricom arbitration algorithm works with any feed that puts batch and/or packet identification numbers into fixed locations, a characteristic of all of the newer "binary" market data feeds. The algorithm may not work with older feed formats based upon FIX standards.</p> <p>A text file installed onto the host computer describes the format of each market feed that has been tested by CSPi or submitted by a CSPi customer. The text file also allows the user to add/define feeds that aren't currently available from CSPi..</p> |
| PART NUMBERS | |
| 10G-PCIE3-8D-2S+DBL | Network adapter with Dual SFP+ 10GbE ports (configured as a dual QSFP with bundled SFP+ adapters) and Myricom DBL™ software. |
| 10G-PCIE3-8D-Q+DBL | Network adapter with Single QSFP (configured as four 10GbE ports) and Myricom DBL™ software. |

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