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SMART POWER ON WHEN SPECIFIC USB-C DOCK OR INDUSTRY USB-C DISPLAY CONNECTION

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Smart power on when specific USB-C dock or industry USB-C display connection

Abstract:

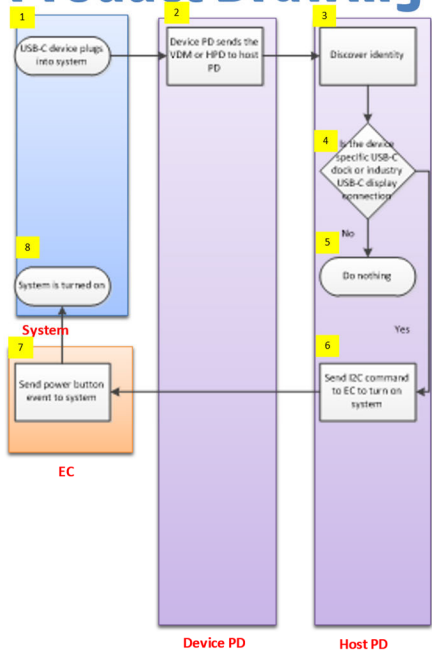
The power on button is on keyboard matrix on some NB units. Some users would like to use NB with external display and keyboard. User doesn't use internal keyboard and panel on NB. User will open lid, press power button to turn on the system, close lid and then connect external display and keyboard. We provide a Smart Power On when specific USB-C dock or industry USB-C display connection (SPO). The system will be turned on from shutdown when specific USB-C dock or industry USB-C display connection. User doesn't need to turn on the system by power button. It can improve the user experience for users which would like to use NB with external display and keyboard.

Design Construction:

- **HW:** No addition hardware design.
- **Device PD FW:** Device PD sends the VDM or HPD to host PD. The VDM includes PID and VID. For the display device, the device PD will also send VDM for DP ALT mode capability and HPD (Hot-Plug Detection). We can also define our specific VDM for our device only. You can see an example for the VDM as table. We define our specific VDM for device identification. Non-HP device won't send the specific VDM. The bit0 is 1 for dock, bit1 is 1 for display and bit2 is 1 for storage.
- **Host PD FW:** Discover identity. Host PD can identify the device is specific dock or display by specific VDM. For industry device, we can use the HPD and DP Alt mode to detect it is a display or not. Send I2C command to EC to turn on system when specific USB-C dock or industry USB-C display connection.
- **Host EC FW:** Send power button event to system when host PD send I2C command to. The system will wake by the power button event from EC.

< Flow Chart and Block Flow Diagram >

Product Drawing



Vendor Defined Message (VDM)

Step1: System : USB-C device plugs into system.

Step2: Device PD : Device PD sends the VDM or HPD to host PD. The VDM includes PID and VID. For the display device, the device PD will also send VDM for DP ALT mode capability and HPD (Hot -Plug Detection). We can also define our specific VDM for device identification. industry device won't send the specific VDM. The bit0 is 1 for dock, bit1 is 1 for display and bit2 is 1 for storage.

Step3: Host PD : Discover identity. We can identify the device is s pecific dock or display by specific VDM. For industry device, we can use the HPD and DP Alt mode to detect it is a display or not.

Step4: Host PD : Is the device specific USB -C dock or industry USB -C display connection. We can use the VID and PID to identify specific dock or specific display. We can also use the specific VDM to identify them. We can identify industry display If the device supports DP alt mode and HPD is high

Yes, go to Step6. No go to Step5.
Step5: Host PD : Do nothing. The system doesn't wake if the device is not a display or dock.

Step6: Host PD : Send I2C command to EC to turn on system. The host PD send I2C command to EC to wake up the system.

Step7: EC : Send power button event to system. The system will wake by the power button event from EC.

Step8: System : System is turned on. We can see the below table, system is turned on by display and dock, but it doesn't be turned on by storage.

	Specific Dock	Specific Display	Industry display	Specific storage
VID	03F0	03F0	413C	03F0
PID	1001	3032	2223	1002
HPD	No	Yes	Yes	No
DP Alt Mode	No	Yes	Yes	No
Specific VDM for specific device only	Yes, bit0=1	Yes, bit1=1	No	Yes, bit2=1
Discover Identity result	Can identify the device is Specific dock by specific VDM	Can identify the device is Specific Display by specific VDM	Can identify the device is industry Display by DP ALT mode and HPD	Can identify the device is Specific storage by specific VDM
System wake	Yes	Yes	Yes	No

Business Strategy/Advantages

- User doesn't need to turn on the system by power button. The system will be turned on from shutdown when specific USB-C dock or industry USB-C display connection. It can improve the user experience for users which would like to use NB with external display and keyboard.
- No addition hardware design and easy to implement in current system.

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