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## 2006: RapidIO® Systems Deployed In Your Market!

*By Tom Cox, Executive Director, RapidIO Trade Association*



RapidIO technology has taken the embedded market by storm, and to some observers RapidIO has come out of nowhere to become the switch fabric interconnect of choice in many applications. The fact that RapidIO has become the choice of not only chip-to-chip interconnects, but backplane data fabrics may seem like this has been a quick domination of the market. In taking a closer look this has been a five-year venture of carefully laid specifications and strong industry supported infrastructure development. The foundation of RapidIO has been carefully constructed and the fruits of that work are being deployed in systems in 2006.

RapidIO is an established, scalable, open-standard, switched fabric, designed by the leaders in embedded computing specifically for OEMs building equipment in the wireless infrastructure, edge networking, storage, scientific, military and industrial markets. RapidIO delivers the reliability, cost effectiveness, performance and scalability required in these markets. RapidIO technology supports a roadmap which is attuned to the changes affecting designers of embedded infrastructure.

As executive director of the RapidIO Trade Association, I'm often asked why RapidIO has done so well in wireless infrastructure and edge networking. These vertical applications are the mainstay of the early designs done with RapidIO components. The answer to this question is that these market applications have the greatest market growth and the systems need performance/cost upgrades. Multiple embedded communications processors, switches and DSPs dominate these applications; market demand made these the first generation components available in the ecosystem.



Throughout 2006 we will continue to see an explosion of the market base of RapidIO systems being deployed based on ATCA, VITA and other blade form factors. Military systems with RapidIO fabric backplanes have already placed RapidIO technology as the incumbent in systems from Mercury Computer Systems, Curtis Wright and Spectrum Signal Processing. Telecom is embracing the ATCA platform for its performance and cost benefits, and RapidIO technology is winning with a match of market requirements and broad product availability. Behind the scenes, enterprise, server and storage OEM's are looking at reliability, determinism and cache coherency system requirements, and are seeing the same match of requirements to match customer demand and required performance to out run the competition.

In the past year RapidIO-based devices have led to a solid base of OEM design wins which will be deployed in 2006. Over the past five years the RapidIO technology has enhanced its capabilities based on the market needs of the OEM's driving the specifications. The evolution of the RapidIO fabric technology base continues with active work groups driving a second serial physical layer at 5-6.25 Gbps, flow control, virtual channels and dataplane extensions.

#### [2006: The Year of RapidIO Deployment](#)

RapidIO technology is an established, internationally-recognized open standard driven by top tier embedded solutions providers and leading OEMs.

In 2006 I look forward to continuing to serve as the executive director of the RapidIO Trade Association, and telling you more about members building systems for wireless infrastructure, edge networking, storage, high-end computing, and military, scientific and industrial applications.

#### **[RapidIO Trade Association Launches RapidIO Radio, Quarterly Podcasts to Provide Technical and Design Tips and Updates](#)**

Leveraging the latest in communications technology to bring news and information on the RapidIO standard to the world, the RapidIO Trade Association unveiled the schedule for its debut season of RapidIO Radio, a series of free quarterly podcasts presented by the association and its members. The first trade association to leverage this technology, RapidIO Radio will be broadcast on [www.RapidIO.org](http://www.RapidIO.org) as well as through the iTunes Music Store.

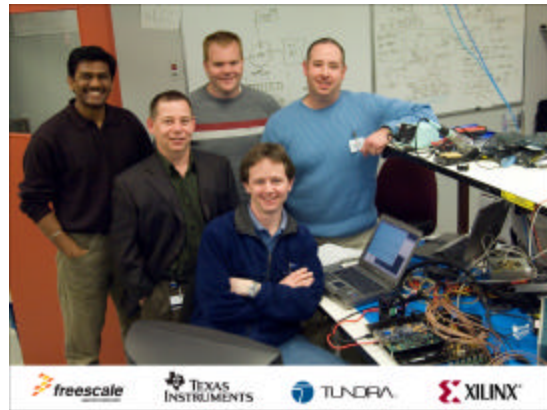
"As deployment of RapidIO products gains momentum across market segments including wireless infrastructure, ATCA, triple play, military and many others, it is incumbent on the RapidIO Trade Association to deliver design tips, technology updates, and other data using the most accessible media available," said Tom Cox, executive director of the RapidIO Trade Association. "RapidIO Radio is just such a communications tool, and takes advantage of a pervasive new medium to deliver in-depth information directly to design engineers working with or exploring RapidIO technology."



RapidIO Radio will debut in March 2006, with additional podcasts scheduled for June, September, and December 2006. The initial broadcast will feature Tom Cox, executive director of the RapidIO Trade Association, discussing, the State of RapidIO: Association, Technology, Deployment. Tundra Semiconductor will delve into interoperability in June, with IDT focusing on the benefits of Serial RapidIO in the wireless infrastructure in September. The introductory year will be rounded out by a podcast from Wind River dealing with software considerations in December. A complete list of dates and topics will be posted on <http://www.RapidIO.org>.

### **RapidIO Trade Association Recognizes Collaborative Efforts of Ecosystem Members to Test Serial RapidIO Component Interoperability**

Applauding the efforts of market leaders Freescale Semiconductor, Inc., Texas Instruments Incorporated, Tundra Semiconductor Corporation, and Xilinx, Inc. (NASDAQ: XLNX), The RapidIO Trade Association hailed the group's demonstration of first-level interoperability testing. This interoperability work is a critical milestone that will help further deployment of RapidIO technology-based systems in a wide range of applications including the wireless infrastructure, edge networking, storage, scientific, military and industrial markets. The interoperability tests build on the trade associations RapidIO Interconnect Specification Device Interoperability and Compliance Checklists, 1.3 Spec, which was developed for ecosystem members as a guide in developing their products.



Working as a team, RapidIO ecosystem members have delivered a clear and powerful message: market leaders are determined to ensure the tools needed for OEMs to create and build systems leveraging the wide range of RapidIO products on the market are readily available, said Tom Cox, executive director of the RapidIO Trade Association. This leadership and commitment is evident not only of the group working on these tests, but of the entire RapidIO Trade Association membership.

According to the team involved in the project, technology experts created multiple levels of Interoperability checklist items. The first level of device interoperability tests ensures Device A is proven to pass a given test with Device B. The subsequent group of checklist items focuses on RapidIO Specification compliance. Building on this work, the team's long-term goal is to partition device interoperability and specification compliance tests into multiple levels of tests, each building off of the other.



"As the first vendor to deliver RapidIO technology-based processors to the market, including the award-winning PowerQUICC III product family, we were excited to see more extensive system-level deployment of RapidIO enabled products, said Lakshmi Mandyam, segment marketing manager for Freescale Semiconductors Digital Systems Division. With more RapidIO capable silicon products interoperating in deployed systems, it's increasingly important for our customers to have confidence that the devices work together as specified. That's why this interoperability work is so important."

A wide range of RapidIO silicon and products is currently available: semiconductors (DSPs, Microprocessors, Switches, FPGAs, ASIC Library Support), software (Processor and DSP RTOS Support), and boards and modules (ATCA Carrier Cards, AMC Modules for DSPs, Processors). As products proliferate, OEMs expect RapidIO Trade Association members to ensure interoperability so they can design systems with certainty. The recent interoperability demonstration has proven the RapidIO Trade Association members are delivering on that expectation.

Serial RapidIO is real today, with all the pieces in place to ease development of high performance multi-processing systems for video, imaging, and communications. Complementing our 1GHz TMS3206455 DSP with integrated Serial RapidIO are Serial RapidIO enabled FPGAs, switches, and embedded processors. All are supported by AMC connector based evaluation systems working to interoperability specifications, said Leon Adams, worldwide marketing manager, Catalog DSP, Texas Instruments. Thanks to Serial RapidIO, it's never been easier to build multi-processing, multi-channel signal-processing solutions.

Being the first RapidIO switch vendor on the market, Tundra Semiconductor has gained a lot of experience testing against different endpoints. Participating in this interoperability partnership with other ecosystem vendors is a natural fit for us," said Rick O'Connor, chief technology officer at Tundra Semiconductor. "We look forward to fulfilling customer demand by continuing interoperability with other end point and switch vendors in the future.

Xilinx, as an active member of the RapidIO community for the past six years, has been a significant contributor to the technology, said Mike Frazier, director of engineering for Xilinx intellectual property solutions division. With the availability of fully interoperable Serial RapidIO solutions from Xilinx and other industry leaders, we are making it easier for customers to rapidly adopt this technology.

## **Mountain View Alliance Welcomes the RapidIO Trade Association**

The Mountain View Alliance <http://www.mountainviewalliance.org>, a consortia of consortia dedicated to creating more coordinated approach to specifications and activities around platform design, today announced the acceptance of the RapidIO Trade Association as its latest member. The RapidIO Trade Association joins the Network Processing Forum (NPF),



PICMG and the Service Availability Forum (SA Forum) as part of the Alliance that provides a forum for the coordination of the marketing and technical activities of its member organizations.

"The success of RapidIO technology in many aspects directly depends on the success of the eco-system we support. The Mountain View Alliance is the macro system architecture focal point that helps formalize relationships with key players in that ecosystem, extends the breadth of support for open standards, and facilitates the design process," said Tom Cox, Executive Director of the RapidIO Trade Association.

RapidIO is an established, scalable, open-standard, switched fabric, designed by the leaders in embedded computing specifically for OEMs building equipment in the wireless infrastructure, edge networking, storage, scientific, military and industrial markets. RapidIO delivers the reliability, cost effectiveness, performance and scalability required in these markets. In addition, RapidIO actively supports a development roadmap which is closely attuned to the technology and market changes affecting embedded infrastructure designers.

Brian Holden, the NPF representative to the MVA added: The RapidIO Trade Association represents a technology standard that is used alongside many of our member's specifications; their presence in the Mountain View Alliance will provide us with much broader industry coverage.

The Mountain View Alliance promotes an environment for coexistence and compatibility such that real applications can be created from COTS elements. Real life interoperability is a significant goal of the MVA and as such the Alliance members will work to harmonize their respective specifications aiming to avoid gaps, overlaps and inconsistencies that would lead to technical conflict. The groups founding members have been holding regular marketing and technical meetings since December 2004.

Mountain View Alliance Member Organizations:

- ✍ Network Processing Forum, <http://www.npforum.org>
- ✍ PICMG, <http://www.picmg.org>
- ✍ Service Availability Forum, <http://www.saforum.org>



## Industry Insights

### The Importance of a Trade Association in Driving Standards

*By Nick Flaherty, Freelance Technology Writer and Editor in the United Kingdom*

It is clear that the primary role of an independent trade association is to develop standards that facilitate the development and deployment of new technologies. In doing so, these independent bodies face a double-edged sword: standards are critical for building a robust, vibrant market where vendors, OEMs, and end-users all benefit, but they can also be a route to delays and customer confusion that can kill a market.

One of the notable and recent examples of the failure of standards is ultra-wideband high-speed wireless links. The IEEE 802.15 standard was abandoned after two years of infighting over two different technologies. In reality, however, this occurrence opened the door to possibilities for trade associations to pick up the gauntlet and drive the final outcome. In fact, the WiMedia group, backing one particular technology, is now moving ahead since the uncertainty among conflicting standards has been removed. Even when an organized effort is not successful, ultimately, a standard must evolve that is supported by an independent organization.

This example points to the fundamental role a trade body, like the RapidIO Trade Association, must play in establishing, promoting and extending the viability of a standards, in working to ensure interoperability, in addressing issues of interworking, in promoting their use, and in facilitating and encouraging market education from a reasonably neutral standpoint.

But even with an established standard like RapidIO, life can be tough. In the early days of standards-based technology deployment careful focus must be placed on the specification and roadmap to ensure that the standard defined addresses the market need and challenges, today and well into the future. In addition, early on, specifications defined by standards organizations must develop tools to address potential interoperability problems and confusion on what devices work with each other to ease decisions for OEMs. The success of the RapidIO standard lies in a solid foundation based on the foresight of the ecosystem members to put aside competing interests and focus on end-user needs. This effort, combined with clearly defined checklists for interoperability, provided a significant leg-up for RapidIO in the market.

Once defined and established, the work doesn't stop. Standards also can drive commoditization – good for the customer, not so good for vendors. There is, therefore, a strong need to move the industry forward to keep ahead of this trend, while allowing customers to take advantage of backward compatible equipment. Even when defined properly in the first place, standards must keep evolving to stay ahead of commoditization. Trade organizations have a pivotal role in this effort and can rely on input from market leaders in their ecosystems for insight into next generation applications. Associations can bring the industry players together to push the evolution of existing standards faster than any one or two companies trying to do so on their own.



Through the years, the embedded community has seen the value of standards, and is expanding its role in developing them. Now there is an increasing range of specifications available, all of which will fight and live or die in the open market. Along with this lies another challenge, in some cases brought about by the existence of standards bodies: competition for dominance of the next generation of products based on one specific and competing standard or technology. This can present a true challenge for OEMs.

It also raises the question then about where the best place is for the standards to reside, be managed, and to develop. Gone are the days of the great religious battles over one technology or another. Manufacturers are embracing multiple standards in their designs depending on the market requirements. In driving the effort for interworking between multiple standards such as RapidIO, PCI Express or Ethernet, trade associations must leverage their strength to join otherwise potentially competing companies and groups within companies in an effort to create an environment that supports co-existence to better serve OEMs and drive never-before-realized applications.

The need for a well-organized, cohesive trade organization is clear. Defining the infrastructure requires standards, and bodies such as the RapidIO Trade Association have provided and pushed specifications. Interconnect technologies also require interoperability, another element driven by the trade association. Standards must work together in some cases to provide best in class solutions, efforts that are also driven by trade groups. Ultimately, an interconnect technology – whether it is RapidIO, Infiniband, Ethernet or a proprietary technology – stands or falls with its user base and ecosystem. This too, is a key benefit of a formal, well-organized trade association: the strength of its members and their products.

A strong, effective trade organization like the RapidIO Trade Association is essential for the long-term growth and permeation of the technology through the market into leading-edge applications. From technology to testing to the ecosystem, a strong trade association that fully understands both the technology it is promoting and the markets it is addressing, is a fundamental key to success.

For the latest information on the RapidIO standard, visit <http://www.RapidIO.org>.



## Technical Insights

### Interoperability and RapidIO-based Products

*By Jim Parisien, Product Manager, Product Marketing Group, Tundra Semiconductor*

Interoperability plays a key role with all protocol standards in establishing faith that multi-vendor devices can interoperate. However, not all interoperability testing is created equal. The PCI-SIG does much of their interoperability testing through plugfests. Upon meeting some basic entry criteria semiconductor or board vendors gather at a plugfest event to determine if their wares interoperate. In the PC and server world, this consists of bringing a motherboard or adapter card to the event. The software used is typically Windows running on a Pentium processor for a motherboard or a Windows driver for the adapter card. In a simple form factor and software environment such as this, a plugfest can be an effective tool to quickly, albeit qualitatively, gain a sense of interoperability.

This gets far more complicated as we examine embedded applications where form factors vary considerably. For example, CompactPCI (cPCI) comes in 3U and 6U heights and supports many different real time operating systems (RTOSs). Many features such as Hot Swap are optional, yet still need testing. As form factor, RTOS, and sets of capabilities vendors wish to test stray further from an ideal PC environment, the ability to assure customers that a device or card is truly “interoperable” becomes limited if a plugfest is the only tool used. It is precisely this limitation that very often has left OEMs to bear the burden of the due diligence required to verify interoperability. This is one reason why system level prototyping has always been so important to an OEM in de-risking a program. It is also why prototyping and system level integration can be so expensive and time consuming.

The reality is that form factors and RTOS in embedded applications will always be diverse. In fact, as we introduce standards like RapidIO® where error recovery is built into hardware, interoperability becomes more complicated. Plugfests are adequate instruments for qualitatively testing components when they work; but they are not effective in testing how devices recover when things inevitably go wrong.

The truth is end-users can't afford problems (a “Blue Screen” during a 911 call would be disastrous) and OEMs can no longer afford to bear the weight of interoperability testing during product integration. Embedded system protocols like RapidIO require a rigorous interoperability testing approach that provides OEMs with a quantitative analysis of multi-vendor interoperability. While embedded protocols like RapidIO are designed to detect errors and recover in predictable ways that are clearly specified, true interoperability testing for RapidIO requires you to go beyond testing what works; it requires you to break the protocol by injecting errors and assessing whether the device under test recovers appropriately.

This class of interoperability testing goes beyond what can be covered during a qualitative plugfest. It pushes the breadth and depth of interoperability testing across different vendor devices and across protocol violations. Plugfests will continue to have a role within



RapidIO product development, but one that will primarily be associated with demonstrations of interoperability rather than a means of achieving it.

Recently Tundra announced the RapidIO Interoperability Lab (RIOLAB™) at the TI Developers forum. This facility will be an interoperability lab designed to meet the interoperability testing needs of commercial semiconductor vendors, as well as ASIC and FPGA developers. It will provide OEMs with a single source of consistent and independent reports that they need to develop products with confidence. The RIOLAB will remove the burden of proving device interoperability from an OEM's shoulders and allow them to focus on system design and integration issues. This lab is an excellent sign of a maturing ecosystem. It will ensure interoperability by design and ultimately help OEMs get to market faster.

For information on Tundra Semiconductor, visit <http://www.Tundra.com>. For information on the RIOLAB, visit: [http://www.rapidio.org/news/pr/view?item\\_key=f316e8cbc17874d764868c7aa7f29a5405875e1f](http://www.rapidio.org/news/pr/view?item_key=f316e8cbc17874d764868c7aa7f29a5405875e1f)

## Design Tips

### Supporting PMCs/XMCs in a RapidIO Multicomputer

*By Eran Cohen Strod, Director, Product Marketing, Defense Electronics Group, Mercury Computer Systems, Inc.*

Mezzanine cards have evolved as an effective way to implement flexible system designs, supporting ever-changing user requirements for I/O and adjunct processing. For high-performance embedded systems, the PCI Mezzanine Card (PMC) has become the most broadly accepted standard. Although their I/O bandwidth is limited by the speed of the PCI bus, PMC modules are still important to RapidIO system designers because they support such a wide array of I/O device interfaces.

The XMC standard (VITA 42) was developed as a superset of the PMC standard. It provides the same level of mezzanine flexibility as the PMC, with the added advantage of a high-bandwidth, switch fabric interface. VITA 42 is flexible enough to support the various switch fabric standards under the umbrella of a single standard; it is divided into a base standard and derivative protocol standards, or *dot* specifications. Each derivative protocol standard maps a specific switch fabric protocol onto the VITA 42 base, including VITA 42.1 for Parallel RapidIO and VITA 42.2 for Serial RapidIO.

A PMC is actually defined by a combination of two IEEE standards that were finally accepted in 2001. (Of course vendors began creating PMC cards based on the proposed version of these specs long before they were officially accepted.) IEEE 1386 defines the Common Mezzanine Card (CMC). The physical and mechanical specification of the PMC. IEEE 1386.1 is the electrical standard for a PMC, mapping the PCI bus signals onto the CMC connectors.



The PMC interface standard consists of four board-to-board 1.00 mm dual-row 64-pin connectors, labeled P1 thru P4. A 32-bit PCI bus uses the P1 and P2 connectors, while a 64-bit PCI bus uses P1, P2, and P3. In either mode, P4 is available for user-defined signaling.

The VITA-42 XMC standard extends the PCI interface by the addition of two new high-speed connectors to the four PMC connectors. These two new connectors, designated P5 and P6, provide XMC RapidIO connections that are independent from the PCI bus support for the P1 - P4 connectors. These additional connectors include power and ground pins, so VITA 42 provides the option of designing a XMC that only includes the two RapidIO connectors.

While any type of module can be designed with a PMC and/or XMC site, overall system architecture often leads to a carrier board created specifically for that purpose.

Since VITA 42 was designed for backwards compatibility, a carrier board with mezzanine sites designed to the VITA 42 specification can support both PCI and RapidIO mezzanine connections, even if the particular mezzanine card selected supports only one or the other. This allows system designers a high level of flexibility to deal with a range of I/O bandwidths.

The carrier board must also provide the interface from the PMC/XMC to the RapidIO fabric. For a PMC, this takes the form of a PCI-to-RapidIO bridge. For an XMC, a bridge chip is not required. Instead, the carrier board needs to connect the fabric XMC pins to a local RapidIO switch, or to a system level switch card via backplane connections.

The bridging from PCI to RapidIO is well defined in the RapidIO System and Device Interoperability Specification. PCI is a load/store transaction architecture which easily maps to RapidIO IO logical layer transactions. Once a system is initialized, neither the RapidIO fabric nor the PCI IO devices need to be aware that any bridging is taking place. This same model will hold through when the industry eventually produces PCI Express mezzanine modules as PCI Express transactions conform to the same PCI architecture. The advent of PCI Express as a future IO interconnect will somewhat simplify bridging implementations because implementations of RapidIO and PCI Express can share the same SerDes block, although PCI Express runs slower per lane than RapidIO.

The mezzanine carrier board usually includes a general purpose processor which controls data movement between the PMC/XMC and the rest of the RapidIO system. In most applications, this processor runs a common operating system such as VxWorks, or Linux, so that standard COTS drivers can be used to control the PMC/XMC.

To support a user application, the PMC/XMC module needs to exchange information with the rest of the RapidIO system, describing the data transfers pertaining to the PMC/XMC and including destination addresses and target identifiers for each transfer. This is typically handled by a portion of the application code that acts as a proxy between the endpoint on the PMC/XMC card and the rest of the multi-computer system, assuming responsibility for the exchange of information.



For PMC/XMC modules, the local processor on the carrier board usually acts as the proxy and handles the information exchange. Writing this proxy software for a multi-computer system can be a challenge. In a Mercury system, a set of well defined application programming interfaces (APIs) facilitate the extraction of the proper information in a standard fashion. This allows most XMC or PMC devices to connect to sophisticated, high performance, data movement middleware libraries, such as the Mercury PAS (Parallel Acceleration System) library with minimal effort. Such a software interface provides maximum flexibility, supporting both PMCs and XMCs and managing data streams with a range of different characteristics. For more information, visit Mercury Computer Systems at <http://www.mc.com>.

## Announcements

Q4 2005 and early 2006 continued to see multiple RapidIO-based products hit the market serving a wide berth of applications and market needs. Highlights and links to each announcement follow:

- ✍ [Altera and TelASIC Announce Breakthrough Power Efficiency for 3G/3.5G Wireless Base Station Radios](#): Altera Corporation and TelASIC Communication announced a jointly-developed radio card, TC8201 that dramatically increases power amplifier (PA) efficiency when compared with analog feed-forward-based systems. The TC8201 radio card increases PA efficiency by up to 300 percent, reducing cost, cooling and maintenance requirements in new 3G/3.5G base station designs. <http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/02-07-2006/0004276126&EDATE=>
- ✍ [Curtiss-Wright debuts industry's first VITA 46 \(VPX\) DSP engine](#): The CHAMP-AV6 combines quad PowerPC 8641 devices with the serial switched fabric capabilities made possible by VPX, the new military aerospace COTS board standard. The VPX standard, collaboratively developed by COTS industry leaders and prime military integrators, delivers a high-speed serial interconnect with a form-factor and feature set specifically designed to meet demanding military/aerospace applications. Multi-processor systems based on the CHAMP-AV6 will benefit from the 10 GB/s full duplex bandwidth provided by the board's four Serial RapidIO ports; this represents a data throughput rate approximately 10x faster than today's best VME/StarFabric implementation. <http://www.cwembedded.com>
- ✍ [FuturePlus Systems adds Serial RapidIO protocol analyzer](#): The FS4410 is a low-cost Serial RapidIO protocol analysis probe for use with Agilent Technologies logic analyzers. It will be used by designers involved in development of computers and peripherals incorporating the Serial RapidIO architecture. The FS4410 allows non-intrusive probing of Serial RapidIO buses at a data rate of 3.125 Gbps. <http://www.futureplus.com>
- ✍ [Jennic announces Serial RapidIO to PCI bridge](#): Jennic has established itself as the leading provider of system-level IP for Serial RapidIO interfaces and has successfully demonstrated



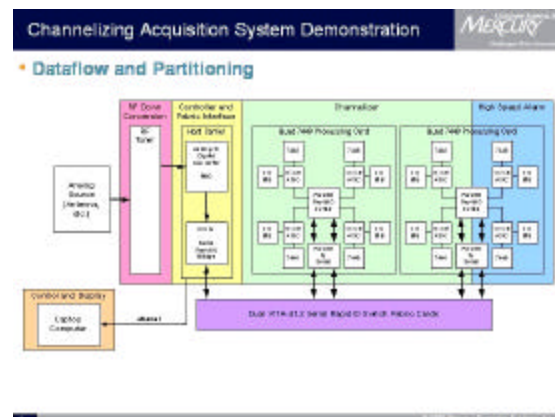
its IP working in a range of silicon technologies, including FPGA and structured ASIC. Responding to customer and market demand, Jennic has developed its first chip-level IP solution, a Serial RapidIO to PCI Bridge; other bridges in the pipeline include Serial RapidIO to PCI-Express and SPI-4.2. <http://www.jennic.com>

✎ **Lattice Semiconductor Launches LatticeSC System Chip FPGA Family:** LatticeSC™ System Chip FPGA family is designed to provide the unsurpassed performance and connectivity essential for high-speed applications. Fabricated on Fujitsu's 90nm CMOS process technology utilizing 300mm wafers, LatticeSC FPGAs are packed with features that accelerate chip-to-chip, chip-to-memory, high-speed serial, backplane and network data path connectivity to provide "Extreme Performance." The flexiPCS block can be configured to support an array of popular data protocols, including PCI-Express, 1.02 or 2.04 Gbps Fibre Channel, Gigabit Ethernet (1000 BaseX), 10 Gigabit Ethernet (XAUI), Serial RapidIO, and SONET (STS-12/STS-12c, STS-48/STS-48c, and TFI-5 support at 10Gbps or above). <http://www.latticesemi.com>

✎ **Micro Memory introduces CoSine-on-Othello MM15x0 and MM-16x0 VME carriers for FPGA processing on serial switch fabrics:** Combining the industry's most powerful System-on-Chip, CoSine, with the application optimized architectures of Othello VME carriers for the VxS VITA 41 and VPX VITA 46 serial link formats, Micro Memory introduced the CoSine-on-Othello MM15x0 and MM-16x0 VME carriers for FPGA processing on serial switch fabrics. These ground-breaking products include significant industry firsts including: the first Serial RapidIO FPGA processing solutions on VME, the first VME boards to include complete on-board Serial RapidIO switch fabric connectivity, the first VME boards to utilize the V-4 SX or V-4 LX series of Xilinx FPGAs, and the first Rugged Conduction Cooled and Rugged Air Cooled Serial RapidIO VME solutions. <http://www.micromemory.com>

✎ **Mercury Computer Systems introduces the industry's first VXS multicomputer system:** The PowerStream 6100, the industry's first 6U VME system based on the Serial RapidIO interconnect fabric and compliant with the VXS (VITA 41.2) form factor standard triples signals intelligence and radar system antenna channels and improves bisection bandwidth by 10x in military contractor applications. At 761 GFLOPS and 42 GB/s sustained fabric throughput, the PowerStream 6100 sets a new record for performance available in the VME form factor. <http://www.mc.com/powerstream6100>

✎ **Mercury Computer Systems introduces the MC432 Serial RapidIO switch with a breakthrough feature set:** The MC432 is a high-performance Serial RapidIO switch that provides advanced features that include high-reliability support, dynamic bandwidth management, and extended



error-handling capabilities. Its unique performance profile is ideal for multiple switching applications in the embedded, communications, wireless and storage markets.

<http://www.mc.com>

- ✎ **Mercury Computer Systems expands capabilities for signals intelligence applications with advanced RF modules:** The new Echotek Series RF family of commercial off-the-shelf (COTS) radio frequency (RF) digital tuning modules leverages the highly optimized technology platform gained through the acquisition of Echotek Corporation in August 2005, and features highly accurate frequency measurement for precise sorting of different signals; low phase noise for enhanced performance in "coherent" applications such as direction finding and beam forming; and 10 usec tuning speed for tracking highly agile signals. <http://www.mc.com>

- ✎ **PMC-Sierra introduces highest density Serial RapidIO® switch for next generation wireless infrastructure and enterprise platforms:** The PM6352 RSE 160 Serial RapidIO® Switch Element is a scalable 16-port switch device for wireless infrastructure equipment *capable of scaling up to 10 gbit/s per port and ideal for ATCA® and MicroTCA™-based platforms*. Wireless Original Equipment Manufacturers (OEMs) are leveraging standards-based hardware solutions, such as AdvancedTCA® (ATCA) and MicroTCA™ to deliver high-performance next-generation platforms. The RSE 160 features scalability, with 16 ports running up to 10 Gbit/s per port to deliver a single-chip solution for ATCA and MicroTCA-based platforms; protection and diagnostic features for carrier-grade applications; enhanced Quality of Service (QoS) features for high performance systems; and industry-leading SERDES technology for guaranteed signal integrity. <http://www.pmc-sierra.com/products/newProducts.html>



- ✎ **TMS320C6455 DSP enables a robust Serial RapidIO ecosystem driving higher bandwidth interconnect:** Texas Instruments Incorporated today announced the immediate availability of a TMS320C6455 digital signal processor (DSP) evaluation module (EVM) and a TMS320C6455 DSP starter kit (DSK), both with a Serial RapidIO bus interface. The C6455 DSP, based on the TMS320C64x+(TM) DSP core and at the heart of the EVM and DSK, is now sampling, bringing together TI's highest performing DSP architecture with Serial RapidIO support to boost performance and I/O bandwidth in high-end and multi-channel applications such as video and voice transcoding, videoconferencing servers, high-definition (HD) video encoding and mixer systems, wireless base station transceivers, HD radio, medical imaging, and photo labs and printing. System performance is boosted 12X because Serial RapidIO eliminates IO bottlenecks by providing a low latency, high bandwidth (10Gb/s full duplex), low pin count interconnect. The new EVM and DSK offer a complete, easy-to-use multiprocessor C6455 DSP development system with Serial RapidIO communications connectivity to third party tools, FGPAs, Serial RapidIO switches and



Serial RapidIO equipped embedded processors. Using the C6455 EVM or C6455 DSK, TI's video infrastructure, telecommunications infrastructure and imaging customers can begin code development for tomorrow's products today. For more information, please visit <http://www.ti.com/c6455pr>

- ✎ **Thales announces rugged 6U VME clone:** Thales is teaming to produce a fully rugged version of the current generation PowerPC blade server called the PowerNode5. PowerNode5 is a rugged 6U VME clone of the IBM JS20 blade design. This new product provides a very high level of performance with a full binary compatibility with IBM JS20 blades servers, in a form factor fully adapted to any of today's embedded systems requirements, said the company. The PowerNode5 features an on-board serial RapidIO switch fabric that allows the end-user to build a powerful and scalable signal processing calculator based on the PowerNode5 building block as well as two Gigabit Ethernet ports. <http://www.thalesgroup.com/home/home/>



- ✎ **Thales bundles PowerNode 3 with PMC-RIO card:** Thales Computers introduced a serial RapidIO distributed switch solution designed for VME systems. According to the company, they bundled the outstanding performance of PowerNode3 with a powerful and reliable switch fabric solution to allow the end-user the ability to interconnect computing nodes all together inside a signal processing calculator. The Serial RapidIO technology reduces pin counts while staying full duplex and provides a low latency packet-based interconnect data push. Additionally, the technology offers a very high degree of error management and provides a state-of-the-art architecture for reporting, and recovering from, transmission errors. The PMC-RIO mezzanine boasts its own distributed switch that prevents any system single point of failures, while Thales' Serial RapidIO switch fabric allows an aggregate throughput of up to 1.6GBps due to the 400MBps sustained link bandwidth (peer to peer). <http://www.thalesgroup.com/home/home/>
- ✎ **RapidIO Trade Association steering committee communicate support for the RIOLAB initiative:** Members of the RapidIO Trade Association steering committee including Altera, Ericsson, Freescale Semiconductor, Lucent Technologies, Mercury Computer Systems, Texas Instruments, Xilinx, and others immediately communicated their support for the RIOLAB initiative as a critical milestone in furthering deployment of RapidIO-based products. [http://www.tundra.com/NewsRoom/PressReleases/2006/pr\\_02\\_28b\\_06.cfm](http://www.tundra.com/NewsRoom/PressReleases/2006/pr_02_28b_06.cfm)
- ✎ **Tundra launches third-generation Serial RapidIO® Switch with high-performance multicast capability for next-generation wireless and video infrastructure platforms:** Highly scalable, the Tsi578™ switch advances the integration of Serial RapidIO in ATCA® and MicroTCA™ architectures. The Tundra [Tsi578](#) Serial RapidIO Switch, a high-performance switch with patent-pending technology, delivers the performance, power and configurability that



designers of embedded designs need to build reliable, high-performance RapidIO-based systems for a wide range of applications such as wireless base stations and video infrastructure. [http://www.tundra.com/NewsRoom/PressReleases/2006/pr\\_02\\_28\\_06.cfm](http://www.tundra.com/NewsRoom/PressReleases/2006/pr_02_28_06.cfm)

- ✍ [Tundra Semiconductor creates world's first RapidIO® interoperability lab, RIOLAB™ to address component manufactures' and OEMs' need to accelerate next-generation RapidIO products to market:](http://www.tundra.com/NewsRoom/PressReleases/2006/pr_02_28_06.cfm) Tundra Semiconductor Corporation announced that the Company has launched the world's first RapidIO Interoperability Lab ([RIOLAB™](http://www.tundra.com/NewsRoom/PressReleases/2006/pr_02_28a_06.cfm)) for interoperability and specification compliance testing. Leveraging its depth of expertise, technology leadership, and commitment to drive the commercialization of RapidIO technology, Tundra has served as a de facto test facility for members of the RapidIO ecosystem and OEMs alike, resulting in the development of proven test scripts and making the formalization of the RIOLAB a natural evolution.

[http://www.tundra.com/NewsRoom/PressReleases/2006/pr\\_02\\_28a\\_06.cfm](http://www.tundra.com/NewsRoom/PressReleases/2006/pr_02_28a_06.cfm)

- ✍ [Customers design RapidIO®-Based systems with confidence using Tundra's high performance Serial RapidIO switch:](http://www.tundra.com/NewsRoom/PressReleases/2006/pr_02_22_06.cfm) Tundra Tsi568A™, the industry's first Serial RapidIO switch, is in full production. With more than one RapidIO switch in production and development platforms available, Tundra is recognized as a market leader and continues to advance RapidIO System Interconnect. Tundra is committed to bringing high performance RapidIO products to market to meet the rapidly growing demand from customers now designing with the RapidIO technology.

[http://www.tundra.com/NewsRoom/PressReleases/2006/pr\\_02\\_22\\_06.cfm](http://www.tundra.com/NewsRoom/PressReleases/2006/pr_02_22_06.cfm)



## Events

Meet up with RapidIO Trade Association members and see their products first hand at a range of industry events.

RapidIO Developments a Light Reading Webinar hosted by Simon Stanley of Earslwood Marketing	Now that silicon is available for serial RapidIO, we take a look further into this interconnect technology to understand what it takes to build a RapidIO-based system. Event sponsored by Freescale Semiconductor, IDT, and Tundra Semiconductor	March 28, 2006 2:00 p.m. ET 7:00 p.m. UK
Embedded Systems Conference - Silicon Valley	The RapidIO Trade Association will be joining other leading edge technologies that cover every aspect of design as an exhibitor and in educational forums.	April 3-7, 2006 in San Jose, CA
Freescale Technology Forum - US	The RapidIO Trade Association will be an active participant in the forums, technology training, and demonstrations that are a hallmark of this annual event.	July 24-27, 2006 in Orlando, FL

## In the News

During the last few months, The RapidIO® Trade Association, its members and their products continue to be sought after news in the industry. Recognizing the explosive deployment taking place in 2006, several of the RapidIO Trade Association members offered their perspectives on how the year started off:

*"It is very encouraging to see the launch of new serial RapidIO components and the expansion of our ecosystem. This demonstrates an increasing level of trust in the RapidIO standard, thereby making RapidIO more viable," said [Dr. Peter Olanders](#), research manager at Ericsson and vice chairman of RapidIO Trade Association.*

*"From the beginning, QNX Software Systems has seen the RapidIO interconnect as a key enabler for next-generation networking and communications systems," said [Mark Roberts](#), director of product management at QNX. "From actively promoting the benefits of RapidIO technology to supporting the first communications processor to implement serial RapidIO, our commitment to the RapidIO standard continues to grow, and we're excited by the increasing adoption of RapidIO among our embedded customers."*

*"It is exciting that leading system manufacturers are bringing RapidIO products to market," said [Travis Scheckel](#), Texas Instruments Communications Infrastructure Systems team member and RapidIO Technical Working Group chair. "The breadth of*



*announcements in Q1 2006 highlights the robust RapidIO ecosystem and underscores the growing importance of RapidIO interconnects for embedded system applications."*

Following are some of the many places where the RapidIO Trade Association made headlines between October 2005 and February 2006.

- ✍ *analogZONE*
- ✍ *ATCA Newsletter*
- ✍ *Chip Design*
- ✍ *CommsDesign.com*
- ✍ *Control Engineering*
- ✍ *COTS Journal*
- ✍ *Dataweek*
- ✍ *Design & Reuse (Paris)*
- ✍ *DSP-FPGA.com*
- ✍ *EDN*
- ✍ *Eg3*
- ✍ *EE Product News*
- ✍ *EE Times*
- ✍ *EE Times Asia*
- ✍ *EE Times UK*
- ✍ *EE Times Online*
- ✍ *Electronic Design*
- ✍ *Electronics Talk*
- ✍ *Electronique International*
- ✍ *Embedded.com*
- ✍ *In-stat*
- ✍ *Light Reading*
- ✍ *Military & Aerospace Electronics*
- ✍ *NE Asia Online*
- ✍ *Network Systems Design Line*
- ✍ *RTC Magazine*
- ✍ *SOCcentral*
- ✍ *Telephony World*
- ✍ *The Asian Age*
- ✍ *The 451 Group*
- ✍ *TMCnet*
- ✍ *VMEbus Systems*

Visit these links to read a sampling of the articles that include RapidIO technology, its members and RapidIO-based products:

- ✍ *ATCA Newsletter: AdvancedTCA Comes of Age,*  
<http://www.atcanewsletter.com/>
- ✍ *ATCA Newsletter: AdvancedTCA Summit has it all on December 6-8, 2005,*  
<http://www.advancedtcasummit.com/>
- ✍ *Chip Design Magazine: Verifying Serial RapidIO Interoperability,*  
<http://www.chipdesignmag.com/display.php?articleId=263>

- ✍ *Control Engineering*: PICMG adds serial RapidIO to AdvancedTCA, defines mapping to ATCA,  
<http://www.manufacturing.net/ctl/article/CA6282284?spacedesc=industryUpdates>
- ✍ *COTS Journal*: Serial Switched Fabrics Enable New Military System Architectures, <http://www.cotsjournalonline.com/home/article.php?id=100438>
- ✍ *COTS Journal*: Higher Throughputs Drive Advanced Signal Processing Applications, <http://www.cotsjournalonline.com/home/article.php?id=100439>
- ✍ *COTS Journal*: VME SBC Designs Wrestle With Fabrics, I/O Issues, <http://www.cotsjournalonline.com/home/article.php?id=100433>
- ✍ *COTS Journal*: Switched Fabrics Challenge the Military and Vice Versa, <http://www.cotsjournalonline.com/home/article.php?id=100448>
- ✍ *Design & Reuse*: First-Time-Ever Demo of FPGA Processing on a Serial RapidIO Device, <http://www.us.design-reuse.com/news/news11677.html>
- ✍ *EE Times*: Three of top ten products in EE Times quarterly ranking designed to support RapidIO technology,  
<http://www.eeproductcenter.com/ultimate/2.2/logic.html>
- ✍ *EE Times UK*: Interconnect standards set to flourish, says In-Stat, <http://www.eetimes.com/news/latest/showArticle.jhtml?articleID=172300031>
- ✍ *EE Times*: Tips for maximizing RapidIO,  
<http://www.eetimes.com/showArticle.jhtml?articleID=171201913>
- ✍ *EE Times Online*: NetSeminar-General Design Considerations with RapidIO Fabric Technology-November 15, 2005 1:00 pm PT/4:00 pm ET,  
<http://www.eetimes.com/netseminar.html>
- ✍ *EE Times*: Quality, easy integration are on IP 'must have' list,  
<http://www.eeproductcenter.com/showArticle.jhtml?articleID=174906844>
- ✍ *Electronique Internationale*: Création d'un laboratoire d'interopérabilité pour les produits RapidIO, <http://www.01net.com/article/306605.html>
- ✍ *Electronics Weekly*: VPX: New era of embedded board performance  
<http://www.electronicweekly.com/Articles/2006/02/07/37622/VPXNeweraofembdeddedboardperformance.htm>
- ✍ *Electronic Design*: PMC + SBC = Serial RapidIO Fabric Solution,  
<http://www.elecdesign.com/Articles/Index.cfm?ArticleID=11953>
- ✍ *Electronic Design*: Mercury Pushes Cell and VXS,  
<http://www.elecdesign.com/Articles/Index.cfm?ArticleID=11995>
- ✍ *Electronic Design*: EiED Online Bus + Board Show Part 1,  
<http://www.elecdesign.com/Articles/Index.cfm?ArticleID=11977>

- ✍ *Electronic Design: EiED Online: Bus and Board, Part 2,*  
<http://www.elecdesign.com/Articles/ArticleID/12062/12062.html>
- ✍ *Electronic Design: Interconnects Make the Cut with the Right Fabrics,*  
<http://www.elecdesign.com/Articles/Index.cfm?ArticleID=11685>
- ✍ *Electronic Design: Fabric Acceptance,*  
<http://www.elecdesign.com/Articles/Index.cfm?ArticleID=11684>
- ✍ *Electronic Design: Cash in Your Chips by Going Multicore,*  
<http://www.elecdesign.com/Articles/Index.cfm?ArticleID=11813>
- ✍ *Light Reading: ATCA's Next Big Step,*  
[http://www.lightreading.com/document.asp?doc\\_id=82575&WT.svl=tease4\\_2](http://www.lightreading.com/document.asp?doc_id=82575&WT.svl=tease4_2)
- ✍ *Light Reading: ATCA and RapidIO,*  
[http://www.lightreading.com/webinar\\_archive.asp?doc\\_id=27246](http://www.lightreading.com/webinar_archive.asp?doc_id=27246)
- ✍ *Light Reading: RapidIO Interop Demo Staged,*  
[http://www.lightreading.com/document.asp?doc\\_id=89867](http://www.lightreading.com/document.asp?doc_id=89867)
- ✍ *Market Wire: Telecom Industry's Top Firms Convene at First AdvancedTCA Summit 2005,*  
[http://www.marketwire.com/mw/release\\_html\\_b1?release\\_id=103109](http://www.marketwire.com/mw/release_html_b1?release_id=103109)
- ✍ *RTC Magazine: Serial RapidIO Fabric Offers Robust Scalability and Performance,*  
<http://www.rtcmagazine.com/home/article.php?id=100463>
- ✍ *The 451 Group: RapidIO finds success in ATCA, seeks to grow into storage (subscribers only)*

## Connect and Contribute

*RapidIO Connections welcomes your comments, ideas, questions and contributions.*