



I/O Features Matrix

This document provides a feature comparison among a number of compute I/O technologies.

Feature	InfiniBand SM	PCI-X	Fibre Channel	1Gb & 10Gb Ethernet	Hyper-Transport TM	Rapid I/O	3GIO
Bus/Link Bandwidth	2.5, 10, 30Gb/s ^a	8.51 Gb/s	1, 2.1Gb/s ^b	1 Gb, 10Gb	12.8, 25.6, 51.2 Gb/s ^g	16, 32Gb/s ^c	2.5, 5, 10, 20,... Gb/s ^d
Bus/Link Bandwidth (Full Duplex)	5, 20, 60Gb/s ^a	Half-Duplex	2.1, 4.2Gb/s ^b	2 Gb, 20Gb	25.6, 51.2, 102 Gb/s ^g	32, 64Gb/s ^c	5, 10, 20, 40,... Gb/s ^d
Pin Count	4, 16, 48 ^e	90	4	4 (GbE), 8 (10GbE-XAUI)	55,103,197 ^g	40/76 ^c	4, 8,16, 32...
Transport Media	PCB, Copper & Fiber	PCB only	Copper and Fiber Cable	PCB, Copper & Fiber	PCB only	PCB only	PCB & connectors ^h
Max Signal Length PCB/Copper Cable	30in, 17m	inches	NA, 13M	20in, 100m	inches	inches	30in, NA
Maximum Signal Length Fiber	Km		Km	Km			
Simultaneous Peer to Peer communication	15 VLs+ Mngt Lane			X		3 Transaction Flows	
Native HW Transport Support with Memory Protection	X						
In-Band Management	X		Out-of-band mngt	Not native, can use IP			
RDMA Support	X						
Native Virtual Interface Support	X						
End-to-End Flow Control	X			X	X	X	X
Partitioning/Zoning ^f	X		X	X			
Quality of Service	X		X	Limited		X	limited
Reliable	X		X		X ^g	X	X
Scalable Link Widths	X				X	X	X
Backwards Compatible	n/a	X (PCI 3.3v only)	X	No, 10 GbE new physical signaling	n/a	n/a	n/a
Maximum Packet Payload	4 KB	Not Packet Based	2 KB	1.5KB (10GbE no jumbo support)	64 bytes	256 bytes	256 bytes

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- a. The raw bandwidth of an InfiniBand 1x link is 2.5Gb/s (per twisted pair). Data bandwidth is reduced by 8b/10b encoding to 2.0Gb/s for 1X, 8 Gb/s for 4X and 24Gb/s for 12x. In comparison to a half duplex bus the full duplex serial connections yields twice the data rate: 4/16/48 Gb/s.
 - b. The bandwidth of 2Gb Fibre Channel is 2.1Gb/s but the actual raw bandwidth (due to 8b/10b encoding) is 20% lower or around 1.7Gb/s (twice that for full duplex).
 - c. Values are for 8 bit/16 bit data paths peak @ 1GHz operation. Speeds of 125, 250 & 500 MHz are supported.
 - d. The raw bandwidth of an 3GIO link is 2.5Gb/s (per twisted pair). Data bandwidth is reduced by 8b/10b encoding to 2.0Gb/s, 4.0Gb/s, 8.0Gb/s, etc. In comparison to a half duplex bus the full duplex serial connections yields twice the data rate: 4,8,16, Gb/s etc.
 - e. The pin count for a 1x link is 4 pins, a 4X links uses 16 pins, and a 12X link uses 48 pins.
 - f. Memory partitioning enables multiple hosts to access storage endpoints in a controlled manner based on a key. Access to a particular endpoint is controlled by this key, so different hosts can have access to different elements in the network.
 - g. Based upon 8, 16, 32 bit HyperTransport (it can support 2 & 4 bit modes) with up to 800 Million transfers per second operation (modes from 400 MHz DDR can be supported). Error management features will be refined in future revisions of the specification.
 - h: 3GIO has 1X, 2X, 4X, 8X, 16X and 32X lane widths. Copper, optical and emerging physical signaling media.