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Test and Measurement

Product of the Week

Tiny Box, Windows Software, Ride Herd On USB Transactions

The manufacturer says . . .	ChipCenter's Alex Mendelsohn says . . .
USB Tracker 110—Low-Cost USB Protocol Analyzer Fairport, New York--USB Tracker 110 is a high-performance, low-cost USB protocol analyzer equipped with innovative features useful to USB developers, making it the perfect tool for troubleshooting USB devices, optimizing data flow, and USB training. With the widespread use of USB, developers have for a long time needed an effective yet economical tool to assist them in their development work. USB Tracker 110 answers those needs uniquely with its powerful features and user-friendly analysis software. USB (Universal Serial Bus) is a communication bus that enables up to 127 peripherals to be linked to a personal computer. Peripherals as varied as mouse, keyboard, camera, CD writer, phone, or PDA can share the bandwidth of a single bus. USB Tracker 110's software is optimized for rapid comprehension of the USB protocol: relevant information is instantly available, while fields that are rarely used are hidden by default. The advanced user has the option to go into more detail within the protocol using various levels of abstraction in a textual or numeric form. To make reading easier where there are several USB	Although charmingly diminutive, the USB Tracker 110's performance belies its size. It can nonintrusively analyze the operation of an existing Universal Serial Bus (USB) device, search for any USB incompatibility in a system, and measure the performance of a piece of on-line USB equipment or a USB driver. As Saelig's press release notes, it also supports the analysis of low-speed-only USB lines running at 1.5 Mbits/s, as well as full-speed 12 Mbits/s systems. It also handles as USB mixed-speed environments to boot, automatically selecting the appropriate speed. According to Alan Lowne, Saelig's stateside product manager and distributor (the product is made by Ellisys in Geneva, Switzerland), the $799 USB Tracker 110 does this competing head on with CATC's Catalyst, as well as USB analyzers such as the Hitex Agent. "But," adds Lowne, "all of these are also much more expensive." **PC Hosted** The use of a PC environment is key to the cost-effectiveness Lowne acclaims. Indeed, most of the USB Tracker's analysis is handled on a host platform,

peripherals, the user can filter or color-code transactions meeting certain criteria. Now it is easy to distinguish traffic coming from two different USB peripherals, hide irrelevant transactions, or even eliminate traffic from hubs.

USB Tracker 110 offers:

- Low-speed (1.5 Mbits/s), full-speed (12 Mbits/s), and mixed capture
- Relevant information gathered in one window
- Details of transactions and transfers in a second window
- Decoding and detailed display of standard requests and descriptors
- Ability to filter or color-code transactions according to certain criteria
- Unlimited capture time using a high-speed USB 2.0 connection
- Real-time statistical display during packet capture
- Nonintrusive analysis
- Upgradeable software

USB Tracker 110 is available now from

Saelig Co. Inc.
1 Cabernet Circle
Fairport, NY 14450

Phone: (585) 425-3753
FAX: (585) 425-3835
E-mail: saelig@aol.com
Web: www.saelig.com

Contact: Alan Lowne

keeping the USB Tracker's hardware to a minimum (hence the unit's small size of just 3.4" × 3.2" × 1.8").
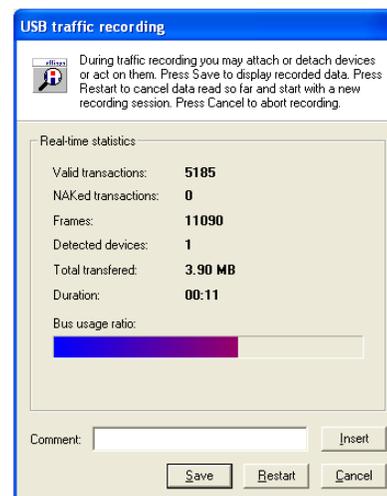
Inside the box, an ESD-protected Philips ISP1107 single-ended USB transceiver chip handles the unit's PHY interface to the bus, and a Xilinx XC2S50 Spartan FPGA handles protocol decoding. The use of the FPGA is a nice touch. It permits the system to be readily upgraded.

The box's smarts accrue to a Cypress Semiconductor EZ-USB FX-2 chip. The FX-2 handles data transfer towards the host PC, using an on-chip enhanced 8051 controller core. The chip also packs its own RAM, and uses DMA to transfer data internally, permitting it to reach burst I/O rates of 96 Mbytes/s.

It Does Windows

What's not mentioned in the Saelig press release is the fact that the bus-powered USB Tracker works in a Microsoft Windows environment, and requires an Internet Explorer 5.0 (or later) Web browser. The USB Tracker is connected between your PC and any USB peripheral, permitting you to view current USB bus transactions immediately in real time, as well as previously recorded traces, gaining real-time statistics.
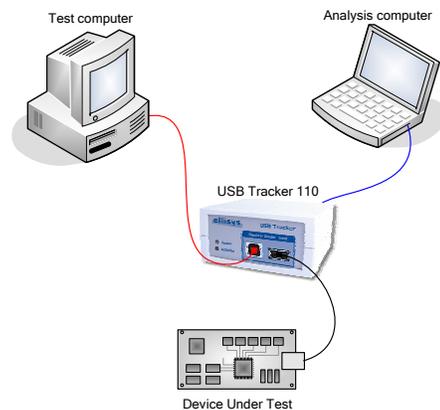
When recording traffic on a peripheral, for example, you may need to find out how many transactions have been successful. A Capture dialog box can display and updates such information in real time, including the number of transactions with and without data, the number of valid frames, total capture time, and bus use rate. Here's what a typical display screen looks like.

Note that the USB Tracker's real-time recording and analysis capability relies on a USB 2.0 connection. As such, the vendor notes that two host controllers comprise an optimum set-up. The first controller is used to connect the peripheral to be tested, and the other controller is used to record your data.

That means that you need either two PCs (one for analysis and the other for testing), or one PC with two host controllers (which is the case when a USB 2.0 extension card is used).

The single-PC option isn't recommended, but it can be used if your PC is sufficiently powerful, and if your device under test requires little processing power. However, two or more host controllers must be available on the PC (if there's only one host controller on your PC, you can expand it with CardBus or PCI extension cards). To obtain the best performance, it's recommended that you use two PCs, one with a USB 2.0 connection.

Test computer

Analysis computer
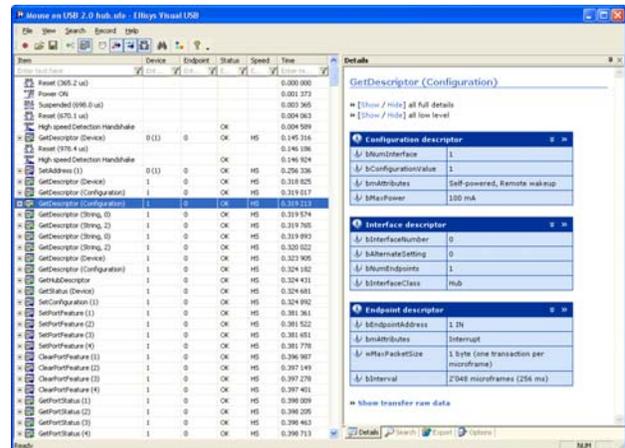
USB Tracker 110

Device Under Test

In any case, the USB Tracker's PC executables run under either Windows 98, Windows SE, Windows Me, Windows 2000, or Windows XP on PCs running Pentium IIIs clocking at least 600 MHz, with at least 128 Mbytes of DRAM. You should also equip your PC with a USB 2.0 host controller (for 480 Mbits/s operation).

Lowne notes that Ellisys claims its unit is easier to use than competitive USB protocol analyzers. "The information is clearer in presentation," agrees Lowne. "It's intended for folks who want to find a bug and fix it, not spend a week trying to learn how to work the product's software."

Once up and running, the USB Tracker's host software depicts a window that lets you display USB packets and decode their descriptors, permitting you to detect errors in peripherals or drivers, and also measure their

performance. Capturing packets, the system derives real-time statistics, with its display revealing bus status, even before you look at the packets that have been read. The USB Tracker records all packets and bus states (such as RESET or SUSPEND).

Information is also displayed in a chronological list, together with a peripheral's address and end-point number. Low-level information can be shown in decimal, hexadecimal, and binary formats.

A second window gives more details. To make it easier to identify packets, the system's software includes filtering and packet-coloring functions. It also lets you select levels of detail. Also, the information derived from bus traffic is equated with references to the USB standard.

Filtering Information

The system's filtering can also ease the identification of transactions. Although the amount of information displayed is kept to a minimum, some applications may demand filtering. The USB Tracker permits you to filter out unwanted packets, letting you mask or keep transactions of a specified type, or certain peripheral addresses or endpoints. This capability lets you eliminate Start-of-Frame (SOF) or NAK transactions, for example.

When you're dealing with many USB connected peripherals, the number of transactions displayed can make it difficult to identify which one a particular transaction belongs to. To save you from tedious searches, the Tracker permits you to color-code transactions belonging to a given peripheral. You can then view the information sent to the peripheral in one color, and see other communications in different colors.

When you consider how ubiquitous USB is, providing plug-and-play communications in everything from keyboards to digital cameras, the availability of a cost-effective tester makes a lot of sense. The USB Tracker 110, with its compelling software and small size, should find a home on many a crowded development bench, as well as for troubleshooting installed USB systems. Like so many of Saelig's cost-effective products, it's also priced so that your organization might consider running a number of these instruments.