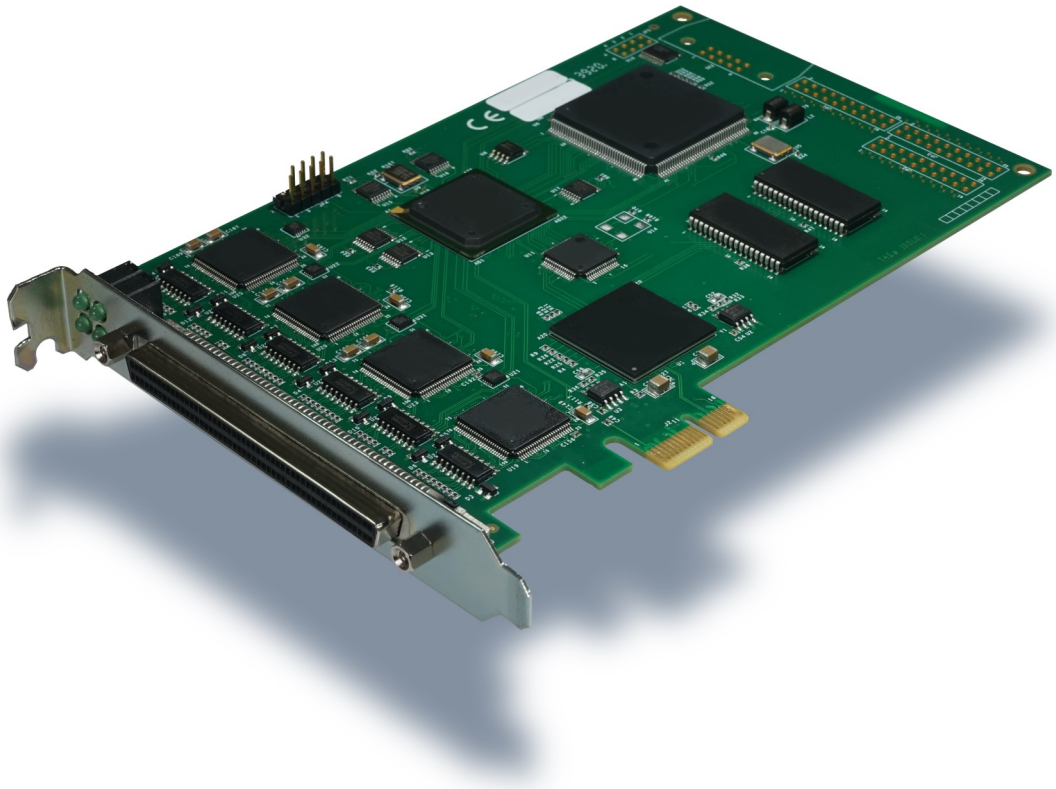
FarSite COMMUNICATIONS

FarSync ® T4Ee

4 port PCIe SYNC/ASYNC Communications Adapter with Multi source clocking

Datasheet v2.11

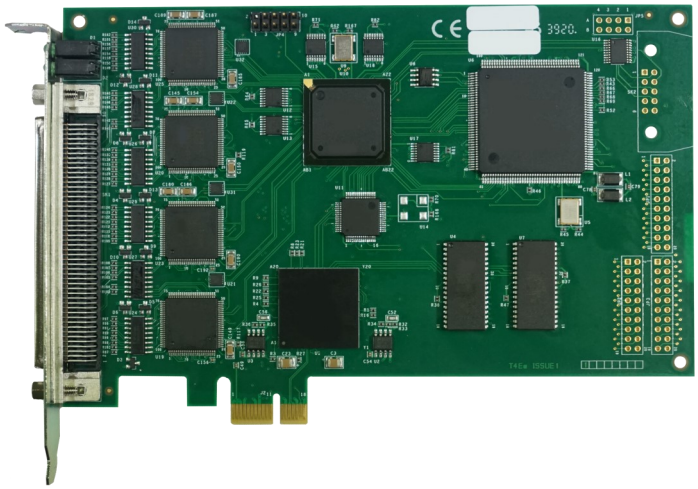


FarSync® T4Ee - 4 Port Synchronous PCIe card

Intelligent PCIe sync/async multi clock source 4 port adapter

Key Features

- **Comprehensive Developers Toolkit available**
- **4 port PCIe bus mastering WAN adapter**
- **Interfaces for RS232, X.21, RS530, RS422, RS449, RS485 and V.35**
- **Sync (Bitstream and HDLC), and Async**
- **NRZ, NRZI, FM0, FM1, Manchester Encoding, Conditioned Diphase line signalling**
- **Wide speed range - up to 10 Mbits/s**
- **Multiplication and division of external clocks and backup clock sourcing.**
- **Comprehensive Developers Toolkit for Windows and Linux APIs**



Overview

The FarSync T4Ee adapter and software is designed to provide high performance hardware communications solutions for business, government and military requirements who require a PCI express high capability synchronous communications adapter to support a range of different line signalling interfaces and highly adaptable control of line clocks.

The product includes a low level driver that allows access to the communications features available in the hardware. The comms processing is handled by a FarSite communications controller that can be customisable for special use.

The FarSync SDK provides a Developers Toolkit for the product.

The T4Ee is a PCI express communications adapter with four independently configurable sync/async serial ports. Sync operation supports transparent bitstream and bitsync (HDLC) of up to 10 Mbits/s per line with a total adapter bandwidth of 53 Mbits/s. The highly flexible universal network connector supports RS232, X.21, RS530 (RS422 signalling), RS485 (2 and 4 wire), RS449 (RS422 signalling) and V.35 network interfaces.

Line signalling modes: NRZ, NRZI, Manchester encoding, FM0, FM1 and Conditioned Diphase (Differential Manchester) up to 10Mbits/s are handled as well as soft selectable line termination resistance.

One of the unique features of the T4Ee is the huge variety of clock source options, clocks can be:

- Internally generated using local clock synthesizers, independently on each line
- External from a WAN communications line
- Sourced on one port then routed to the others

The transparent bitstream option available with the APIs is suitable for VoIP (as a subsystem), video and voice such as T-DMB (Digital Multimedia Broadcasting), DAB (Digital Audio Broadcasting) ETI (Ensemble Transport Interface - ETSI EN 300 799).

FarSync T4Ee 100 pin HIPPI type connector

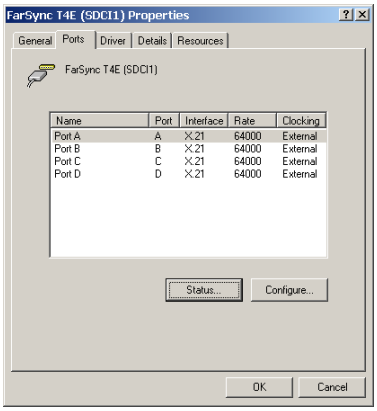
Typical Applications

The FarSync T4Ee suits a wide range of different applications these include:

- High speed multi-port HDLC framing support for non standard or specialist protocols
- Network clock synchronisation
- Multi purpose multi port communications adapter supplying a wide range of adapter generated clock speeds
- Line connection adapter for LabVIEW application
- Manchester Encoding or Conditioned Diphase for long, reliable, high speed self clocking lines
- Interfacing DAB ETI (Ensemble Transport Interface - ETSI EN 300 799) transparent bit streams to Servers
- Interfacing high speed MPEG Video bit streams T-DMB ETI to Servers

Features under Windows

The FarSync T4Ee supports a **Windows based API,** common to the entire range of FarSync adapters/devices, it is referred to as the FarSync Windows API (FsWinAPI). This is an extension of the MS COMM API and enables, for example, applications developed to support COM ports, to be easily ported to use FarSync support in **synchronous or asynchronous modes**. This standardization enables the API to also be readily accessible from higher level environments such as .NET, C#, VB etc. The special clocking features are all accessible though the FsWinAPI.



Async operation support is also provided by the Win32 COMM interface as well as FsWinAPI.

The FsWinAPI provides applications with direct access to the adapter's communications port/s for **bit sync (HDLC) also transparent bitstream operation** for video and voice type applications.

LabVIEW applications can access this adapter.

The product is supplied with a comprehensive configuration utility, a typical screen is shown. The lines can be reconfigured and restarted without reloading the software. There is context sensitive help and an on-line manual should it be required. An advanced tab permits users to further specify the configuration of the line if necessary.

The product is supplied with its own Line Monitor that allows the user to record, display and store line traffic with WAN protocol decoding for fast debugging.

Features under Linux:

The **Char I/O API** provides a programming language independent, high-level interface to the FarSync base driver it supports access to **bit synchronous (HDLC) framed, transparent bitstream and asynchronous data**.

The link level protocol can be Cisco HDLC or Frame Relay with optional authentication by CHAP, MSCHAP or PAP (RFC 1334) providing a standard point-to-point network interface.

The adapter installs seamlessly as a plug and play device. The driver supports Linux kernel versions 2.6 onwards including the leading distributions supplied by Red Hat, SuSE, CentOS, Debian, Ubuntu, Fedora, Slackware and more. Multi-processor systems are supported. The driver is dynamically loadable so a kernel rebuild is not required for the driver to be installed.

FarSite is committed to supporting the adapters on new versions of Linux and Linux kernels as they are released. The source code for the driver is supplied with the product allowing rebuilding by the end user for use with almost any of the current or future Linux variants. **The driver supports both big-endian and little-endian memory storage formats.**

A configuration utility is provided to set the line speed, interface type and protocol, after which the ports may be configured with standard networking tools.

FarSync SDK—The Developer's Toolkit

The FarSync SDK (ordered separately) includes support for writing applications on both Linux and Windows and contains documentation, working sample applications, development and test utility applications. There is everything a user needs to rapidly develop and test a wide variety of applications such as specialist synchronous (HDLC framed) protocols or transparent bitstream data requirements including Audio, MPEG Video T-DMB and DAB ETI with bitstream encoder and decoder.

Our Engineering department provides free email and telephone assistance to application developers using the API as part of the package provided when the FarSync SDK is purchased.

For further details see the website.

Product Details

The FarSync T4Ee is supplied with software drivers for Windows and Linux. This includes a driver that allows access to the communications features available in the hardware.

The drivers supplied with Windows and Linux allow large numbers of ports to be supported by the installation of multiple FarSync T4Ee 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 and the total number of PCIe buses available.

Adapter Hardware

The adapter comprises an AMD processor with no wait state SRAM. The whole memory space may be mapped via the PCIe interface to the PC/Server. The adapter has a FarSite communications controller (customisable) and the AMD processor contains a quad embedded HDLC / transparent controller with SDMA access (128 buffers per port) and a full range of timers.

The T4Ee supports four synchronous ports which can run to speeds of up to 10 Mbits/s full duplex internally clocked and 10 Mbits/s externally clocked. Total bandwidth supported by the adapter is 53 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 all the ports support RS232 (V.24), X.21 (V.11), V.35, RS530 (EIA530, RS422), RS485 and RS449 (RS422 signalling) 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 to the four serial ports.

Internally sourced clocks

Internally generated clocks to drive a serial communications port are derived from either an on-board 8.192MHz clock (32ppm) and can be set to hundreds of different frequencies between 300 baud and 10 Mbits/s, some of pre-programmed list is in the table below. Many other frequencies can be synthesized using the custom frequency tool (supplied), contact us to discuss your requirements.

100, 300, 600, 1200, 2400, 4800, 7200, 8000, 9600, 12000, 14400, 16000, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 32000, 33000, 33333, 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, 1000000, 1024000, 1088000, 1152000, 1216000, 1280000, 1344000, 1408000, 1472000, 1536000, 1600000, 1664000, 1728000, 1792000, 1856000, 1920000, 1984000, 2000000, 2048000, 2112000, 2176000, 2240000, 2304000, 2368000, 2432000, 2496000, 2560000, 2624000, 2688000, 2752000, 2816000, 2880000, 2944000, 3000000, 3008000, 3072000, 3136000, 3200000, 3264000, 3328000, 3392000, 3456000, 3520000, 3584000, 3648000, 3712000, 3776000, 3840000, 3904000, 3968000, 4000000, 4032000, 4096000, 4160000, 4224000, 4288000, 4352000, 4416000, 4480000, 4544000, 4608000, 4672000, 4736000, 4800000, 4864000, 4928000, 4992000, 5000000, 5056000, 5120000, 5184000, 5248000, 5312000, 5376000, 5440000, 5504000, 5568000, 5632000, 5696000, 5760000, 5824000, 5888000, 5952000, 6000000, 6016000, 6080000, 6144000, 6208000, 6272000, 6336000, 6400000, 6464000, 6528000, 6553600, 6592000, 6656000, 6720000, 6784000, 6848000, 6912000, 6976000, 7000000, 7040000, 7104000, 7168000, 7232000, 7296000, 7360000, 7424000, 7488000, 7552000, 7616000, 7680000, 7744000, 7808000, 7872000, 7936000, 8000000, 8064000, 8128000, 8192000, 9000000, 10000000.

Externally sourced clocks

External clocks received from a serial port and used to a drive serial communications port can be any frequency up to 10,000,000 Hz.

Terminal Timing

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

Clock Routing

Clocks sourced from one port can be routed to drive the other ports.

Clock Speed Detection

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

PCIe Compatibility

The FarSync T4Ee adapter is suitable for systems with a PCIe bus, covering single and multi-processor systems. The adapter is compliant with PCI Express Base specification revision 1.0a and above. The FarSync T4Ee is a bus mastering, 1x (single lane) adapter.

Line Signalling Modes

NRZ plus the self clocking (clock for the data is decoded from the incoming data line) line signalling modes NRZI, Manchester Encoding, Conditioned Diphase (also known as Differential Manchester), FM0 and FM1 at speeds of up to 10 MBits/s. This means separate clock lines are not required, these line signalling modes, are a soft configurable alternative to NRZ and a reliable way of handling long high speed cable runs.

Line termination is supported on all the balanced pair signals for X.21 (V.11), V.35, RS485 (2 and 4 wire), RS530 (EIA530, RS422) and RS449 (RS422 signalling) operation. The line termination resistors may be soft selected to be selected on a port by port basis. The addition of line termination resistors can be helpful in improving signal quality on long high speed lines.

Cables

This four port adapter uses a single large high density 100 pin HIPPI female 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 EIA530 and RS232. X.21, V.35 and RS449 are available through transition connectors. Details of the cables and DTE to DCE conversion cables are listed in the Order Information on the last page.

Technical Specifications - Hardware Features	
Adapter type and PCIe specification	AMD Processor with embedded communications controller, FarSite extended communications controller (customisable), PCIe bus compliant with PCI Express Base Specification Revision 1.0a, x1 (single lane) bus mastering adapter.
Network connection types supported (with Cables)	4 synchronous or asynchronous ports, soft switchable line termination **RS232** (V.24, X.21bis) - DTE DB25M type connector, **X.21** (V.11) - DTE DB15M type connector, **V.35** - DTE M34M V.35 type connector, **RS530** (EIA530, RS422) - DTE DB25M type connector, **RS449** (RS422) - DTE DB37M type connector, **RS485** 2 and 4 wire. DCE type cables are also available.
Link speed range Sync	X21, RS530, RS449, V.35, RS485: up to 10 Mbits/s internally or externally clocked, RS232: up to 128 Kbits/s.
Link speed range Async	RS232, X.21, RS530, V.35: 50, 75, 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38.4K, 57.6K and 115.2 Kbits/s.
Line Signalling Modes	NRZ, NRZI, Manchester Encoding, Conditioned Diphase (Differential Manchester), FM0 and FM1.
ESD line protection	Littelfuse high speed ESD and over-voltage protection.
Multiple adapters	12 or more; only dependant of the number of PCIe slots available on the server .
Maximum total bandwidth	53 Mbits/s
LEDs	4 LEDs one per port showing line connection status.
Line clocking - internal	Internal clock range: over 160 different frequencies between 300 baud & 10 Mbits/s. See the complete list on page 3. No special cables are required to use internal clocks. Internal clocking is supported on RS530, RS232, X.21, V.35 and RS449 connections
Line clocking - external	External clocks received from a serial port and used to a drive serial communication port can be any frequency up to 10MHz.
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.
Approvals	EN55022 class B, CE, FCC class B, RoHS2, REACH.
MTBF	165,256 hours calculated using Bellcore Method 1 Case 3, 40 deg.C ambient, 15 deg.C case temperature rise above ambient.
Operating temperature	0 to 50 Deg C An industrial temperature range version is available on special order.
Humidity	Operating humidity 10 to 85% non condensing.
Power requirements	< 2.32 A @ +3.3v, < 1mA @ +12v, < 7.7 watts.
Physical characteristics	Short card (height 107mm, length 167mm).
Cables	Cables are ordered separately, see the Order Information on the last page for details.
Warranty	Free 5 year warranty.

Technical Specifications - Software Features	
Linux	
Distribution Support	Distributions by Red Hat, SuSE, Slackware, CentOS, Ubuntu, Debian, Fedora and more. Drivers for kernel series 2.6 and onwards on both single and multi-core 32 and 64 bit systems.
Kernel Supported	All sub versions of kernel releases from 2.6.12 onward.
Protocol Supported	Cisco HDLC, LAPB, Frame Relay, CHAP, MSCHAP, PAP (RFCs 1661, 1332, 1334), Bitstream. ETI (NI, V.11) with FarSync SDK.
API and Interfaces	Char I/O API, hdlcX
Windows	
O/S Types	Windows 11, 10, Windows Server 2025, 2022 and 2019, LabVIEW running on a Windows O/S. (For earlier version contact FarSite) 32 and 64 bit (single and multi-core systems)
Protocol Supported	LAPB, V.120, CHAP, PAP (RFCs 1661, 1332, 1334), ETI (NI, V.11), Bitstream.
API and Interfaces	FsWinAPI
Utilities	Line Monitor to record, display and store line traffic included.

Order Information		
Name	**Description**	**Product Code**
FarSync T4Ee	PCI express Synchronous and Asynchronous 4 port bus mastering adapter (X.21 / V.35 / RS232 / EIA530 / RS485 / RS422 / RS449), bitstream and HDLC run-time support for custom applications on Linux and Windows. NRZ, NRZI, Manchester encoding, Conditioned Diphase, FM1 or FM0 selectable, other encoding can be developed to order. To develop applications to use the API the FarSync SDK should also be ordered. Cables are ordered separately.	FS4456
Compatible Cables		
HCR4	HCR4, Quad port RS530 and RS232 DTE cable, 2.0 metres for use with FarSync T4Ee cards. Also supports X.21, V.35 and RS449 interfaces with addition of conversion cables TCX1, TCV1 and TC449 respectively.	FS6076
TCX1	TCX1, X.21 DTE (V.11) DB15M 1 port HCR4 cable to X.21 transition connector.	FS6052
TCV1	TCV1, V.35 DTE M34M 1 port HCR4 cable to V.35 transition connector.	FS6053
TC449	TC449, RS449 DTE DB37M 1 port HCR4 cable 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, DB15F to DB15F connectors, 0.5 metres. Converts DTE presentation to DCE.	FS6090
Null-MR4	Combined RS530 (RS422, EIA 530) and RS232 (V.24) double shielded crossover cable, DB25F to DB25F connectors, 0.5 metres. Converts DTE presentation to DCE.	FS6097

+44 (0)1256 330 461
info@farsite.com
www.farsite.com