

Financial Trading's lowest latency, most full-featured market feed connections

Drive down Tick-To-Trade latency with CSPi's Myricom® ARC Series of 10 gigabit network adapters. They surpass all other full-featured adapters, with industry-leading latency plus advanced capabilities to accelerate your trading application and meet MiFID II reporting regulations.

Choose the Model That Matches Your Requirements

The ARC network adapters are FPGA-based PCIe cards with extreme low-latency firmware and tightlyintegrated acceleration software libraries. Three ARC product classes offer a choice of capabilities. See Table 1 for a feature comparison.

Driving Latency Close to Zero

All ARC adapters minimize latency by exploiting the parallel processing capabilities of powerful FPGAs and integrated software to:

- Move packets into the host computer with the lowest possible latency
- Send a subset of these packets directly to specific CPU cores, bypassing the kernel entirely
- Stage TCP market orders or quotes in advance to further reduce latency



- 10GbE network adapters lead the industry in system-level Tick-To-Trade Latency
- Tightly integrated FPGA firmware and server software combine to accelerate trading applications
- A/B arbitration in hardware for up to 4 sources per feed
- Precise hardware timestamps on both ingress and egress packets
- Support for Linux and Windows
- FPGA-based architecture enables continual enhancements
- Industry's best customer support



Precise Hardware Timestamps

The ARC adapters are able to track latency in real-time with less effort and more accuracy than expensive packet capture devices, using precise hardware timestamps on both ingress and egress packets. This unique capability allows your application to calculate and display latency in real-time without needing to tag TCP/IP orders with UDP sequence numbers, for simplified trading performance verification.

Precise timestamping also prepares trading systems for compliance with the detailed reporting defined in the MiFID II regulations. By implementing both Receive and Send timestamps in the Myricom ARC Series hardware, your trading application can meet the new transparency requirements while still executing with extreme low-latency.

Hardware Acceleration for Applications that use A/B Arbitration

If your application uses A/B arbitration you can offload that function to the ARC adapter hardware, thereby reducing software overhead and removing significant traffic from your server's shared DRAM subsystems. The adapter's specialized FPGA firmware can arbitrate the A and B sides of multiple feeds for both fiber and microwave sources, effectively implementing 4-way arbitration. Turning on hardware-based A/B arbitration adds zero latency to the adapter's receive path.

Configuration Flexibility and Future Enhancements

Only Myricom network adapters support both Windows and Linux. They also can be used with either Intel or IBM Power Architecture systems, allowing you to maintain future flexibility and avoid being locked into any one vendor or architecture.

Our ARC Series FPGA-based designs enable a steady stream of enhancements without lengthy and complex ASIC design cycles. Features are added regularly with firmware upgrades, quickly responding to new market requirements. New adapter designs are created using straightforward migrations to next generation FPGAs with more performance and firmware capacity.

The industry's most reliable and responsive customer support

At every level of our organization, CSPi is committed to customer success. We respond quickly, providing information to address most questions without delay. For complex situations, we'll do whatever it takes to solve your technology issue.



D-Class



Features

- Competitve latency
- Cost optimized
- Timing kit is optional

E-Class



Features

- Industry's lowest latency
- Larger FPGA to enable a stream of future enhancements from CSPi
- Timing kit is standard

F-Class



Features

- Same performance as E-Class
- Much larger FPGA to leave room for your own IP
- On-board memory subsystem
- 25/40/50/100 GbE capable



ARC NETWORK ADAPTER FAMILY

- KEY SPECIFICATIONS PCI Express Gen 3, 8 lanes wide **Bus Interface** Form Factor Low-profile PCI Express x8 add-in card. Ships with a standard height faceplate installed; low profile faceplate in the box. The optional timing kit has a standard height faceplate with coax connectors installed. The E-series does not require a timing kit. Environmental CSPi recommends that adapters be installed into servers that provide some air flow over the PCIe slots (very common). Use in an office or computer room environment. **DBL Endpoints** Support for 16 simultaneous rings (DBL endpoints). The size of each ring is limited by the amount of available host memory. Support for up to 511 simultaneous UDP multicast groups open per Ethernet port (1022 per board). Packets Per Second Every adapter optimized for ultra-low latency will bump into a maximum packet-per-second rate when the packets hit Intel's PCIe implementation. That maximum depends upon the Intel chip on the other end of the PCIe bus. Expect about 22 M PPS. On-board clock tick precision The process associating timestamps with packets has ±5 nanoseconds of uncertainty. If you elect to synchronize with an external time source ("trim the clock"), that process has ± 10 nanoseconds of uncertainty. Timestamp stability Timestamp stability is determined by the on-board oscillator (a Vectron VT 804 TCXO) or by any optional, user-provided 10 MHz clock. **IEEE 1588** Myricom time stamps are captured in a manner that allows IEEE-1588 software implementations to deliver highly accurate, synchronized time. Ping-Pong latency 1.31µ is the minimum latency for a 1-byte-payload UDP 1/2 roundtrip using the E-Class adapter. For a full set of more meaningful latency measurements see our Tick-To-Trade Latency application note. Passive Copper Cable Length 7 meters with a quality, passive, copper cable. Not all passive cable specifications support this length. Using a QSFP to SFP+ adapter may also limit cable length. **Operating Systems** Support for all major Linux distributions as well as Windows 2008R2 and newer. Virtualization Myricom adapters are compatible with all popular virtual environments, provided that users assign the adapter to a single virtual machine. The alternative, sharing an adapter, conflicts with delivering high performance. Connections D-Class: Dual SFP+ 10GbE ports (configured as a dual QSFP with bundled SFP+ adapters) E-Class: Dual SFP+ 10GbE ports F-Class: Dual QSFP28 Emissions Emissions and safety authorities do not certify board-level products. They certify complete systems with all boards installed. To minimize risk for OEM customers, CSPi uses a third-party certification organization to test its Myricom adapters installed into a generic PC. Final test reports are available to customers. We meet US, Canadian, and European emissions, Class A. Compliance RoHS (Reduction of Hazardous Substances) Country of Origin USA Cables and transceivers Contact your Account/Sales representative for more information on cables and transceivers that are compatible with each adapter. One year for hardware defects and 90 days for software defects. 90 days of "getting started" Warranty and add-on support

telephone and email support, as well as any software upgrades shipped within that window.

Refer to the support datasheet for options extending the 90-day window.



Summary

The ARC Series network adapters are the lowest-latency full-featured market feed connections available today. They compresses Tick-To-Trade latency at multiple points in the trading application process. Unique capabilities include hardware-based A/B arbitration and hardware timestamping for ingress and egress packets. The adapters' FPGA-based architecture enables frequent firmware enhancements and a credible roadmap to future technology.



About CSPi

CSPi (NASDAQ: CSPi) is a global technology innovator driven by a long history of business ingenuity and technical expertise. A market leader since 1968, we are committed to helping our customers meet the demanding performance, availability, and security requirements of their complex network, applications and services that drive success.

CSPi Corporate Headquarters 175 Cabot Street - Suite 210 Lowell, MA 01854 800.325.3110 (US & Canada) **CSPi High Performance Products** 800.325.3110 (US & Canada) us-hpp-sales@cspi.com CSPi Technology Solutions 800.940.1111 us-ts-sales@cspi.com



www.linkedin.com/company/csp-inc



us-hpp-sales@cspi.com

www.cspi.com

All companies and logos mentioned herein may be trademarks and/or registered trademarks of their respective companies.



MYRICOM Network Products