



apu2: How to Route USB ports to EHCI controller?

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There are some use cases where USB devices work very well with EHCI (and even UHCI+OHCI) but fail to work with XHCI. This is mostly due to XHCI controllers handling more of the USB protocol internally (with related non-fixable firmware bugs/shortcomings), while predecessors are more software-defined.

So in such use cases, one normally wants to route the USB traces of the physical USB connectors to the EHCI controller IP core, rather than the XHCI controller. For Intel XHCI there are some more or less standard ways to do this via PCI configuration space. One good explanation is found at <https://www.systutorials.com/how-to-force-a-usb-3-0-port-to-work-in-usb-2-0-mode-in-linux/>

3 (<https://www.systutorials.com/how-to-force-a-usb-3-0-port-to-work-in-usb-2-0-mode-in-linux/>)

Now the question is: How to achieve this on an APU2? I have unloaded xhci_pci and now I only have the EHCI linux driver bound to the two EHCI controllers. However, the attached low/full/high speed devices do not show up on the EHCI controllers.

I couldn't find any register-level documentation of the AMD XHCI, but maybe somebody at PC Engines could check how to determine where the USB 2 DN/DP of the physical connectors should be routed internally (XHCI vs. EHCI) and share this information with the APU users.

Thanks in advance!



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Thanks to Pascal Dornier of pc-engines who pointed me to the BIOS and Kernel Developer Guide available at https://www.amd.com/system/files/TechDocs/52740_16h_Models_30h-3Fh_BKDG.pdf (https://www.amd.com/system/files/TechDocs/52740_16h_Models_30h-3Fh_BKDG.pdf) and specifically to the USB section of it, I could identify what needed to be done to re-route the physical USB-A connectors on the APU2 from XHCI to EHCI:

- * re-route the USB8+USB9 from XHCI to EHCI
 - * enable the EHCI2 controller
 - * re-xcan the PCI bus to detect the new EHCI controller
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Afterwards, any devices plugged into the USB A connectors on the APU2 boards enumerate on the EHCI instead of the XHCI controller.

The source-code of a related tool to perform these steps is available at <https://git.systocom.de/systocom> (<https://git.systocom.de/systocom>) - in case anyone else runs into this problem.