FarSync OEM T4E

A intelligent PCI / PCI-X sync/async multi clock source 4 port adapter

FarSite COMMUNICATIONS

Key Features

- **PCI / PCI-X (Universal PCI) bus mastering WAN adapter**
- **Interfaces for RS232C, X.21, RS530, RS449 and V.35**
- **4 ports, all configurable for sync or async**
- **External (H.100 bus) clock sourcing and synchronisation**
- **Multiplication and division of external clocks**
- **Backup clock sourcing**
- **Very wide speed range - up to 8 Mbits/s per port**
- **Transparent bitstream and HDLC framed sync data options**
- **Extended SDCI API for Windows and Raw Sockets API for Linux**
- **Comprehensive Developers Toolkit**

Overview

The FarSync OEM T4E adapter and software is part of a range of FarSite's products **designed to provide high performance hardware communications solutions for companies who wish to quickly develop their own communications products** without incurring the cost of having to develop and approve hardware.

The T4E is a Universal PCI communications adapter (PCI and PCI-X) with four independently configurable sync/async serial ports. Sync operation supports both bitsync (HDLC) and transparent bitstream of up to 8 Mbits/s per port with a total adapter bandwidth of 60 Mbits/s.

The unique feature of the T4E is the wide variety of clocking options. The clock can be:

- **Internally generated using a local clock generator**
- **External from the WAN communications line**
- **External via a special H.100 clock bus connector**

External clocks can also be multiplied or divided to obtain a required rate. The clock speeds for each line on the adapter are independently configurable.

The product supports the standard **Windows SDCI API**, providing applications with direct access to the card's communications port/s for asynchronous, bit synchronous (HDLC) framing, and also transparent bitstream operation for video and voice type applications. The special clocking features are all accessible though the SDCI interface.

Support is included for the Linux Raw Sockets API that allows HDLC frames and transparent bitstream data to be sent and received. It also allows selection of the full range of clock modes. Full documentation, source code for the Linux driver and a sample application demonstrating both modes of operation is provided.

Typical Applications

The FarSync OEM T4E is particularly suitable for VOIP applications where clock synchronisation or widely variable clock speeds are required. Examples of such applications include:

- **Interfacing Audio, DRM or DAB bit streams to Servers**
- **Reproduction of legacy Audio streams across the TCP/IP networks using Satellite (GPS) clock source synchronisation**
- **Interfacing high speed MPEG Video bit streams to Servers**
- **High speed multi-port HDLC framing support for non standard or specialist protocols**

Adapter Hardware

The adapter comprises a **AMD processor with 1 Mbyte** of on board no wait state SRAM. The whole memory space may be mapped via the PCI / PCI-X interface to the PC/Server. The AMD processor contains a **quad embedded HDLC / transparent controller with SDMA access** (128 buffers per port) and a full range of timers.

The T4E supports four synchronous ports which can run to speeds of up to 8.192 Mbits/s full duplex. Total bandwidth supported by the adapter is 60 Mbits/s. A quad port UART (async controller) is included. Async or Sync operation is dynamically selectable on each port.

Network Interfaces

The multi function line drivers available on the adapter support **RS232C (V.24), X.21 (RS422, V.11), V.35, EIA530 (RS-530) and RS449 network interfaces, all soft configurable** and protected from static charges by ESD protection devices.

Clock Generation, Detection and Selection

Five on-board frequency synthesisers are configurable for generating clocks for the H.100 bus and/or to the 4 serial ports.

Internally sourced clocks

Internally generated clocks to drive a serial communications port can be derived from either an on-board 8.192MHz clock (32ppm) or an H.100 bus clock and can be set to 160 different frequencies between 300 baud and 8.192 Mbits/s, the complete list is below:

300, 600, 1200, 2400, 4800, 7200, 8000, 9600, 12000, 14400, 16000, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 32000, 33600, 36000, 38400, 40000, 40800, 43200, 48000, 56000, 64000, 80000, 96000, 112000, 128000, 160000, 192000, 224000, 256000, 320000, 384000, 448000, 512000, 576000, 640000, 704000, 768000, 832000, 896000, 960000, 1024000, 1088000, 1152000, 1216000, 1280000, 1344000, 1408000, 1472000, 1536000, 1600000, 1664000, 1728000, 1792000, 1856000, 1920000, 1984000, 2048000, 2112000, 2176000, 2240000, 2304000, 2368000, 2432000, 2496000, 2560000, 2624000, 2688000, 2752000, 2816000, 2880000, 2944000, 3008000, 3072000, 3136000, 3200000, 3264000, 3328000, 3392000, 3456000, 3520000, 3584000, 3648000, 3712000, 3776000, 3840000, 3904000, 3968000, 4032000, 4096000, 4160000, 4224000, 4288000, 4352000, 4416000, 4480000, 4544000, 4608000, 4672000, 4736000, 4800000, 4864000, 4928000, 4992000, 5056000, 5120000, 5184000, 5248000, 5312000, 5376000, 5440000, 5504000, 5568000, 5632000, 5696000, 5760000, 5824000, 5888000, 5952000, 6016000, 6080000, 6144000, 6208000, 6272000, 6336000, 6400000, 6464000, 6528000, 6592000, 6656000, 6720000, 6784000, 6848000, 6912000, 6976000, 7040000, 7104000, 7168000, 7232000, 7296000, 7360000, 7424000, 7488000, 7552000, 7616000, 7680000, 7744000, 7808000, 7872000, 7936000, 8000000, 8064000, 8128000, 8192000

Externally sourced clocks

External clocks received from a serial port and used to a drive serial communications port can be any frequency up to 8192KHz.

A H.100 bus clock may be generated from a received serial port clock for the following sub-set of frequencies: 38400, 57600, 64k, 128k, 256k, 512k, 1024k, 2048k, 4096k and 8192k.

Terminal Timing

Terminal Timing is supported to enable system-wide clock synchronisation.

Clock Speed Detection

A 16-bit timer enables differentiation between the clock frequencies, enabling auto-configuration of clock synthesisers when cables are connected.

H.100 Bus - Special clocking options

The T4E supports a subset of the H.100 interface to enable synchronisation of serial ports(s) to the H.100 bus (both master and slave modes), with CT_C8_A, CT_C8_B, CT_FRAME_A and CT_FRAME_B signals and jumper-selectable signal terminations. Serial port data is not frame aligned.

In CT_Bus Slave mode, the H.100 bus clock (auto-selected with A being primary) can be used as a clock source to derive serial port clock(s).

In CT_Master mode, the H.100 bus clock (either A or B) can be derived from either a received serial port clock or an internal oscillator.
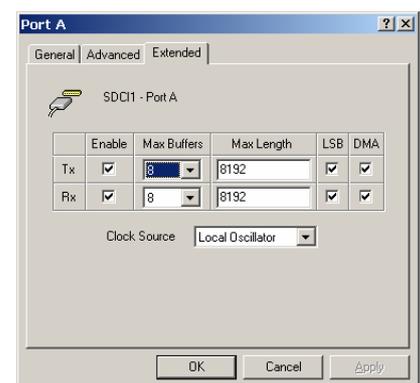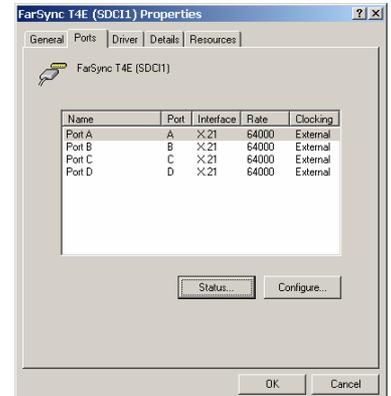
PCI Bus Specification

The FarSync OEM T4E is PCI version 2.2 compliant and PCI-X compatible, this universal PCI adapter can operate in PCs / Servers using either 3.3 volt or 5 volt signalling. The adapters are suitable for PCs with both 32 bit bus and 64 bit bus configurations. Power for the adapters is derived from the 3.3 volt supply rail. **The PCI / PCI-X bus access is controlled by a PLX bus mastering DMA enabled, universal signalling controller.**

Multiple Adapters

The drivers supplied with Windows and Linux allow large numbers of ports to be supported by the installation of multiple FarSync T-Series adapters in a Server. Typically 12 or more adapters (48+ ports) can be supported; the adapter limit is only dependent on the resources available in the host Server.

Windows SDCI API

The FarSync OEM T-Series adapters and software provides support for an enhanced SDCI (Synchronous Dumb Card Interface) API. The API has been extended to allow applications to exactly control the type of data sent and received in both bit synchronous (HDLC framed) data and transparent bitstream formats. The SDCI SDK contains everything a user needs to rapidly develop and test applications for such requirements as supporting specialist synchronous protocols or transparent data requirements such as Audio, MPEG Video, DAB and DRM. The unique clocking options are selectable and configurable from the API.

To operate a port with asynchronous data under Windows 2000/XP, the FarSync driver supports a subset of the standard Win32 COMM API as detailed in Microsoft's MSDN Documentation. This enables applications that currently interface to standard serial ports on Windows to be easily ported to use FarSync ports in asynchronous mode. As an alternative to using the Win32 COMM interface, SDCI clients also have the option of using much of the same code to support FarSync ports in either asynchronous or synchronous modes e.g. the same data transfer IOCTLs.

A number of easy to follow sample applications are provided demonstrating the wide variety of features available with the adapter. This includes a kernel mode sample for those customers who require the ultimate performance. GUI based feature demonstration and test utilities are supplied capable of using the wide range of featured support by the adapter.

The product is easy to install and configure. Plug-and-play compatible drivers are supplied for Windows XP, 2000 and Server 2003. There is On-line help and documentation .
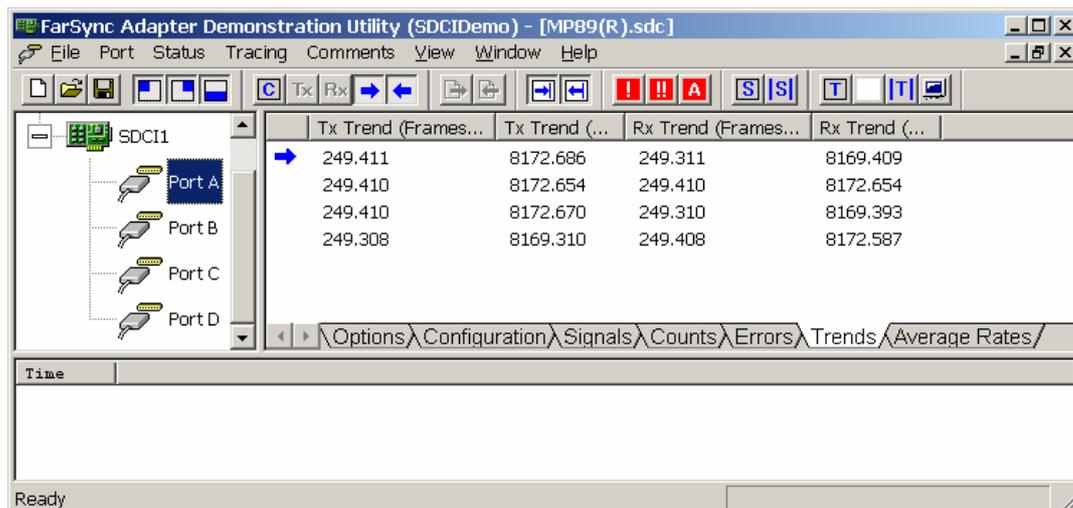
SDCIDemo utility program to test and demonstrate the T4E's capabilities

Linux Raw Sockets API

The Linux API allows applications to send and receive HDLC format (bitsync) frames and also transparent bitstreams with the raw sockets based API. The sample application supplied with the Developers Toolkit demonstrates both modes of operation.

Data rates of up to 8.192 Mbits/s are supported, with all the ports individually selectable for speed, clocking direction and mode of operation (HDLC or Transparent). Frame sizes up to 32 Kbytes are supported in HDLC mode to allow support for a wide variety of **specialist synchronous protocols**. The transparent bit stream is suitable for **transparent data requirements such as Audio, MPEG Video, DAB and DRM.** The unique clocking options available with the FarSync OEM T4E are selectable and configurable from the API. The API allow the full range of internal clock speeds to be selected.

The source for the application and drivers is included, with the Linux API manual provided in Abode PDF format. The driver is supported under kernel version 2.4 and 2.6 for both single CPU and SMP 32 and 64 bit machines. Multiple adapters can be installed up to the maximum slot count for the Server.

Technical Specifications - Hardware Features

Product name	**FarSync OEM T4E**
Product code	**FS5444**
Warranty	5 years
Port count and features	4 Synchronous / Asynchronous ports, soft configurable on each port.

Hardware Features

Adapter type and PCI specification	AMD Processor with 1 Mbyte SRAM, Intelligent bus mastering Universal PCI adapter, Short adapter (height 107mm, length 167mm), PCI-X compatible, PCI v2.2 compliant, Supports 3.3 & 5 volt signalling, Suitable for 32 and 64 bit PCI bus slots, 100 pin HIPPI connector for the network connections, H.100 bus for external clocking connection Memory mapped and DMA PC interface
Network connection types supported	X.21 (V.11, RS422) - 15 pin male D type, RS232C (V.24, X.21bis) - 25 pin male D type, V.35 - MRAC-34 male 'brick' type, RS530 (EIA-430) - 25 pin male D type, RS449 - 37 pin male D type
Link speed range Sync	X21, RS530, RS449: up to 8.192 Mbits/s; V.35: 2 Mbits/s or 8.192 Mbits/s with termination RS232C: up to 128 Kbits/s;
Link speed range Async	RS232C, X.21: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38.4K, 57.6K and 115.2 Kbits/s
ESD line protection	Littelfuse high speed ESD and over-voltage protection
Multiple adapters	12 or more; only dependant of the number of PCI slots available on the server
Maximum total bandwidth	60 Mbits/s
LEDs	4 LEDs one per port showing line connection status
Approvals	EN55022 class B, CE, FCC class B
Power requirements	< 1.75 A @ +3.3v, < 10mA @ +/- 12v, < 6 watt. Note: 5 V supply not required
MTBF	187,427 hours calculated using Bellcore Method 1 Case 3, 40 deg.C ambient, 15 deg.C case temperature rise above ambient
Line clocking - internal	Internal clock range: over 160 different frequencies between 300 baud and 8.192 Mbits/s. See the complete list on page 2. No special cables are required to use internal clocks. Internal clocking is supported on RS530, RS232C, X.21, V.35 and RS449 connections
Line clocking - external	External clocks received from a serial port and used to a drive serial communication sport can be any frequency up to 8.192MHz. For a specific sub-set of frequencies (listed) .an H.100 bus clock may be derived from a received serial port clock. 38400, 57600, 64k, 128k, 256k, 512k, 1024k, 2048k, 4096k, 8192k
Terminal timing	Terminal Timing is supported to enable system-wide clock synchronisation.
Clock speed detection	A 16-bit timer enables differentiation between the clock frequencies listed above, enabling auto-configuration of clock synthesisers when cables are connected.
H.100 Bus - Special Clocking options	The T4E supports a subset of the H.100 interface to enable synchronisation of serial ports(s) to the H.100 bus in both master and slave modes.
Cables	Cables are ordered separately, see the Cables section on the last page for details

Technical Specifications - Software Features

Example Applications	Linux Raw Sockets sample application, Windows SDCI sample application, Windows Kernel level sample application. All example applications are in C, source provided.
Line Drivers	Fully functional bit sync and transparent bitstreaming line drivers supplied for Windows XP, 2000, Server 2003 and Linux. The Linux driver includes source and is supported under kernel versions 2.4 and 2.6 for both single CPU and SMP 32 and 64 bit machines.
Utility Applications	Windows and Linux applications demonstrating the adapters features.

Manuals

Programming Manuals	Programming Reference manuals in PDF format provided, includes details on the hardware and sample software.
API Manuals	FarSync OEM Linux Raw Sockets Reference Manual, FarSync Windows SDCI SDK Reference Manual.

Packaging

The product includes:

Adapter drivers for Windows Extended SDCI and Linux Raw Sockets APIs, documentation supplied on CD-ROM, a quick start guide, the communications adapter, the Developers Toolkit for the SDCI API and Raw Sockets API

Any cables required are ordered separately.

New releases of OEM software in support of the Windows SDCI API and the Linux Raw Sockets API are made available for downloading from the Support section of www.farsite.co.uk.

Cables

This four port adapter uses a single large high density 100 pin HIPPI type connector, all four lines are available though this connector. The quad port cable HCR4 splits out the four network interfaces into separate network connectors to provide support for EIA-530 and RS232C. X.21, V.25 and RS449 are available through transition connectors. Details of the cables and converters available are listed in the table below. Crossover cables, sometimes referred to as null modem cables are available, they are also

Cable Type and Adapter Compatibility Matrix		
Name	**Cable types available for the FarSync OEM T4E**	**Product Code**
HCR4	Quad port EIA-530 and RS232C cable, 2 metres. Also supports X.21, V.35 and RS449 interfaces with addition of the transition connectors TCV1, TCX1 and TC449 listed below	FS6076
TCX1	X.21 (V.11) - DB-15M 1 port EIA-530 to X.21 transition connector	FS6052
TCV1	V.35 - V.35M 1 port EIA-530 to V.35 transition connector	FS6053
TC449	RS449 - DB-37M 1 port EIA-530 to RS449 transition connector	FS6054
	Special Purpose Cables - Suitable for all FarSync T-Series adapters	
Null-MX	X.21 (V.11, RS422) double shielded crossover cable, 15 pin D type female connectors, 0.5 metres	FS6090
Null-MR3	RS232C (V.24) double shielded crossover cable, 25 pin D type female connectors, 0.5 metres	FS6092

Tel: +44 (0)1256 336740
Fax: +44 (0)1256 854931
Email: info@farsite.co.uk
Web: www.farsite.co.uk

FarSite
COMMUNICATIONS