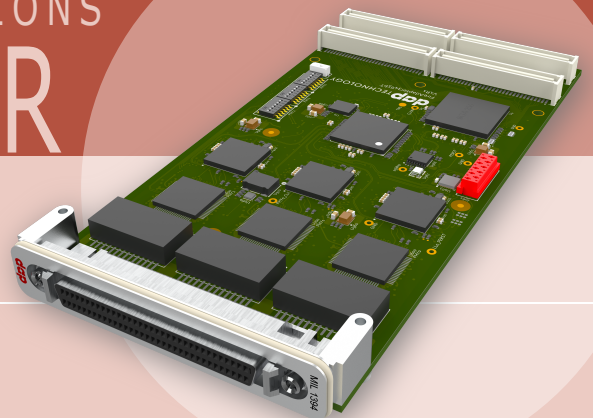




INTERFACE SOLUTIONS

FIREADAPTER 3465bT



FIREADAPTER OVERVIEW:

The **FireAdapter** product family complements DapTechnology's successful **FireSpy®** and **FireTrac®** host adapter product lines. It clearly is a powerful platform for standard IEEE1394 as well as Mil1394 (AS5643) data transfer. The family aims at addressing the most common requirements with regards to physical interface type (copper vs. optical), number of buses, active transformer coupling, etc.

DapTechnology has seen a continued and steady demand for general purpose hardware systems for the processing of AS5643 (and generic 1394) data streams. Often driven by the existence of SW layers interfacing directly to OHCI compliant interfaces, customers look for equivalent platforms but application-specific physical interfaces. Mil1394 active transformer coupling, optical interconnectivity and even extended speeds are the typical requirements.

The **FireAdapter** family is the answer for these market needs. The combination of innovative physical connectivity layers with standardized OHCI Link Layer chip functionality makes these interface cards a perfect platform for both IEEE-1394 as well as Mil1394 applications. Optionally, **FireAdapter** cards are used together with **FireStack®**, i.e. DapTechnology's home-grown IEEE-1394 software stack. This very robust and well-designed 1394 software stack runs on a host computer and very effectively supports the OHCI descriptor model for packet assembly and disassembly. Interfacing to this stack can be done via an API which offers C/C++ interfaces and runs on several different operating systems.

An "Enabling" Mil1394 Solution

It is important to understand that **FireAdapter** is a "Mil1394 enabling" but not a dedicated and optimized solution for the specific processing of AS5643 type of data transmissions. Usage of OHCI compliant LLC components provides the necessary ability to transmit and receive Asynchronous Stream packets as required by the AS5643 specification for Asynchronous Subscriber Model (ASM) related data traffic.

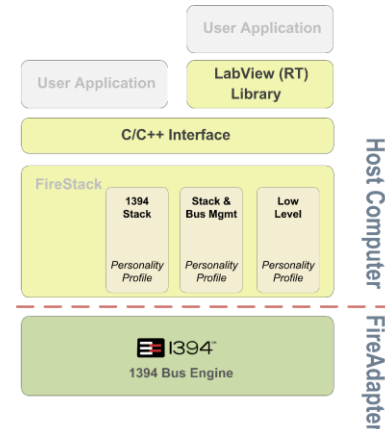
Furthermore, the Mil1394 compliant versions of **FireAdapter** provide the specified active transformer coupling essential for support of longer cable length and electrical isolation. These versions also feature hardware supporting multi-bus requirements which is critical for the support of Mil1394 redundancy and fault tolerance.

For a proper system design as well as integration optimization it is important to understand that due to its OHCI compliance **FireAdapter** will utilize host processor resource for handling all Mil1394 – and specifically ASM - related packet handling tasks. Standard OHCI 1.1 is "Mil1394 unaware" and related functions will have to be implemented in a product-specific application or middleware layer. Such functions include packet encapsulation, data extraction, receive/transmit STOF offsets, etc. As a key example, using **FireAdapter**, ASM transmission timing needs to be handled entirely in software. The application has full responsibility of handling offset relative to the STOF during packet transmission as well as receive offset validations as well as many other verification functions.

While this can be seen as an advantage, implementers have to pay attention to system resource utilization and latency concerns in order to meet the stringent Mil1394 timing requirements. Please also evaluate Dap's approach to mitigate related challenges and check out **FireTrac®** and its innovative, resource-saving and industry approved take on embedded and HW assisted support for packet receive/transmit and timing related Mil1394 requirements.



An essential feature of **FireAdapter** is its standardized HW layer. The devices are designed to comply to most typical form factors (PMC, XMC, PCIe, etc.) as well as standardized interfaces. For **FireStack®** the individual features and functions of **FireAdapter** are grouped into so-called Personality Profiles. These profiles may be purchased separately so that the user may configure their system based on individual requirements.



The *Personality Profiles* allow the solution to be adapted for use in embedded systems which typically have limited resources, and/or with powerful host processors that can utilize even the fully featured profile.

The following profiles are available:

- Low-Level API Profile
- 1394 Software Stack Profile
- 1394 Software Stack + Bus Mgmt. Profile

Functional Modules	Profiles		
	Low-Level API	SW Stack	SW Stack + Bus Mgmt.
Single Packet TX / RX	✓	✓	✓
Local PHY Register Access	✓	✓	✓
Bus Reset Detection	✓	✓	✓
Topology Information		✓	✓
Isochronous Stream RX / TX		✓	✓
Inbound Transactions		✓	✓
Outbound Transactions		✓	✓
TX Jitter Insertion			✓
TX Error Insertion			pend.
Cycle Master Capable			✓
IRM Capable			✓
Bus Manager Capable			✓

Application Programming Interface (API)

FireStack® provides C/C++ and Python APIs with multiple levels of abstraction from the 1394 bus that allows for a very "1394-unaware" application programming. Due to the very high degree of abstraction the user does not have to be a 1394 low-level expert for most of the typical 1394 bus control and transaction handling tasks. The high-level APIs focus on ease-of-use, low learning curve and streamlined programming.

For very fundamental 1394 bus controls a Low-Level API is available. It can be used for operations on the basic 1394 level. For example, this API allows for remote PHY access, commands, bus optimization, error condition testing, etc.

Bus Interconnectivity

In order to provide a wide variety of connectivity options – either to additional FireAdapters and FireTracs or to other AS5643 equipment - DapTechnology is offering various harnesses/inter-connectivity options. They are targeted to take full advantage of the off-board SCSI2 connector with its high pin density together with a fan-out spider harness approach.

The most flexible approach for interconnecting other devices to FireAdapters is provided by the 19" breakout panel (depicted below) which offers an extremely flexible way for connecting bus devices via 1394b bilingual sockets. Such a "patch" panel can also be configured with 1394 bilingual, LEMO or 38999 sockets depending on the customer's interconnectivity preferences. A number of configuration parameters allows for tailoring of the panel to specific customer's usage scenarios.

Configuration Parameters:

- Length
- number of buses
- Connector Type (female)
 - LEMO
 - MIL38999
 - 1394 Bilingual



Besides the 19"-panels, DapTechnology also offers a series of connection harnesses suitable for the SCSI2 off-board connector. Its most simplistic form is the spider cable fans out to non-terminated cables as depicted below and exposes the different ports (A0-A2, B0-B2, C0-C2). Customers can attach their own connectors.

Configuration Parameters:

- Length
- number of buses
- Bus-to-Bus connection



Other variants include fan-out cables with Bilingual, LEMO or 38999 connectivity as depicted below.

The variation of parameters (length, channels, port-to-port connections, ...) offers a large variety of options and cannot be displayed in its entirety. Please check on the web for more variants and/or consult with our sales specialists regarding your specific needs, lengths, channels and male/female connector options.

Configuration Parameters:

- | | |
|--------------------|------------------------|
| - Length | - Connector Type |
| - number of buses | - No-termination |
| - Connector gender | - LEMO (f/m) |
| - male | - MIL38999 (f/m) |
| - female | - 1394 Bilingual (f/m) |
| - Connector Type | - 1394 Legacy (f/m) |
| - No-termination | |
| - LEMO | |
| - MIL38999 | |
| - 1394 Bilingual | |



Optimized IEEE-1394 Software Layers

The objective of **FireStack's**® 1394 packet handler is to reduce resource burden when receiving and transmitting 1394 packets. The consistent utilization of zero-copy operations greatly enhances the overall system performance. **FireStack**® provides memory buffers accessible by both the user application and the 1394 Link Layer DMA engine.

For example, when transmitting an asynchronous packet and the user application has filled the memory buffer with the needed packet data, **FireStack**® will hand the buffer directly to the Link Layer for reading the packet into the packet transmission FIFO without having the CPU copy memory to memory.

Likewise, displaying a video stream from an IIDC camera only requires creation of DMA-capable reception buffers for the video frame data and registration of notification upon filling of a complete frame. Once notified the buffers holding the received data can be accessed directly by the video rendering engine in order to move the data to video card memory.

Inbound Transactions:

Inbound Transactions (handling of incoming requests) are defined in two separate methods:

Map Local Memory: The user can "map" a memory buffer to a specific address space. The contents of the memory buffer can be accessed by the user application at any point in time. At the same time when the stack receives a request packet from a remote device it will automatically perform the response operation (read, write or lock) and will send a response packet back to the requester. The user has the option to be notified by the notification callback function when the transaction completes.

Transaction Handler: Similar to the Map Local Memory above the user can "register for" a specific address space instead of "mapping" local memory. When the stack receives a request packet it will call the user-specified handler callback function. The user can then perform any operation within the callback function. Upon returning from the handler callback, the **FireStack**® may transmit a response packet. The notification callback function will be called after completion of the response process.

Outbound Transactions:

This module can be used to perform memory transactions (read, write, lock) on remote nodes. When a memory transaction is initiated **FireStack**® will automatically determine the maximum speed to the destination node by performing the needed PHY remote accesses.

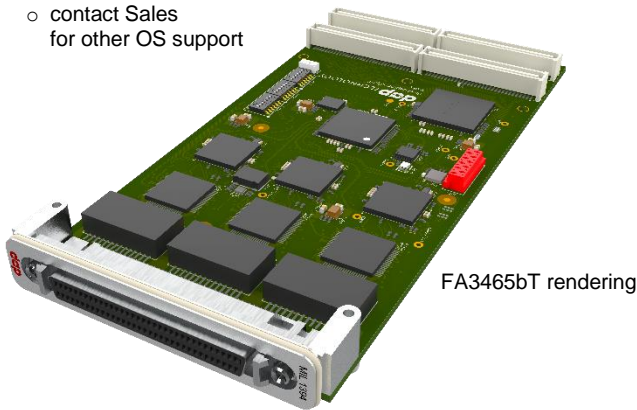
Outbound Transactions can be used in the following ways with respect to result indication: In *Blocking mode* the TX functions will not return until the response packet is received and thus making the code sequential. In contrast to that the *Non-Blocking mode* can be used to initiate a series of "split" transactions i.e. a series of requests that are then followed by the corresponding - but not necessarily sequential - responses.

Isochronous Messaging:

The Isochronous Streaming modules build on the mechanisms for efficient data processing defined by OHCI and provide a flexible and user-friendly API around it. Linked lists of buffers can be setup by the user application and will be automatically processed by the Link Layer DMA engine. Notification mechanisms are available for buffer and/or packet completion.

FEATURE SUMMARY:

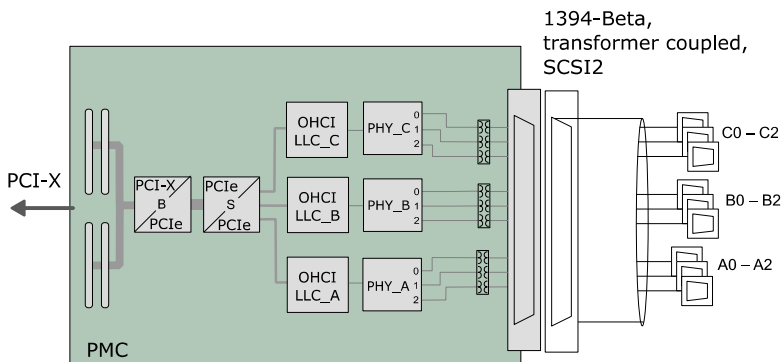
- AS5643 compliant
- IEEE 1394b-2008 compliant
- Supported Speeds*: S100B, S200B, S400B
*) depending on specific model
- 3 independent 1394 nodes
- PHY Layers: TSB41BA3 (latest commercially available revision)
- 9 active transformer-coupled Mil1394 ports
- SCSI2 off-board connector for 1394 ports A0-A2, B0-B2, C0-C2
- PCI-X 1.0 host connectivity, 64-bit x 133MHz
- Link Layers: XIO2213B (1394b LLC)
 - OHCI 1.1 compliant
- Sustained multi-bus IEEE-1394 traffic at S400
- C/C++ and Python Application Programming Interface (API)
- Support for:
 - MS Windows
 - Linux
 - VxWorks
 - contact Sales for other OS support



ARCHITECTURE:

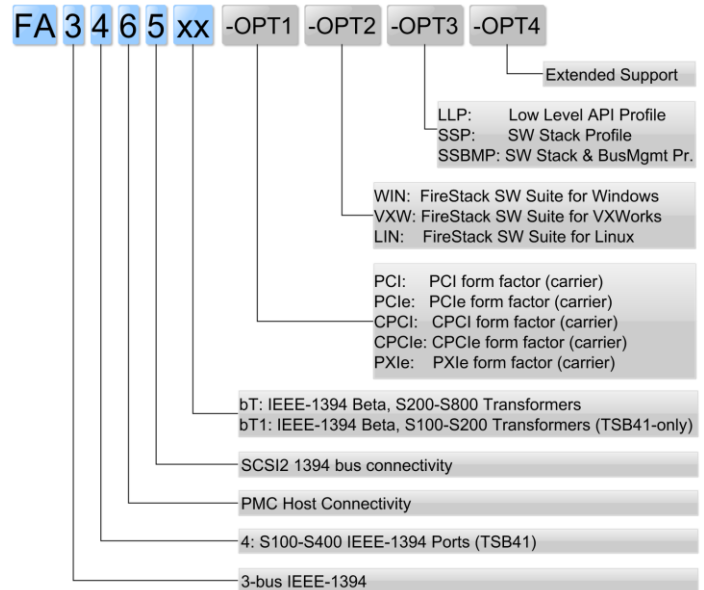
In order to offer long-term availability of a triple OHCI card in PMC form factor, the FireAdapter3465bT was designed as a 1-to-1 replacement of the PMC341bT using a modern PCI Express based approach. Three XIO2213B 1394b LLC chips are connected to a PCI Express switch which is connected to a PCIe to PCI-X bridge in reverse mode in order to connect to PCI-X or PCI based Single Board Computers. This concept allows using the latest PCIe based OHCI LLC technology even on legacy PMC-based systems.

The internal PHY of the XIO2213B is disabled and an external TSB41BA3 is used in order to benefit from all the latest updates to IEEE-1394 PHY technology.



SPECIFICATION:

Dimensions:	PMC: 15 x 74 x 154 mm
Weight:	100 g
Operating Range:	-40 – 85 °C
Power Requirements:	PMC: 3.3 V, 6.6 W max
Compliance:	FCC Class A
Connections:	- 64-bit PMC connector configuration - off-board SCSI2 connector for 9 bus connections, fan-out cable is optional
Indicators:	-
Switches:	3 dip switches for port mode programming including TSB41BA3F features (once released by Texas Instruments)
Package Content:	Mil1394 PMC interface card User Guide
Product warranty:	36 months limited warranty
HW Part Number:	FA3465bT FA3465bT1
Codes:	ECCN: 3A992.a / HST: 9030.40.00
Optional Accessories:	Cable Harnesses



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