

USB Power Delivery ENGINEERING CHANGE NOTICE

Title: Correction to BMC description

Applied to: USB Power Delivery Specification Revision 3.2

Version 1.0

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| Brief description of the functional changes proposed: |
| This ECN has no functional change but is a correction to the language in the description of the timing between BMC packets. This text was incorrect from the very first appearance in the spec. Every known implementation does it the way the drawing shows - which is correct. |

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| Benefits as a result of the proposed changes: |
| Text in the spec will be in accordance with the drawing. |

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| An assessment of the impact to the existing revision and systems that currently conform to the USB specification: |
| None |

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| An analysis of the hardware implications: |
| None |

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| An analysis of the software implications: |
| None |

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| An analysis of the compliance testing implications: |
| None |

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Actual Change Requested

(a). Section 5.8.1 Encoding and signaling, P.95

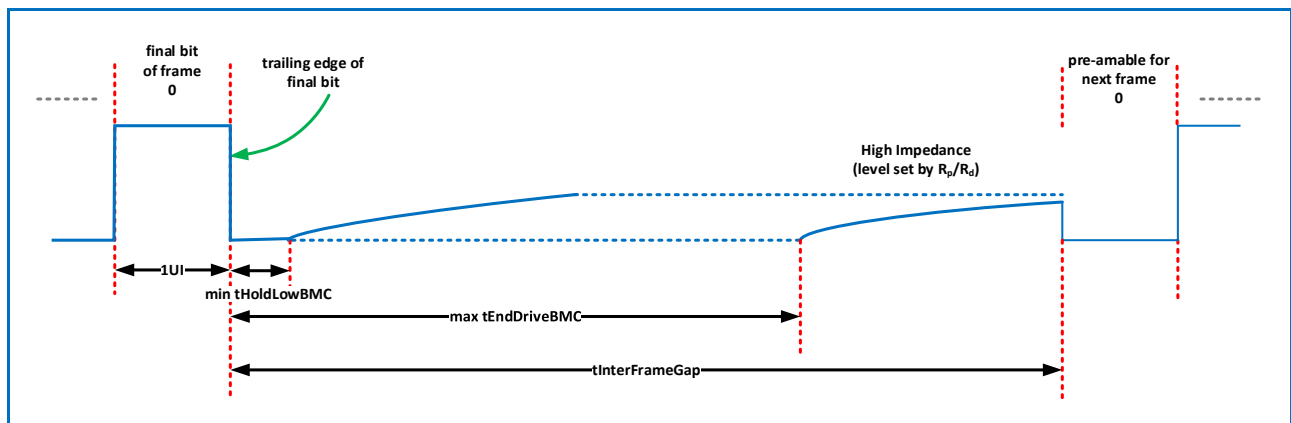
From Text:

The transmitter **Shall** terminate the final bit of the Frame by an edge (the “trailing edge”) to help ensure that the receiver clocks the final bit. If the trailing edge results in the transmitter driving CC low (i.e., the final half-UI of the frame is high), then the transmitter:

- **Shall** continue to drive CC low for ***tHoldLowBMC***.
- Then **Shall** continue to drive CC low for ***tEndDriveBMC*** measured from the trailing edge of the final bit of the Frame.
- Then **Shall** release CC to high impedance.

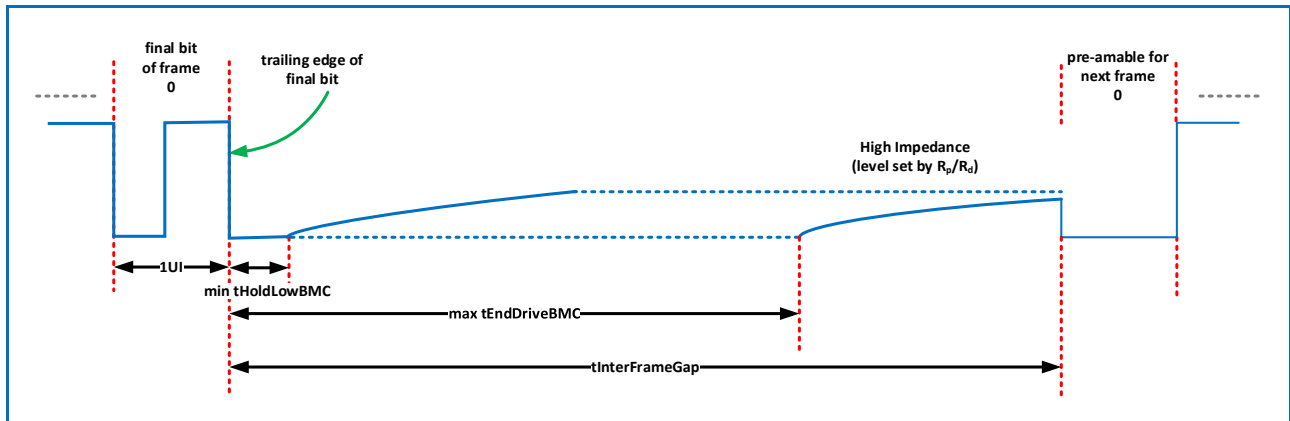
Figure 5-1 “Transmitting or Receiving BMC Encoded Frame Terminated by Zero with High-to-Low Last Transition” illustrates the end of a BMC encoded Frame with an encoded zero for which the final bit of the Frame is terminated by a high to low transition. **Figure 5-2 “Transmitting or Receiving BMC Encoded Frame Terminated by One with High-to-Low Last Transition”** illustrates the end of a BMC Encoded frame with an encoded one for which the final bit of the Frame is terminated by a high to low transition. Both figures also illustrate the ***tInterFrameGap*** timing requirement before the start of the next Frame when the Port has either been transmitting or receiving the previous Frame (see **Section 5.8.5.4 “Error! Reference source not found.”**).

Figure 5-1 “Transmitting or Receiving BMC Encoded Frame Terminated by Zero with High-to-Low Last Transition”



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Figure 5-2 “Transmitting or Receiving BMC Encoded Frame Terminated by One with High-to-Low Last Transition”

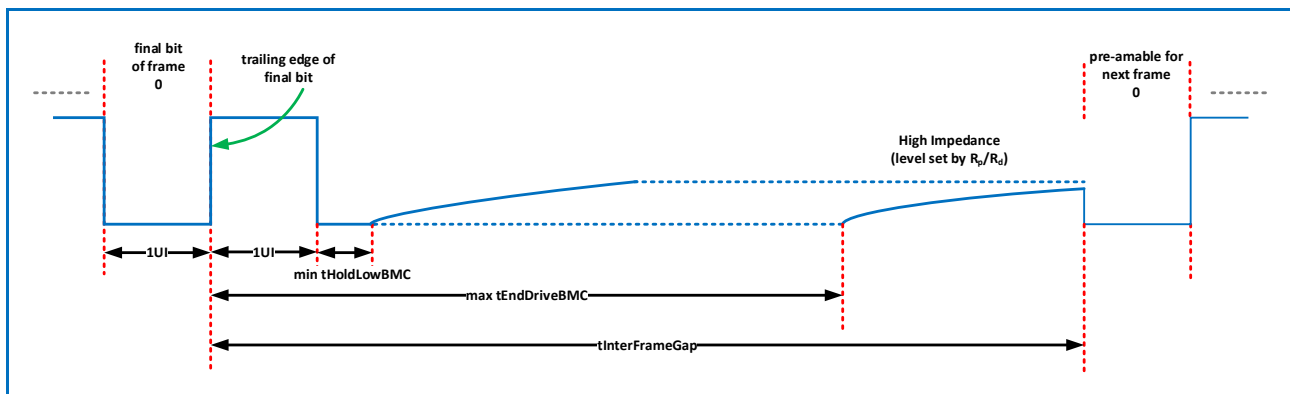


If the trailing edge results in the transmitter driving CC high (i.e., the final half-UI of the frame is low), then the transmitter:

- **Shall** continue to drive CC high for 1 UI.
- Then **Shall** drive CC low for $t_{HoldLowBMC}$.
- Then **Shall** continue to drive CC low for $t_{EndDriveBMC}$ measured from the final edge of the final bit of the Frame.
- Then **Shall** release CC to high impedance.

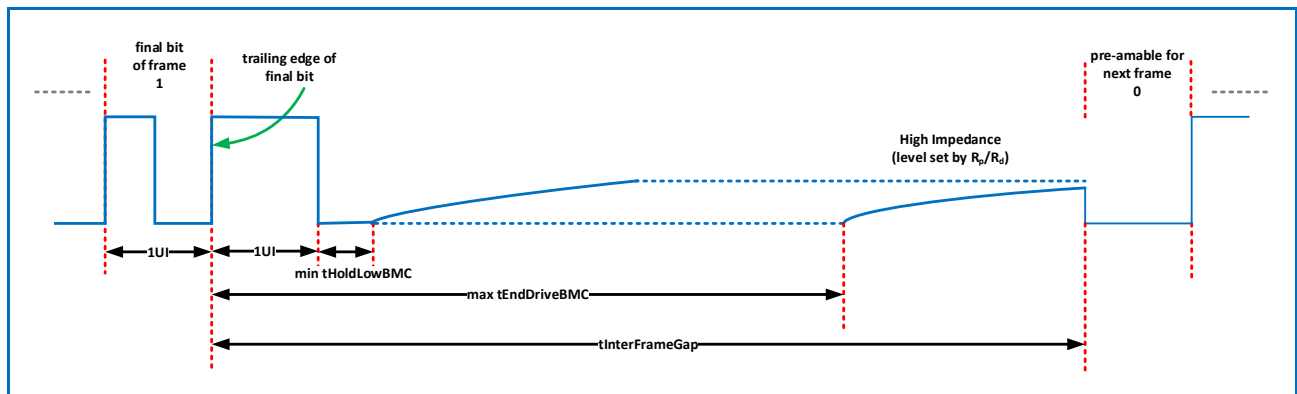
Figure 5-3 “Transmitting or Receiving BMC Encoded Frame Terminated by Zero with Low to High Last Transition” illustrates the ending of a BMC encoded Frame that ends with an encoded zero for which the final bit of the Frame is terminated by a low to high transition. Figure 5-4 “Transmitting or Receiving BMC Encoded Frame Terminated by One with Low to High Last Transition” illustrates the ending of a BMC encoded Frame that ends with an encoded one for which the final bit of the Frame is terminated by a low to high transition. Both figures also illustrate the $t_{InterFrameGap}$ timing requirement before the start of the next Frame when the Port has either been transmitting or receiving the previous Frame (see Section 5.8.5.4 “Error! Reference source not found.”).

Figure 5-3 “Transmitting or Receiving BMC Encoded Frame Terminated by Zero with Low to High Last Transition”



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Figure 5-4 “Transmitting or Receiving BMC Encoded Frame Terminated by One with Low to High Last Transition”



Note: There is no requirement to maintain a timing phase relationship between back-to-back packets.

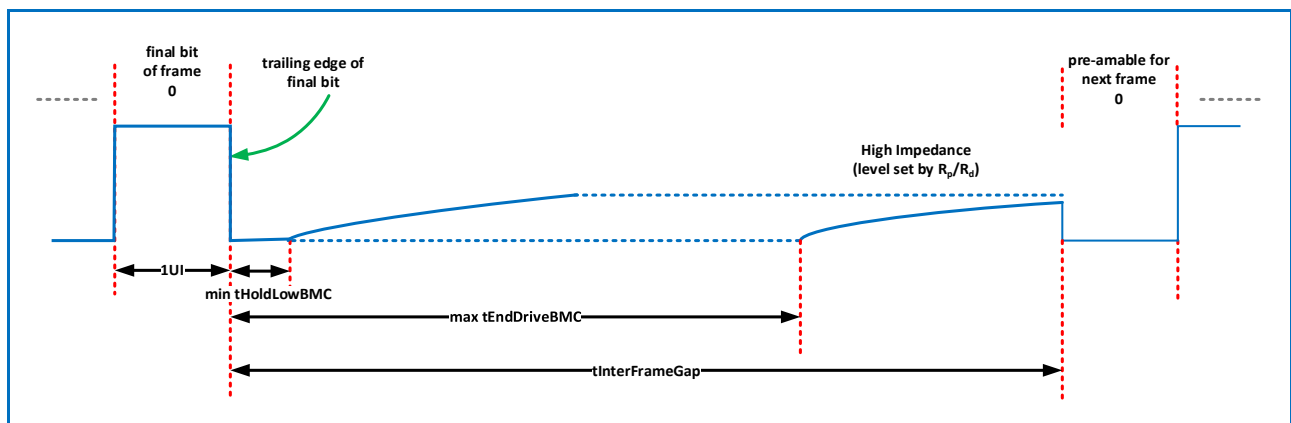
To Text:

The transmitter **Shall** terminate the final bit of the Frame by an edge (the “trailing edge”) to help ensure that the receiver clocks the final bit. If the trailing edge results in the transmitter driving CC low (i.e., the final half-UI of the frame is high [see figures 5.11 and 5.12](#)), then the transmitter:

- **Shall** continue to drive CC low for min ***tHoldLowBMC***.
- **Should** release CC to high impedance as soon as possible after min ***tHoldLowBMC*** and **Shall** release CC by max ***tEndDriveBMC***.

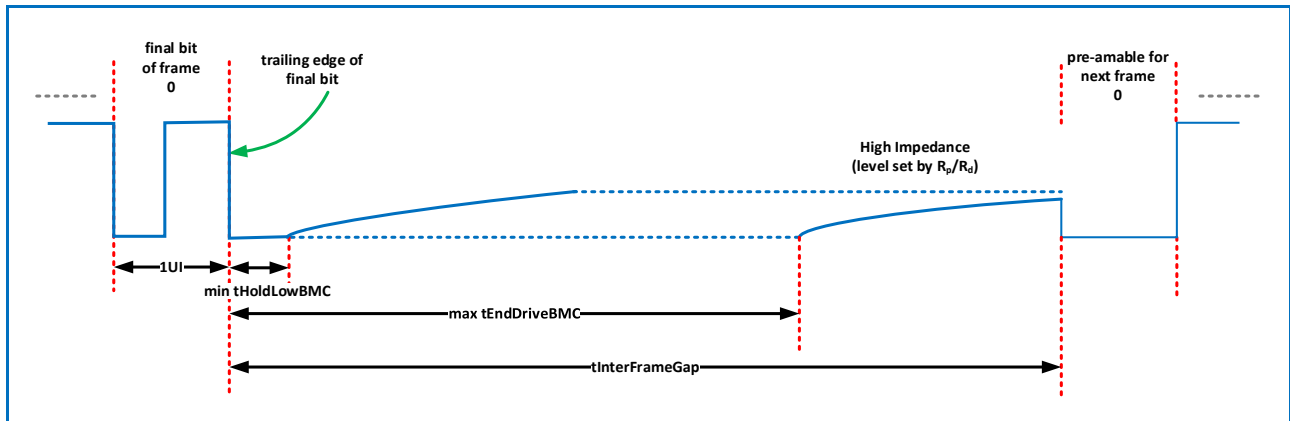
Figure 5-1 “Transmitting or Receiving BMC Encoded Frame Terminated by Zero with High-to-Low Last Transition” illustrates the end of a BMC encoded Frame with an encoded zero for which the final bit of the Frame is terminated by a high to low transition. **Figure 5-2 “Transmitting or Receiving BMC Encoded Frame Terminated by One with High-to-Low Last Transition”** illustrates the end of a BMC Encoded frame with an encoded one for which the final bit of the Frame is terminated by a high to low transition. Both figures also illustrate the ***tInterFrameGap*** timing requirement before the start of the next Frame when the Port has either been transmitting or receiving the previous Frame (see [Section 5.8.5.4 “Error! Reference source not found.”](#)).

Figure 5-5 “Transmitting or Receiving BMC Encoded Frame Terminated by Zero with High-to-Low Last Transition”



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Figure 5-6 “Transmitting or Receiving BMC Encoded Frame Terminated by One with High-to-Low Last Transition”

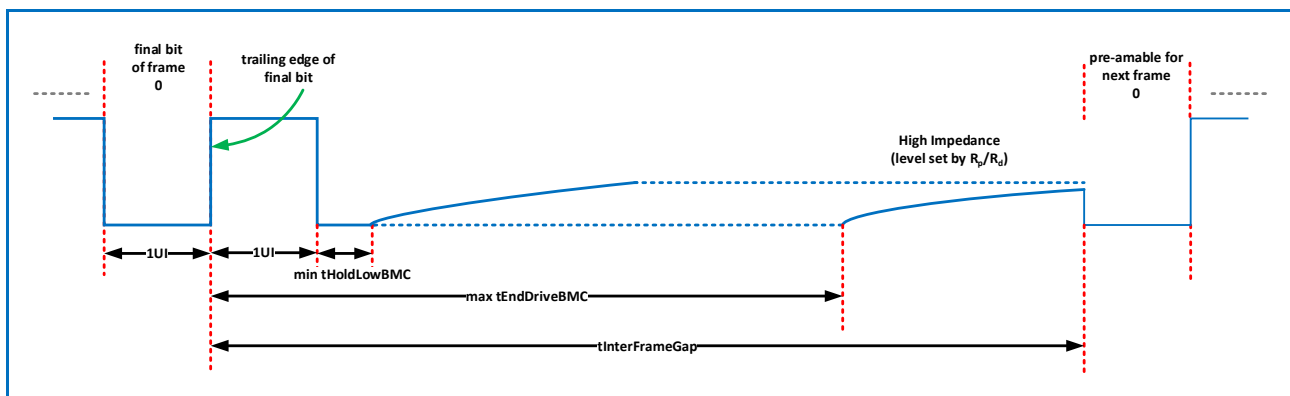


If the trailing edge results in the transmitter driving CC high (i.e., the final half-UI of the frame is low see figure 5.13 and 5.14), then the transmitter:

- **Shall** continue to drive CC high for 1 UI.
- o Then Shall drive CC low for $\min t_{HoldLowBMC}$.
- **Should** release CC to high impedance as soon as possible after $\min t_{HoldLowBMC}$ and **Shall** release CC by $\max t_{EndDriveBMC}$.

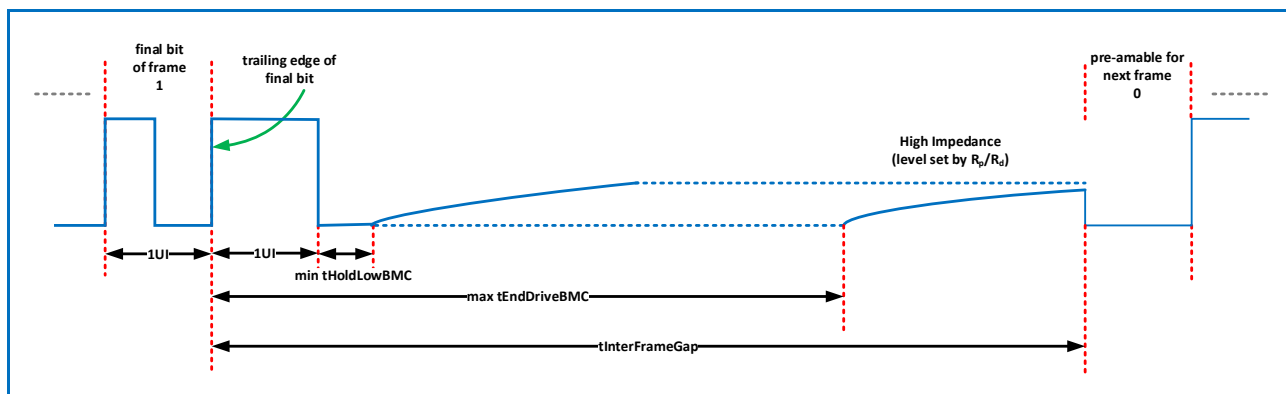
Figure 5-3 “Transmitting or Receiving BMC Encoded Frame Terminated by Zero with Low to High Last Transition” illustrates the ending of a BMC encoded Frame that ends with an encoded zero for which the final bit of the Frame is terminated by a low to high transition. Figure 5-4 “Transmitting or Receiving BMC Encoded Frame Terminated by One with Low to High Last Transition” illustrates the ending of a BMC encoded Frame that ends with an encoded one for which the final bit of the Frame is terminated by a low to high transition. Both figures also illustrate the $t_{InterFrameGap}$ timing requirement before the start of the next Frame when the Port has either been transmitting or receiving the previous Frame (see Section 5.8.5.4 “Error! Reference source not found.”).

Figure 5-7 “Transmitting or Receiving BMC Encoded Frame Terminated by Zero with Low to High Last Transition”



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Figure 5-8 “Transmitting or Receiving BMC Encoded Frame Terminated by One with Low to High Last Transition”



Note: There is no requirement to maintain a timing phase relationship between back-to-back packets.