

USB Power Delivery ENGINEERING CHANGE NOTICE

Title: Power button and power state indicators

**Applied to: USB Power Delivery Specification Revision 3.0
Version 2.0**

Brief description of the functional changes proposed:
This ECR proposes changes to the Alert message to indicate a power button press and release from a dock-like device, an addition to the Alert message to allow a host to indicate its system power state to a dock-like device. The system power state indicator is accompanied by an additional byte in the Status message to allow the host to indicate its new power state and a choice from several predefined behaviors to indicate to a user what the system power state is.

Benefits as a result of the proposed changes:
This ECR allows a power button press and a power state change to be provided between devices from different vendors. This functionality has been provided by custom means by many OEMs, so this proposal attempts to provide a standard mechanism to accomplish the same functionality.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
The new messages are optional, and shouldn't cause any interoperability issues if used between devices that don't support this functionality.

An analysis of the hardware implications:
A power button on the dock-like device needs to connect is power button to an agent that can send the appropriate messages to indicate the power button press.

An analysis of the software implications:
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The SW/FW on the host needs to provide a means to communicate its system power state changes to a downstream device via these new messages.

The SW/FW in the host needs to provide a means to communicate the new power button press and release events to the OS to allow it to initiate the user specified behavior for the power button press

An analysis of the compliance testing implications:

Compliance testing would need to include tests to manually manipulate the power button on the dock-like device to check if the corresponding messages were sent correctly.

Compliance testing would need to check if the system power state change status message is correctly sent with the new system power state.

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Actual Change Requested

(a). Section 6.4.6, Page 159, Table 6-42

From Text:

Table 6-42 Alert Data Object

Bit(s)	Field	Description																		
B31...24	Type of Alert	<table><tr><th>Bit</th><th>Description</th></tr><tr><td>0</td><td>Reserved and Shall be set to zero</td></tr><tr><td>1</td><td>Battery Status Change Event(Attach/Detach/charging/discharging/idle)</td></tr><tr><td>2</td><td>OCP event when set (Source only, for Sink Reserved and Shall be set to zero)</td></tr><tr><td>3</td><td>OTP event when set</td></tr><tr><td>4</td><td>Operating Condition Change when set</td></tr><tr><td>5</td><td>Source Input Change Event when set</td></tr><tr><td>6</td><td>OVP event when set</td></tr><tr><td>7</td><td>Reserved and Shall be set to zero</td></tr></table>	Bit	Description	0	Reserved and Shall be set to zero	1	Battery Status Change Event(Attach/Detach/charging/discharging/idle)	2	OCP event when set (Source only, for Sink Reserved and Shall be set to zero)	3	OTP event when set	4	Operating Condition Change when set	5	Source Input Change Event when set	6	OVP event when set	7	Reserved and Shall be set to zero
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7	Reserved and Shall be set to zero																			
B23...20	Fixed Batteries	When Battery Status Change bit set indicates which Fixed Batteries have had a status change. B20 corresponds to Battery 0 and B23 corresponds to Battery 3.																		
B19...16	Hot Swappable Batteries	When Battery Status Change bit set indicates which Hot Swappable Batteries have had a status change. B16 corresponds to Battery 4 and B19 corresponds to Battery 7.																		
B15...0	Reserved	Shall be set to zero																		

To Text:

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B15...4	Reserved	Shall be set to zero																		

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Bit(s)	Field	Description
B3...0	Extended Alert Event Type	<p>When the Extended Alert Event bit in the <i>Type of Alert</i> field equals '1', then the <i>Extended Alert Event Type</i> field indicates the event which has occurred:</p> <ul style="list-style-type: none">• 0 = <i>Reserved</i>.• 1 = Power state change (DFP only)• 2 = Power button press (UFP only)• 3 = Power button release (UFP only)• 4 = Controller initiated wake e.g. Wake on Lan (UFP only)• 5-15 = <i>Reserved</i> <p>When the Extended Alert Event bit in the <i>Type of Alert</i> field equals '0', then the <i>Extended Alert Event Type</i> field is <i>Reserved</i> and <i>Shall</i> be set to zero.</p>

(b). Section 6.4.6.1, Page 160

From Text:

To Text:

6.4.6.1.7 Extended alert event

The Extended Alert Event bit *Shall* be set when the event is defined as an Extended Alert Type.

(c). Section 6.4.6.4, Page 161

From Text:

To Text:

6.4.6.4 Extended Alert Event Types

The Extended Alert Event Type field provides extensions to the available types for the Alert Message. If the Extended Alert Event bit is not set, then the Extended Alert Event Type is *Reserved* and *Shall* be set to zero.

6.4.6.4.1 Power State Change

The Power state change event value *May* be set when the DFP transitions into a new power state. The new power state *Shall* be communicated via the Power state change byte in the Status Message. This message *Should* be sent by the host in response to any system power state change.

6.4.6.4.2 Power Button Press

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The Power button press event value **May** be set when the power button on the UFP is pressed. The press and release events are separated into two different events so that devices that respond differently to a long button press will see a long button press. On the host-side, the power button press event typically initiates the same behavior as a power button press of the host's power button.

6.4.6.4.3 Power Button Release

If a Power button press event was sent, then the Power button release event value **Shall** be sent by the UFP following the Power button press event. If a physical power button press initiated the Power button press event, then the Power button release event **Should** be sent when the physical button is released.

6.4.6.4.4 Controller initiated wake

The Controller initiated wake is used to communicate a wake event from the UFP to the DPF such as Wake on Lan from a NIC or another controller. This event doesn't need the press/release form of the Power button press, because it only needs to communicate the presence of the event, and not the timing.

(d). Section 6.5.2.1, Page 166

From Text:

A **Status** Message, sent in response to **Get_Status** Message to **SOP**, enables a Port to inform its Port Partner about the present status of the Source or Sink. Typically, a **Get_Status** Message will be sent by the Port after receipt of an **Alert** Message. Some of the reported events are critical such as OCP, OVP and OTP, while others are informative such as change in a Battery's status from charging to neither charging nor discharging.

The **Status** Message returns a 6-byte Status Data Block (SDB) whose format **Shall** be as shown in Figure 6-31 and Table 6-46.

To Text:

A **Status** Message, sent in response to **Get_Status** Message to **SOP**, enables a Port to inform its Port Partner about the present status of the Source or Sink. Typically, a **Get_Status** Message will be sent by the Port after receipt of an **Alert** Message. Some of the reported events are critical such as OCP, OVP and OTP, while others are informative such as change in a Battery's status from charging to neither charging nor discharging.

The **Status** Message returns a 7 byte Status Data Block (SDB) whose format **Shall** be as shown in Figure 6-31 and Table 6-46.

(e). Section 6.5.2.1, Page 166, Figure 6-31

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From Text:

Figure 6-31 SOP Status Message

Extended Header Data Size = 6	SDB (6-byte block)
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To Text:

Figure 6-31 SOP Status Message

Extended Header Data Size = 7	SDB (7-byte block)
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(f). Section 6.5.2.1, Page 167, Table 6-46

From Text:

To Text:

6	Power state change	Bit	Description																		
		2...0	New power state																		
			<table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Status not supported</td></tr><tr><td>1</td><td>S0</td></tr><tr><td>2</td><td>Modern Standby</td></tr><tr><td>3</td><td>S3</td></tr><tr><td>4</td><td>S4</td></tr><tr><td>5</td><td>S5 (off with battery, wake events supported)</td></tr><tr><td>6</td><td>G3 (off with no battery, wake events not supported)</td></tr><tr><td>7</td><td>Reserved, Shall Not be used</td></tr></table>	Value	Description	0	Status not supported	1	S0	2	Modern Standby	3	S3	4	S4	5	S5 (off with battery, wake events supported)	6	G3 (off with no battery, wake events not supported)	7	Reserved, Shall Not be used
		Value	Description																		
		0	Status not supported																		
		1	S0																		
		2	Modern Standby																		
		3	S3																		
		4	S4																		
		5	S5 (off with battery, wake events supported)																		
6	G3 (off with no battery, wake events not supported)																				
7	Reserved, Shall Not be used																				
5...3	New power state indicator																				
	<table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Off LED</td></tr><tr><td>1</td><td>On LED</td></tr><tr><td>2</td><td>Blinking LED</td></tr><tr><td>3</td><td>Breathing LED</td></tr><tr><td>4...7</td><td>Reserved, Shall Not be used</td></tr></table>	Value	Description	0	Off LED	1	On LED	2	Blinking LED	3	Breathing LED	4...7	Reserved, Shall Not be used								
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0	Off LED																				
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2	Blinking LED																				
3	Breathing LED																				
4...7	Reserved, Shall Not be used																				
7...6	Reserved, Shall Not be used																				

(g). Section 6.5.2.1.7, Page 168

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From Text:

To Text:

6.5.2.1.7 Power state change

6.5.2.1.7.1 New power state

The Power state change status byte indicates a power state change to one of the specified power states. Any device that supports the ACPI standard system power states **shall** use the ACPI states. For devices that do not support the support the ACPI power states, the following mapping **Should** be used:

- High power (on) state -> S0
- Sleep state -> S3
- Low power (off) state -> S5 or G3

6.5.2.1.7.2 New power state indicator

The Power indicator value defines the host's desired indicator for the specified power state. This indicator allows several possibilities for pre-defined behaviors that the host can specify to indicate its system power state to the user via the downstream device. The New power state indicator is a "best effort" indicator. If the device cannot provide the requested indicator, then it provides the best indicator that it can. If a Breathing indicator cannot be provided, then a Blinking indicator should be provided. If a Blinking indicator cannot be provided, then a constant on indicator **Should** be provided.

New power state indicators in decreasing precedence:

Breathing -> Blinking -> constant on -> no indicator