

USB4 1.0 ENGINEERING CHANGE NOTICE FORM

Title: Error Cases and Recovery
Applied to: USB4 Specification Version 1.0

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| Brief description of the functional changes: |
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| Add the requirement for the adapter's action when link errors are detected during the CLx exit flow. |
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| Benefits as a result of the changes: |
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| Increase clarity and improve interoperability. |
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| An assessment of the impact to the existing revision and systems that currently conform to the USB specification: |
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| Need to verify that Routers can comply, if not a waiver will be given and an interoperability solution should be implemented. |
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| An analysis of the hardware implications: |
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| Routers may implement the new requirements. |
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| An analysis of the software implications: |
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| None |
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| An analysis of the compliance testing implications: |
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| Waivers will be given for implementations that followed the spec before the change. |
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Actual Change

(a). Table 4-66. Error cases and impact on Logical Layer

From Text:

Table 4-66. Error Cases and Impact on Logical Layer

| Error | Event | Response | Reporting |
|----------------------------|---|---|---|
| Alignment Lock Error (ALE) | Adapter received N number of Symbols in a row with illegal Sync Bits values, where N is a number between 1 and 8 (inclusive) that is chosen by the implementation. | Go to Training.LOCK1 sub-state. | <p>An Adapter shall set the <i>ALE</i> bit in the <i>Logical Layer Errors</i> field to 1b.</p> <p>If the <i>ALE</i> bit in the <i>Logical Layer Errors Enable</i> field is 1b, the Router shall send a Notification Packet with Event Code = ERR_LINK to the Connection Manager (see Section 6.5).</p> <p>If the <i>ALE</i> bit in the <i>Logical Layer Errors Enable</i> field is 0b, the Router shall not send a Notification Packet.</p> |
| Order Set Error (OSE) | <p>Gen 2/3 – Adapter received 2 back-to-back Symbols that contain an Ordered Set that is not defined in this specification and/or have an uncorrectable error in the <i>SCR</i> field.</p> <p>Gen 4 – Control Symbols received in a way that doesn't match any Ordered Set.</p> | Gen 2/3 – Go to Training.LOCK1 sub-state. | <p>An Adapter shall set the <i>OSE</i> bit in the <i>Logical Layer Errors</i> field to 1b.</p> <p>If the <i>OSE</i> bit in the <i>Logical Layer Errors Enable</i> field is 1b, the Router shall send a Notification Packet with Event Code = ERR_LINK to the Connection Manager (see Section 6.5).</p> <p>If the <i>OSE</i> bit in the <i>Logical Layer Errors Enable</i> field is 0b,</p> |

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| | | | the Router shall not send a Notification Packet. |
| Timeout Error (TE) | Adapter entered Training state from either CL0, CL1, or CL2 state and did not transition to CL0 state within tTrainingError after sending the first SLOS1 (in Gen 2/3) or Gen 4 TS1 (in Gen 4). | Gen 2/3 – Go to Training.LOCK1 sub-state. Gen 4 – Initiate Gen 4 Link Recovery (see Section 4.4.7). | <p>An Adapter shall set the <i>TE</i> bit in the <i>Logical Layer Errors</i> field to 1b.</p> <p>If the <i>TE</i> bit in the <i>Logical Layer Errors Enable</i> field is 1b, the Router shall send a Notification Packet with Event Code = ERR_LINK to the Connection Manager (see Section 6.5).</p> <p>If the <i>TE</i> bit in the <i>Logical Layer Errors Enable</i> field is 0b, the Router shall not send a Notification Packet.</p> |

To Text:

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Table 4-66. Error Cases and Impact on Logical Layer

| Error | Event | Response | Reporting |
|----------------------------|---|---|--|
| Alignment Lock Error (ALE) | Adapter received N number of Symbols in a row with illegal Sync Bits values, where N is a number between 1 and 8 (inclusive) that is chosen by the implementation. | Go to Training.LOCK1 sub-state. During Gen 2 and Gen 3 CLx exit when re-timers are present on the link, an adapter may continue to lock on CL_WAKE1.X till tTrainingAbort2 timeout. See Section 4.2.1.6.5.3. | An Adapter shall set the ALE bit in the Logical Layer Errors field to 1b. If the ALE bit in the Logical Layer Errors Enable field is 1b, the Router shall send a Notification Packet with Event Code = ERR_LINK to the Connection Manager (see Section 6.5). If the ALE bit in the Logical Layer Errors Enable field is 0b, the Router shall not send a Notification Packet. |
| Order Set Error (OSE) | Gen 2/3 – Adapter received 2 back-to-back Symbols that contain an Ordered Set that is not defined in this specification and/or have an uncorrectable error in the SCR field. Gen 4 – Control Symbols received in a way that doesn't match any Ordered Set. | Gen 2/3 – Go to Training.LOCK1 sub-state. During Gen 2 and Gen 3 CLx exit when re-timers are present on the link, an adapter may continue to lock on CL_WAKE1.X till tTrainingAbort2 timeout. See Section 4.2.1.6.5.3. | An Adapter shall set the OSE bit in the Logical Layer Errors field to 1b. If the OSE bit in the Logical Layer Errors Enable field is 1b, the Router shall send a Notification Packet with Event Code = ERR_LINK to the Connection Manager (see Section 6.5). If the OSE bit in the Logical Layer Errors Enable field is 0b, the Router shall not send a Notification Packet. |
| Timeout Error (TE) | Adapter entered Training state from either CL0, CL1, or CL2 state and did not transition to CL0 state within tTrainingError after sending the first SLOS1 (in Gen 2/3) or Gen 4 TS1 (in Gen 4). | Gen 2/3 – Go to Training.LOCK1 sub-state. Gen 4 – Initiate Gen 4 Link Recovery (see Section 4.4.7). | An Adapter shall set the TE bit in the Logical Layer Errors field to 1b. If the TE bit in the Logical Layer Errors Enable field is 1b, the Router shall send a Notification Packet with Event Code = ERR_LINK to the Connection Manager (see Section 6.5). If the TE bit in the Logical Layer Errors Enable field is 0b, the |

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| | | | Router shall not send a Notification Packet. |
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