USB Switching in A/V Environments

USB is a popular standard that has been around since 1995. Its evolution has extended to the point where each of us utilizes this interface on a daily basis. USB ports are standard fixtures on computers and laptops with further extension recently onto other peripheral devices such as: keyboards, mice, printers, cameras, speakers, and of course storage devices like thumb drives. With all of this connectivity, it is no wonder that USB has permeated into A/V environments and therefore must be accommodated into many installations.

The promise of USB

The availability of USB on so many electronic devices is testament to delivery of its promise – simplicity. Connectivity via the USB platform offers many significant conveniences and advantages in comparison to past approaches; namely, the time savings and lack of hardware/software device configuration when adding to a system. The plug-and-play approach simplifies connectivity while providing the capability for simultaneous communications between hosts and up to 127 attached peripheral devices. Host devices generally consist of a computer, or processing device, while peripherals comprise mass storage and HIDs – Human Interface Devices. Furthermore, standardized connectivity, cross-platform operation, and the ability to hot-swap allows for easy, straightforward accessibility.

USB in A/V

USB-based components are commonly used in today’s A/V systems, and the need to reliably switch USB signals continues to grow along with the evolution of the electronics industry. Three of the most popular USB centered applications include KVM – keyboard/video/mouse, interactive whiteboards, and annotator-based systems.

KVM – These applications revolve around the need to monitor, access, and operate multiple CPUs with a single keyboard, monitor, and mouse from a remote location. Many Command & Control centers incorporate this approach due to security aspects and available space within the operational area. The ability to house computers in a central secure location, while still being able to use them, is of great benefit.

Video annotation systems – A video annotator gives the user the ability to overlay text onto displayed video within a system. The user interface is pen-based, with touch screen monitors generally used as the writing surface. Video switchers are often used to switch multiple signals into the annotator with its output feeding a display. These systems are widely used in courtrooms and other corporate settings.

USB Terminology

USB – Universal Serial Bus – A popular serial bus interface standard that allows communication between a host and one, or many, peripheral devices. USB 1.0 was introduced in 1995, and the current version, 2.0, was released in 2000.

Host – A device, usually a computer, that initiates communications transfer with attached downstream devices/peripherals. Hosts utilize Type A connectors.

Peripheral – Downstream devices, such as keyboards, mice, and other interfaces that communicate with the attached host. Multiple peripherals can be actively connected within a system with simultaneous communication taking place. Peripheral devices typically utilize Type B connectors.

Enumeration – The discovery process in which device recognition and configuration takes place. This process is repeated each time the USB host is restarted.

Hub – Expands the number of devices to which a host can communicate. Powered or “active” hubs provide 5V power for attached peripherals.

Speed/Data Rate – USB currently supports three speeds, or data rates. Low speed – 1.5 Mbps, Full Speed – 12 Mbps, and High Speed – 480 Mbps.

Device Class – Categories defined by the Device Working Group of the USB Implementers Forum that describe usage and operation. Drivers are utilized to support functionality of these classes. Two common classes are Mass Storage and HID – Human Interface Devices.

Mass Storage – Devices such as thumb drives, external hard drives, and digital cameras

HID – Human Interface Devices include keyboards, mice, joysticks, annotators, and interactive whiteboards

Connector types, Multiple connector types exist, but at the most basic levels, Type A connectors are utilized on Host devices, while Type B connectors are found on Peripherals.
Extron USB switching solutions

The SW USB Series were recently introduced to address the need for reliable USB switching. These products are loaded with integrator-friendly features that deliver streamlined design capability into any A/V environment. The advanced feature set was designed specifically to address the specialized requirements of these systems, providing high reliability and flexible usability to suit the needs of these versatile environments.

- Available in two and four input models
- USB 2.0 compatibility allows the switcher to be used with peripheral devices meeting all current and past USB standards
- Four-port output hub provides 5V, 500mA of power on each output for attachment of multiple peripheral devices
- Port status LEDs provide visual confirmation of port activity for all connected and active host devices
- Front panel, contact closure, and RS-232 control capabilities offers integration flexibility into a variety of control environments
- RS-232 pass-through offers increased flexibility, allowing other Extron controllable switchers to be incorporated into designs that require additional signal switching
- Host and peripheral emulation in the SW4 USB Plus provides “keep alive” functionality by continuously mimicking host and keyboard/mouse communications within the switcher. This emulation eliminates the need for enumeration, and reduces the chance of failed device communications throughout the switching process.

Interactive whiteboards

Used extensively in education and corporate training environments, interactive whiteboards have become very popular over the past few years. Information written onto the whiteboard is electronically communicated to the host computer via USB connection. Classrooms and training labs often incorporate multiple PCs in association with video projection onto the board.