**IDT RapidIO® 2 Switch Portfolio**

**IDT CPS/SPS RapidIO 2 Switch Comparison Matrix**

**RapidIO® 2 PORTFOLIO BENEFITS**
- Design highest performance backplane in industry with 20 Gbps data rate per link
- Lowest power per payload bit vs. other interconnect protocols
- RapidIO standard supports arbitrary system topology with true peer-to-peer networking
- RapidIO Messaging Support for transfers of 4 KB messages in hardware

**TARGET APPLICATIONS**
- Wireless: Baseband cards and backplanes in LTE, WiMAX, WCDMA, and TD-SCDMA
- Defense and aerospace: Radar, sonar and navigation systems
- Medical imaging: CT scanners, MRIs
- Video: Teleconferencing
- Networking
- Servers

**COMPARISON WITH OTHER INTERCONNECT PROTOCOLS**
- Highest performance serial interconnect with up to 6.25 Gb/s per link
- Highest protocol efficiency in embedded systems with 94% payload versus header efficiency
- RapidIO standard supports arbitrary system topology with true peer-to-peer networking
- Twice the performance per link compared to 10 Gb Ethernet
- RapidIO messaging support for transfers of large blocks of data, superior to PCIe and 10 GbE in target applications

**SOFTWARE AND HARDWARE ECOSYSTEM**
- Serial RapidIO Development Platform Gen2 (SRDP2)
- RapidIOJTAG edition software support
- Serial RapidIO 2 Endpoint Intellectual Property for ASIC, CPU, DSP, and FPGAs
- RapidIO LH support
- Power Calculator tool
- HSPICE and IBIS models
- System Modeling Tool

The Serial RapidIO Development Platform 2 is ideal for RapidIO prototyping RapidIO systems. It has a CPS-1848 and CPS-1616 which can be connected to a variety of development platforms for DSPs, FPGA and microprocessors.

**Connectors**
- 3 AMC B+ Connectors: 2 with two 4x S-RIO links, 1 with three 4x S-RIO links, AMC 0 and AMC 4 Specification (full support on IPMC and JTAG)
- 2 SFP+ Connectors: 1 port with 1x S-RIO link, INF-4301 Specification
- 1 QSFP Connectors: 1 port with 1x S-RIO link, SFF-8438 Specification
- 2 InfiniBand/FC Connectors: 1 port with 4x S-RIO link or 2 ports with 2x S-RIO links, SFF-8470 Specification
- 1 SMA Array: 1 port with 4x S-RIO links

**Bandwidth (Gbps)**
- CPS-1848: 20
- CPS-1616: 10
- CPS-1432: 10
- SPS-1616: 8
- SPS-1432: 10

**Cut-through latency (ns)**
- CPS-1848: 100
- CPS-1616: 100
- CPS-1432: 100
- SPS-1616: 100
- SPS-1432: 100

**Target Applications**
- Networking
- Servers

**Overview**
IDT is the industry’s leading supplier of RapidIO® interconnect solutions, providing a broad portfolio of switches, bridges, IP and development platforms for defense, aerospace, video, imaging, and wireless markets. IDT has several switches supporting RapidIO 2 which are available today.

Why RapidIO® 2?
The RapidIO Interconnect Architecture, designed to be compatible with the most popular integrated communications processors, host processors, and networking digital signal processors, is a high-performance, packet-switched, interconnect technology.

Around 2001, a number of experts from the embedded systems world met to come up with a new way to connect microprocessors, FPGAs, digital signal processors, ASICs, entire boards and entire chassis. The intention was to design an interconnect that allowed these elements to speak to one another using any networking topology, with low latency, low power and an architecture that would simplify the design of application level software. For the reasons mentioned, above, it was clear back then as it is today, that applications would very rarely be built in embedded systems with single processors only. Moore’s law simply could not catch up with application needs. This led to the inception of RapidIO.

Because RapidIO® was built from the ground up for multi-processor peer-to-peer networks, it inherently comes with the following attributes:
- Reliable transmission
- Sub micro-second end-to-end packet delivery
- 100 ns cut through latency
- No processor overhead to terminate the protocol
- High performance messaging for transmitting large amounts of data
- Push architecture with the option for every processor in the system to have its own memory subsystem

RapidIO® 2 builds on previous generations of RapidIO® and supports serial link speeds of up to 6.25 Gb/s, resulting in switches with single port bandwidths of 20 Gbps with only 100 ns latency.
RapidIO 2 for Wireless
- Carrier-grade reliable packet transport
- Gig2 performance to power ratio allows unprecedented compute density to enable 3G and 4G systems

RapidIO 2 for Video and Imaging
- 40 multicast paths per port provides strong support for broadcasting or multicasting a given data stream to multiple endpoints executing unique transforms, for broadcasting or multicasting a given data stream to multiple endpoints executing unique transforms,

RapidIO 2 for Defense and Aerospace
- IDT PCIe to S-RIO bridging to interface S-RIO DSP/FPGA
- 40 multicast masks per port provides strong support

RapidIO 2 for Video and Imaging
- Switched architecture allows highly scalable system
- Gen2 performance to power ratio allows unprecedented

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RapidIO 2 for Video and Imaging
- 40 multicast roads per port provides strong support for broadcasting or multicasting a given data stream to multiple endpoints executing unique transforms, scaling, and CODECs
- IDT PCIe to S-RIO bridging to interface S-RIO DSP/FPGA cluster to a PCI front end for image acquisition or data/graphics display processing

RapidIO 2 for Defense and Aerospace
- Serial RapidIO Error Management Extension support including Time-to-Live enables fault-tolerant systems
- VITA 41, Open VPX, and ATCA fabric mappings enable rapid development of modular, standards-based systems
- True peer-to-peer networking allows scaling of arbitrary topology and simplifies hot swap software implementation
- Per-port filter feature allows blocking errant packets or malicious attack (for example, denial of service, system memory reads and writes)

RapidIO 2 for Networking
- High performance networking requires high throughput and reliable packet delivery with low end to end latency that is only provided with RapidIO 2
- RapidIO 2 provides up to 20 Gbps per port for high performance control plane
- PCIe to RapidIO Bridging allows for use of any PCIe enabled control plane CPU while also using RapidIO 2 for control in backplane

RapidIO 2 for Servers
- Backbone switching capability of IDT RapidIO 2 exceeds anything available in 10-Gigabit market and offers better performance, lower power and best end to end packet latency
- Network Interface cards and Processor cards benefit from IDT's PCIe to S-RIO bridging to interface to a variety of peripherals and high end processors locally, while using RapidIO to backplane/cell of shelf switch hub
- Reduce overall cabling and total cost of ownership

IDT RapidIO 2 Switch Features
- Designed to Serial RapidIO 2.1 Specification
- Up to 48 lanes, with up to 12x4, 16x2, 18x1 port configurations
- Up to 240 Gbps non-blocking bandwidth
- Carrier-grade, high performance S-RIO
- 1.25, 2.5, 3.125, 5.0, or 6.25 Gbaud
- Long reach 100 cm with 2 connectors
- Transmit drive strength and Pre-emphasis
- Receive equalization with OPE
- Up to 40% power per-gigabit savings vs. RapidIO 1.3 Switches
- Dynamic ingress and egress buffer management improves performance over RapidIO 1.3 switches
  - Better port throughput
  - Better system level traffic engineering
- 40 multicast groups per port
- Cut-through and Store-and-Forward modes
- Cut-through latency of 100 ns
- RapidIO Error Management Extension Support
- Error log captures sequence of errors
- Packet mirror, trace, filter per port
- Receiver- and Transmitter-based flow control
- Per-port error provides robust hot swap support
- Multicast Event Control Symbol generation input pin
- Industrial and commercial temperature grades
IDT RapidIO® 2 Switch Portfolio

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RapidIO 2 builds on previous generations of RapidIO and supports serial link speeds of up to 6.25 Gbaud, resulting in switches with single port bandwidths of 20 Gbps with only 100 ns latency.

IDT RapidIO® 2 Switch Portfolio

ECOSYSTEM AND TOOLS

A variety of software tools, and hardware platforms are available from third party companies which support IDT RapidIO Switches.

SOFTWARE AND HARDWARE ECOSYSTEM

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• RapidIET JTAG edition software support
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Connectors

• 3 AMC B+ Connectors: 2 with two 4x S-RIO links, 1 with three 4x S-RIO links, AMC B+ and AMC C Specification (NO support on IPMC and JTAG)
• 2 SPF+ Connectors: 1 port with 1x S-RIO link, 1IF-4311 Specification
• 1 GSPF Connectors: 1 port with 4x S-RIO link, SFF-8438 Specification
• 2 InfiniBand/CX4 Connectors: 1 port with 4x S-RIO link or 2 ports with 2x S-RIO links, SFF-4479 Specification
• 1 SMA Array: 1 port with 4x S-RIO links

Table: IDT RapidIO 2 Switch Comparison Matrix

| Switch | Ports | Clocking Options (MHz) | Power per 10 Gbps link (typical, mW) | Minimum Power Per Port (mW) | Power Down Per Port (mW) | Maximum of number of x2 ports | Maximum of number of x4 ports | Multicast Architecture | Programmable Watermarks on Ingress Buffers | Programmable Receive Equalization | Error Management Features Exceeding S-RIO Spec | Error Log (History) and Broad Error Detection Coverage |
|--------|-------|------------------------|------------------------------------|-----------------------------|-------------------------|-------------------------------|-----------------------------|------------------------|---------------------------------|---------------------------------|--------------------------------------|
| CPS-1848 | 4 | 21x21 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| CPS-1816 | 2 | 14x14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| SPS-1616 | 2 | 10x10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| SPS-1616 | 2 | 8x8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

RapidIO 2 PORTFOLIO BENEFITS

• Design highest performance backplane in industry with 20 Gbps data rate per link
• Lowest power per payload bit vs. other interconnect protocols
• RapidIO standard supports arbitrary system topology with true peer to peer networking
• RapidIO Messaging Support for transfers of 4 Kb messages in hardware

TARGET APPLICATIONS

• Wireless: Baseband cards and backplanes in LTE, WiMAX, WCDMA, and TD-SCDMA
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• Medical imaging: CT scanners, MRIs
• Video: Teleconferencing
• Networking
• Servers

COMPARISON WITH OTHER INTERCONNECT PROTOCOLS

• Highest performance serial interconnect with up to 62.5 Gbaud per link
• Highest protocol efficiency in embedded systems with 94% payload versus header efficiency
• Serial RapidIO standard supports arbitrary system topology with true peer to peer networking
• Twice the performance per link compared to 10 Gb Ethernet
• RapidIO messaging support for transfers of large blocks of data, superior to PCIe and 10 GbE in target applications

The IDT RapidIO® 2 Switch Portfolio is designed to address the needs of high-performance, high-density, end-to-end networking applications in the data center, high-performance computing, networking, and storage markets. The portfolio includes a range of switch models with various port counts, clocking options, and power consumption, enabling customers to tailor their interconnect solutions to specific system requirements.