

Reconnecting Sentech USB Cameras in Linux

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1 Problem

When the usb bus power fails for a sufficiently short period of time, the USB controller assumes that the device is disconnected and the re-connection fails to be detected. The mechanical disconnection and re-connection is not acceptable.

2 Solution

The candidate programmatic solution is based on causing the hub controller to re-enumerate the bus. Note that the hub driver commonly performs this enumeration when it is installed.

Therefore, a first solution consists of simply removing and re-installing the hub driver. The Linux driver for the USB2 controller is ehci_hcd.

Using sysfs In general, one can dissociate the bus from the controller via the sysfs bind/unbind mechanism. For example, one can see the buses controlled by the ehci_hcd driver using the tree command:

```
$tree /sys/bus/pci/drivers/ehci_hcd/
/sys/bus/pci/drivers/ehci_hcd/
0000:00:1a.0 -> ../../../../devices/pci0000:00/0000:00:1a.0
0000:00:1d.0 -> ../../../../devices/pci0000:00/0000:00:1d.0
bind
module -> ../../../../module/ehci_hcd
new_id
remove_id
uevent
unbind
```

As it can be observed, on this system there are two buses controlled by the EHCI driver. One can disassociate them from EHCI with:

```
# echo -n "0000:00:1a.0" >/sys/bus/pci/drivers/ehci_hcd/unbind
# echo -n "0000:00:1d.0" >/sys/bus/pci/drivers/ehci_hcd/unbind
```

The buses can be re-associate with the driver using:

```
# echo -n "0000:00:1a.0" >/sys/bus/pci/drivers/ehci_hcd/bind
# echo -n "0000:00:1d.0" >/sys/bus/pci/drivers/ehci_hcd/bind
```

On re-association, the controller driver will re-enumerate the devices attached on the bus. At this moment, the USB cameras can be detected. The Sentech driver associated with these cameras will be loaded (if no longer loaded) and the camera will be detected as a new camera.

Any software employing the camera should by this moment free the old “/dev/video” device and should open the new “/dev/video” device file.

Implementation Sketch In a user software, a module may be implemented to detect potential disconnection of the camera (e.g., based on a timeout). On timeout, the device file of the camera should be closed, the corresponding strings (bus IDs, e.g., “0000:00:1a.0”) should then be written into the above files, “/sys/bus/pci/drivers/ehci_hcd/unbind” and “/sys/bus/pci/drivers/ehci_hcd/bind”. Subsequently, wait for “/dev/video” to re-appear and open it to continue operations. Since the camera did lose power, and it might have forgotten its setting, one has to make sure to reset its operation mode.

Using modprobe When the hcd driver is compiled as a module, its removal and re-installation can be done with a suid root script:

```
$ sudo -s
# modprobe -vr ehci_hcd
# modprobe -v ehci_hcd
```

Subsequently one has to follow the same operations as above (close the device file description and open the new one).