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## CHARGE DIRECTION INDICATING USBC CABLE

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## **CHARGE DIRECTION INDICATING USB-C CABLE**

### **ABSTRACT**

A hardware based solution is proposed for indicating charging direction in a USB-C cable. The solution comprises of bi-color red/green LEDs attached to the connector of the USB-C cable. The LEDs are electrically connected and will glow when the USB-C supportive device is connected to the USB-C supportive system either for receiving or providing power. The device which is providing power or receiving power is identified by the color of the glowing LED at the specific end of the connector of USB-C cable, for example green could indicate providing end and red the receiving end. The LEDs are always connected in the opposite orientation on each end of the cable such that they always have opposing color.

### **BACKGROUND**

The USB-C is an industry standard connector and cable used for connectivity and power. The USB-C cable has same connector in both the ends and does not have any up-down orientation. The USB-C supportive system can receive power from the USB-C supportive device or also provide power to the USB-C supportive device using the same physical cable and port. For example, a laptop can receive power and charge itself from a USB device or it can provide power to the USB device using the same cable and port. When two USB-C devices both capable of providing and receiving power are connected together to a USB-C supportive system, it becomes difficult for the user to distinguish between the USB device providing power and the USB device receiving power from the system. This situation is made worse when the device is not supported with any display or indicator to show its power state. This problem is solved to some extent in some devices in which a UI pop up window appears where the user is allowed to select the direction of power. Any hardware indication will not be visible if the device is closed and the user is forced to open the device

to see the charging direction. The opening and closing of the device to check the charging direction is a pain point. There are number of devices available in the market with power indicators. The indicators range from advanced meters showing current consumption to simple lights indicators in the USB based power supply but most of them serve only aesthetic purpose. A new hardware device and method is proposed to overcome the challenges involved in identifying the charging direction in a USB-C cable.

### DESCRIPTION

A dual/multi colored light is added to each end of the USB-C cable to make it obvious for the user to identify which end of the given cable is providing power and which end is receiving power. The light on each end is connected electrically such that its color changes depending on the direction from which current is provided. With this addition of lights to the cable the user can identify which device is providing power and which device is receiving power at a glance, even if the devices themselves are closed.

An example of the proposed device would be using bi-color red/green LEDs where the current direction across them is switched with the current flow on VBUS on the USB-C cable. The LEDs will be connected in the opposite orientation on each end of the cable such that they always have opposing colors. The providing end would always be one color and receiving end will be the other. For example red could indicate receiving and green providing.

The device is truly a hardware solution and has the advantage of not requiring any software interaction. Hence it will work with any USB-C compatible devices. The solution also could be implemented with software controlled LEDs. In another alternative, LEDs could be included in the port of the system itself to indicate the status. Implementing this solution in the cable allows the users to have varied choice in terms of LEDs of different styles and colors, or the user could simply not desire a lit cable.