Sure USB-C Power Source Detection

Abstract:
The host uses USB-C power source from USB-C port on notebook or AIO now. The USB-C power source detection fail happens sometimes. The power status is incorrect and keep DC when the failure happens. The USB-C power source detection fail may cause by communication problem between PD, EC, chipset and OS. The communication problems are maybe related about the hardware, firmware, driver and OS. It is a complex process for USB-C power source detection. We provide a Sure USB-C Power Source Detection (SUPSD). When the USB-C power source plug-in, SUPSD can detect the power status from OS. It can recover the USB-C power source detection problem and make sure the power status is correct in OS. It can improve the user experience.

Design Construction:
- **HW**: No addition hardware design. Standard EC controller and PD controller.
- **SW**: Application update power source status in OS to BIOS/EC
- **EC**: Application will notify the EC to Update power source status in OS. EC will send the power source status to PD and follow the PD to do the power source recovery if the power source status is incorrect in OS.
- **PD**: Gets and checks the power status for each component and send command to recover the fail
Situation 1: Adapter PD gets the feedback from application and the power status is still DC.

**VDM:** Vendor Define Message

**Step 1:** Adapter PD: Gets and checks the power status for each component and send command to recover the failure. For example, as power status 2, the communication problem happen between host PD and EC. Adapter PD will send VDM command to request host PD to recover this problem. The VDM command is defined by HP specific for this innovation.

**Step 2:** Host PD: Gets recover VDM command and communicate with EC for power source again.

**Step 3:** EC/BIOS Gets the power source from PD and issues an SCI to notify OS and application. EC gets correct power status from host PD and notify the OS and application for correct power status.

**Step 4:** Application Reads power status from OS and Sends WMI to notify EC the power status

**Step 5:** EC: Gets the power status and notify host PD by VDM.

**Step 6:** Host PD: Gets the power status and notify the adapter PD by VDM.

**Step 7:** Adapter PD: Gets and checks the power status for each component. The power status is correct in OS after recovery. The recovery method can be re-communication or re-connection USB-C adapter or so on.

Situation 2: In normal situation, adapter PD will get feedback from application for power status in OS. If Adapter PD doesn’t get the feedback from application after USB-C adapter plug-in, Adapter PD will send VDM to get the feedback from application again.

**Step 1:** Adapter PD: Send command to get the feedback from application. Adapter PD will send VDM command to feedback application after wait the feedback fail and time out. The VDM command is defined by HP specific for this innovation.

**Step 2:** Host PD: Send the command to EC by VDM

**Step 3:** EC/BIOS Send SCI to notify the application

**Step 4:** Application Reads power status from OS by VDM

**Step 5:** EC: Gets the power status and notify host PD by VDM.

**Step 6:** Host PD: Gets the power status and notify the adapter PD by VDM

**Step 7:** Adapter PD: Gets the feedback for the power status. You can see the table as example after getting the feedback for the power status. Adapter PD will do recovery as situation 1 in P6 after getting the feedback. The power status will be correct after recovery.
Business Strategy/Advantages

1. SUPSD can detect the power status from OS and feedback the status to adapter PD. Adapter PD also can send VDM command to get power status from application if adapter PD doesn’t get feedback from application. It can do recovery when detection fail happens and then make sure the power status is correct in OS. SUPSD prevent the power source detection fail. It can improve the user experience.

2. Use software and firmware solution. No addition hardware design and easy to implement in current system.

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