



RapidIO® Connections

2/2007

Special Edition

Definitive White Paper Provides Detailed Technology Comparison of Ethernet and RapidIO Interconnects

A newly released white paper, *System Interconnect Fabrics: Ethernet Versus RapidIO® Technology*, offers embedded designers a detailed technology comparison that will prove invaluable as they design and specify standards for next generation applications. The paper, authored by Greg Shippen, system architect for Freescale Semiconductor's Digital Systems Division, NCSG and a member of the RapidIO Trade Association's Technical Working Group and Steering Committee, is available on the RapidIO web site, www.RapidIO.org.

As the white paper's introduction notes, "market pressures demand that each new generation of networking and communications system deliver both higher performance and new functionality at a lower price." As system engineers strive to meet these demands, they turn increasingly to standards-based solutions, and many, by default, consider Ethernet due to its longevity in the market. Yet, interconnect technologies like RapidIO are gaining wide acceptance and in many cases, becoming the de facto standard as in the wireless and military/aerospace markets.

"A white paper on this topic and of this high caliber is long overdue. This document provides essential information that designers can use to make an informed technical design choice."

With this white paper, engineers for the first time have access to an unbiased, comprehensive review and comparison of these two important interconnect technologies. The paper explores system level fabric requirements and provides a technical overview of both technologies before delving into an in-depth comparison. Prior to concluding, the white paper examines practical considerations and economics.

While system requirements will determine whether Ethernet or RapidIO is most suitable for a given application, this paper provides critical information that delineates where each technology excels. While Ethernet will clearly dominate the WAN and the Internet markets, market trends that demand increasing performance with higher levels of QoS, suggest that RapidIO will be increasingly important in meeting many system requirements in the future.

“For too long designers believed it was either Ethernet or RapidIO. This paper demonstrates the need for both interconnect standards and helps clarify where each is best suited to meet performance demands.”

System Interconnect Fabrics: Ethernet Versus RapidIO® Technology White Paper At-A-Glance

The new white paper, *System Interconnect Fabrics: Ethernet Versus RapidIO® Technology*, reviews the use of Ethernet and RapidIO technology as a system interconnect fabric, comparing them against the requirements for such fabrics, and includes quantitative analysis where possible. Following is the top-line table of contents for the paper:

1. **Interconnects Everywhere** – *“As systems grow more complex, the variety of interconnects grows as well, requiring increased engineering costs to design and support them. As Moore’s Law increases the speed and complexity of functional blocks, interconnects can become a bottleneck, especially interconnects between ICs and boards. Clearly, increasing interconnect performance is critical to increasing system performance.”*
2. **System-Level Fabric Requirements** – *“A system interconnect necessarily engages a broader set of requirements than smaller subsystems. Reviewing common system fabric requirements can help to sort out the suitability of Ethernet or RapidIO as a system fabric.”*

“This paper will be widely consulted as an important resource by the embedded design community as new applications break new boundaries in demands for performance and functionality.”

3. **Ethernet Technical Overview** – *“It is doubtful that the originators of Ethernet could have envisaged how widespread their technology would become. As services layered on top of Ethernet become the common language for the Internet, Ethernet is now ubiquitous as both a wide and local area computer interconnect. Also, it has evolved into multiple technical meanings.”*
4. **RapidIO Technical Overview** – *“Motorola started work in 1997 on a next-generation front-side bus for its Power- and PowerPC™-based processors. By 1999, Motorola and Mercury Computer had collaborated to complete the initial RapidIO specification. In 2000, these two companies drove the formation of the RapidIO Trade Association,*

making RapidIO an independent standard. By 2004, the RapidIO Specification had become an international standard as ISO/IEC 18372:2004.”

5. **Ethernet and RapidIO Comparison** – *“The differences between Ethernet and RapidIO begin with the initial design constraints...”*
6. **Practical Considerations** – *“As with most ubiquitous technologies, Ethernet has been applied to applications that were not an original design goal... Therefore, this section discusses Ethernet and RapidIO in the context of a variety of issues system designers must confront on a daily basis, such as the impact of standardization, throughput, and power as well as economic considerations of cost and availability.”*
7. **Conclusion** – *“System requirements fundamentally determine whether Ethernet or RapidIO is most suitable for a given embedded application. There is no general answer to this question.”*

“The level of technical detail in virtually every aspect of Ethernet and RapidIO combined with a thorough review of practical considerations makes this paper a tremendous resource for the embedded design community.”

Special Programs Explore the Ethernet – RapidIO White Paper In Detail

Throughout 2007, the RapidIO Trade Association will provide educational events and discussions around the white paper comparing Ethernet and RapidIO. As programs are announced they will be posted on the www.RapidIO.org. A sampling of these programs include:

- ⌘ Special Edition RapidIO Radio Podcasts featuring discussions with author, Greg Shippen
- ⌘ Webinars featuring the author and other industry experts discussing the RapidIO and Ethernet standards in an interactive environment
- ⌘ “Did You Know?” campaigns highlighting key features and findings from the paper
- ⌘ A series of detailed technical articles published in industry trade publications
- ⌘ Expanded collateral including professionally printed copies of the entire white paper as well as PowerPoint presentations and application notes examining the finer points of the discussion

Be sure to visit the RapidIO web site to learn more about these programs and sign-up for the RapidIO mailing list to receive special mailings and invitations.