

**Key Features**

- ✓ **4 port Universal PCI bus mastering WAN adapter**
- ✓ **Interfaces for RS232, X.21, RS530, RS422, RS449 and V.35**
- ✓ **Sync (Bitstream and HDLC) and Async**
- ✓ **NRZ, FM0, FM1, Manchester Encoding, Conditioned Diphase**
- ✓ **Wide speed range - up to 10 Mbits/s**
- ✓ **External (H.100 bus) clock sourcing and synchronisation**
- ✓ **Multiplication and division of external clocks and backup clock sourcing**
- ✓ **Interoperates with TCP/IP**
- ✓ **Comprehensive Developers Toolkit for Windows and Linux APIs**

**Overview**

The FarSync T4E+ adapter and software is designed to provide high performance hardware communications solutions for business, government and military requirements who require a Universal PCI synchronous communications adapter with externally sourced line clocks or 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 adapter can optionally use the host's standard TCP/IP protocol stack to allow access to IP based networks such as the Internet. The FarSync SDK provides a Developers Toolkit for the product.

The T4E+ is a Universal PCI communications adapter (PCI and PCI-X compatible) with four independently configurable sync/async serial ports with an external synchronisation capability (eg sourced from GPS). Sync operation supports transparent bitstream and bitsync (HDLC) of up to 10 Mbits/s per line. The highly flexible universal network connector supports RS232, X.21, RS530 (RS422 signalling), RS449 (RS422 signalling) and V.35 network interfaces.

Line signalling modes: NRZ, 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 T4E+ 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
- ✓ External via a special CTBus (H.100) clock bus connector
- ✓ Sourced on one port then routed to the others
- ✓ Sourced from a T4E+ then routed down the CTBus to other T4E+s (and other adapters supporting the CTBus) to allow clock synchronisation to be maintained

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).

## Typical Applications

The FarSync T4E+ suits a wide range of different applications these include:

- ✓ Reproduction of legacy Audio streams across the TCP/IP networks (VoIP) using Satellite (GPS) clock source synchronisation
- ✓ 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
- ✓ High speed multi-port HDLC framing support for non standard or specialist protocols
- ✓ Network clock synchronisation
- ✓ Multi purpose multi port communication 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

## Features under Windows

The FarSync T4E+ 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 through 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) framing and also transparent bitstream operation for video and voice type applications.

The FarSync T4E+ can also be installed to appear as a NDIS (LAN) interface so it can simply use the **TCP/IP stack over PPP** to allow access to IP based networks such as the Internet.

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.

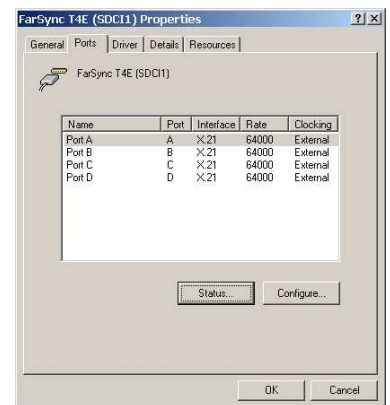
The adapters can also use the TCP/IP stack to allow access to IP based networks such as the Internet. It also allows selection of the full range of clock modes.

The link level protocol can be PPP, 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.

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 FarSync SDK provides a Developers Toolkit with full documentation, useful utilities, such as a line monitor, and many sample applications using the APIs for Linux and Windows. Free support from FarSite's Engineering department is provided to customers purchasing the FarSync SDK who have technical questions using the APIs.

For further details see [FarSync SDK Datasheet](#).

## Product Details

The FarSync T4E+ is supplied with software drivers for Windows and Linux. This includes a driver that allows access to the communications features available in the hardware and an optionally installable driver that connects with the standard TCP/IP protocol stack to allow access to IP based networks such as the Internet.

The drivers supplied with Windows and Linux allow large numbers of ports to be supported by the installation of multiple FarSync T4E+ 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 bandwidth of the PCI bus.

## Adapter Hardware

The adapter comprises a AMD processor with 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 10 Mbits/s full duplex internally clocked and 10 Mbits/s externally clocked. 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) 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 for the CTBus (H.100) 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 CTBus bus clock 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 to order, 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 drive serial communications port can be any frequency up to 10,000,000Hz.

A CTBus (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 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.

## H.100 Bus - Special clocking options (Windows only)

The adapters supports a subset of the CTBus (H.100) interface to enable synchronisation of serial port(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. This is of particular use in VoIP applications where a data on a line must be exactly reproduced at another location without slip.

In CT\_Bus Slave mode, the CTBus 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 CTBus clock (either A or B) can be derived from either a received serial port clock or an internal oscillator.

## PC / Server PCI and PCI-X Compatibility

The FarSync T4E+ adapter is suitable for systems with a PCI or PCI-X bus, covering single processor systems and multi-processor systems. The adapter is PCI revision 2.2 compliant with support for both 3.3 and 5 volt signalling, the power for the adapter is taken from the 3.3 volt supply rail. The FarSync adapters may be fitted in either 32-bit PCI bus slots or 64-bit PCI-X bus slots as this Universal PCI adapters will work perfectly well in both.

If you are not sure about your particular system, contact us and we can provide advice on the adapter that is most suitable for you.

## Line Signalling Modes

NRZ plus the self clocking (clock for the data is decoded from the incoming data line) line signalling modes Manchester Encoding, Conditioned Diphase (also known as Conditional 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, 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 type connector, all four lines are available through 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

<b>Adapter type and PCI specification</b>	AMD processor with SRAM and quad port synchronous controller, Universal PCI (PCI-X compatible, PCI v2.2 compliant), bus mastering, DMA enabled, 100 pin HIPPI connector for the network connections, CTBus (H.100 bus) for external clocking connection, Suitable for 32 and 64 bit PCI bus slots.
<b>Network connection types supported (with Cables)</b>	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.
<b>Link speed range Sync</b>	X21, RS530, RS449, V.35: up to 10 Mbits/s internally or externally clocked, RS232: up to 128 Kbits/s.
<b>Link speed range Async</b>	RS232, X.21: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38.4K, 57.6K and 115.2 Kbits/s
<b>Line Signalling Modes</b>	NRZ, Manchester Encoding, Conditioned Diphase (Conditional Manchester), FM0 and FM1.
<b>ESD line protection</b>	Littelfuse high speed ESD and over-voltage protection.
<b>Multiple adapters</b>	12 or more; only dependant of the number of PCI slots available on the server .
<b>LEDs</b>	4 LEDs one per port showing line connection status.
<b>Line clocking - internal</b>	Internal clock range: over 160 different frequencies between 300 baud and 10 Mbits See the complete list on page 3. No special cables are required to use internal clocks. Internal clocking is supported on RS530, RS422, RS232, X.21, V.35 and RS449 connections
<b>Line clocking - external</b>	External clocks received from a serial port and used to a drive serial communication port can be any frequency up to 10MHz.  For a specific sub-set of frequencies (38400, 57600, 64k, 128k, 256k, 512k, 1024k, 2048k, 4096k, 8192k) an H.100 bus clock may be derived from a received serial port clock.
<b>Terminal timing</b>	Terminal Timing is supported to enable system-wide clock synchronisation.
<b>Clock speed detection</b>	A 16-bit timer enables differentiation between the clock frequencies listed above, enabling auto-configuration of clock synthesisers when cables are connected.
<b>H.100 Bus - Special Clocking options (Windows only)</b>	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.
<b>Approvals</b>	EN55022 class B, CE, FCC class B
<b>MTBF</b>	141,438 hours calculated using Bellcore Method 1 Case 3, 40 deg.C ambient, 15 deg.C case temperature rise above ambient
<b>Power requirements</b>	< 1.75 A @ +3.3v, < 10mA @ +/- 12v, < 6 watt. Note: 5 V supply not required
<b>Physical characteristics</b>	Short card (height 107mm, length 167mm)
<b>Cables</b>	Cables are ordered separately, see the Order Information on the last page for details
<b>Warranty</b>	5 Years
<b>Compliance</b>	RoHS, REACH



## Technical Specifications - Software Features

### Linux

<b>Distribution Support</b>	Distributions by Red Hat, SuSE, CentOS, Ubuntu, Debian, Fedora, Slackware and more. Drivers for kernel series 2.6 and onwards on 32 and 64 bit systems
<b>Kernel Supported</b>	All sub versions of kernel releases from 2.6.12
<b>Protocol Supported</b>	TCP/IP, PPP, Cisco HDLC, Frame Relay, CHAP, MSCHAP, PAP (RFCs 1661, 1332, 1334)
<b>API and Interfaces</b>	Char I/O API

### Windows

<b>O/S Types</b>	Windows 10, 8, 7; Windows Server 2019, 2016 and 2012; LabVIEW running on a Windows O/S. 32 and 64 bit (single and multi-core systems)
<b>Protocol Supported</b>	TCP/IP, PPP, CHAP, PAP (RFCs 1661, 1332, 1334)
<b>API and Interfaces</b>	FsWinAPI, NDIS (LAN) where the line appears as a LAN interface
<b>Utilities</b>	Line Monitor to record, display and store line traffic included

### Order Information

Name	Description	Product Code
<b>FarSync T4E+</b>	Universal PCI Synchronous and Asynchronous 4 port bus mastering adapter (X.21 / V.35 / RS232C / EIA530 / RS422 / RS449), bitstream and HDLC run-time support for custom applications plus TCP/IP operation on Linux and Windows. Highly flexible clocking options include external clock source via a H.100 bus and clock frequency multiplication and division. NRZ, Manchester encoding, Conditioned Diphase, FM1 or FM0 selectable, other encoding can be developed to order. FsWinAPI for Windows 10, 8, 7; Windows Server 2019, 2016 and 2012. Char I/O API for Linux, To develop applications to use the API the FarSync SDK should also be ordered. Cables are ordered separately.	FS4446

### Compatible Cables

<b>HCR4</b>	HCR4, Quad port EIA-530 and RS232 DTE cable, 2.0 metres for use with FarSync T4E cards. Also supports X.21, V.35 and RS449 interfaces with addition of conversion cables TCX1, TCV1 and TC449 respectively.	FS6076
<b>TCX1</b>	TCX1— 1 port HCR4 cable to X.21 DTE (V.11) DB15M X.21 transition connector.	FS6052
<b>TCV1</b>	TCV1 — 1 port HCR4 cable to V.35 DTE M34M V.35 type connector.	FS6053
<b>TC449</b>	TC449 — 1 port HCR4 cable to RS449 DTE DB37M transition connector.	FS6054

### Special Purpose Cables - Suitable for all FarSync T-Series adapters

<b>Null-MX</b>	X.21 (V.11, RS422) double shielded crossover cable, DB15F connectors, 0.5 metres. Converts DTE presentation to DCE.	FS6090
<b>Null-MR4</b>	Combined RS530 (RS422, EIA 530) and RS232 (V.24) double shielded crossover cable, DB25F connectors, 0.5 metres. Converts DTE presentation to DCE.	FS6097

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