USB Power Delivery ENGINEERING CHANGE NOTICE

Title: Timer Descriptions Corrections
Applied to: USB Power Delivery Specification Revision 3.1 Version 1.5

Brief description of the functional changes proposed:

Improves error recovery in Data Reset State Machines to resolve the issues described below:

Figures 8-139 and 8-140 specify Data Reset procedures. In the case of a failure, tDataResetFail specifies when the failure should be assumed to have occurred and when error recovery should take place. However tDataResetFail has no upper limit, so there is no guarantee that error recovery will *ever* occur.

In Figure 8-139 UFP Data_Reset Message State Diagram at the end in PE_UDR_Wait_For_Data_Reset_Complete, the UFP is waiting for a Data_Reset_Complete message, but currently has no timer running as it is depending on the other port to fix an issue caused by that other port.

Benefits as a result of the proposed changes:

Allow autonomous error recovery for DFP and UFP

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:

They should do error recovery better.

An analysis of the hardware implications:

Should be none.

An analysis of the software implications:

Requires small corrections.

An analysis of the compliance testing implications:

Would allow testing which is currently not possible.

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Actual Change Requested

(a). Section 6.6.10.4 Page 222

New Text:

6.6.10.4 DataResetFailUFPTimer

The ***DataResetFailUFPTimer Shall*** be used by the UFP's Policy Engine to ensure the Data Reset process completes within ***tDataResetFailUFP*** of the last bit of the ***GoodCRC*** acknowledging the ***Accept*** Message in response to the ***Data_Reset*** Message. If the UFP's ***DataResetFailUFPTimer*** expires, the UFP ***Shall*** enter the ***ErrorRecovery*** State.

(b). Section 6.6.22 Page 229, Table 6-68

From Text:

tDataResetFail	300			ms	Section 6.6.10.3

To Text:

tDataResetFail	300		400	ms	Section 6.6.10.3
tDataResetFailUFP	450		550	ms	Section 6.6.10.4

(c). Section 6.6.22 Page 230, Table 6-69

New Text:

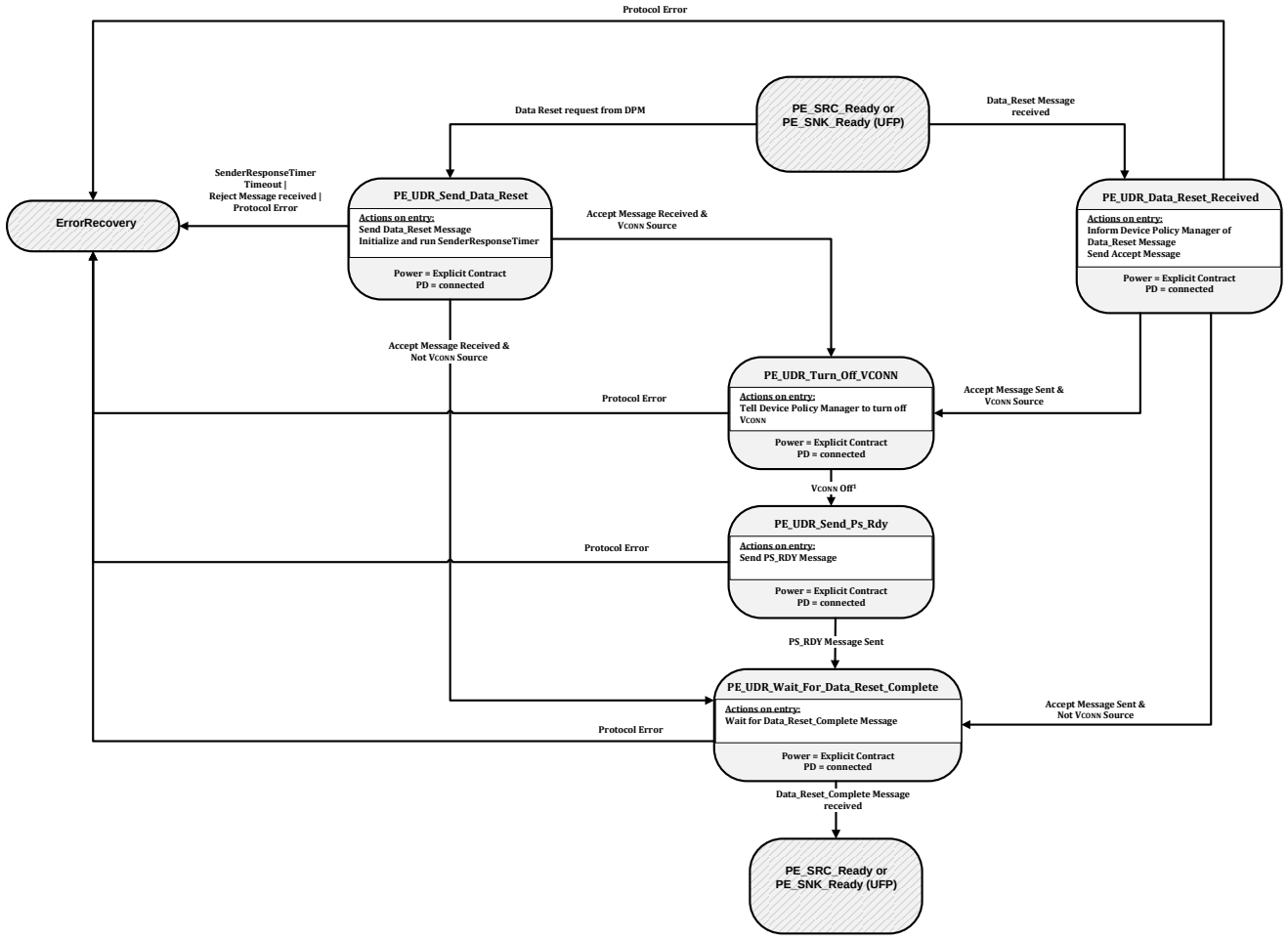
DataResetFailUFPTimer	*tDataResetFailUFP*	Policy Engine	Section 6.6.10.4

(d). Section 8.3.3.5.2 Page 700

From Text:

Figure 8-89 shows the state diagram for a ***Data_Reset*** Message sent or received by a UFP.

Figure 8-139 UFP Data_Reset Message State Diagram



[1] VCONN ***Shall*** be fully discharged see Section 7.1.15.

8.3.3.5.2.1 PE_UDR_Send_Data_Reset State

The ***PE_UDR_Send_Data_Reset*** State ***Shall*** be entered from the ***PE_SRC_Ready*** or ***PE_SNK_Ready*** State when requested by the Device Policy Manager.

On entry to the ***PE_UDR_Send_Data_Reset*** State the Policy Engine ***Shall*** request the Protocol Layer to send a ***Data_Reset*** Message and then initialize and start the ***SenderResponseTimer***.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Turn_Off_VCONN*** State when:

- An ***Accept*** Message has been received and
- The UFP is presently the VCONN Source.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Wait_For_Data_Reset_Complete*** State when:

- An ***Accept*** Message has been received and
- The UFP is not presently the VCONN Source.

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:

- The ***SenderResponseTimer*** has timed out or
- A ***Reject*** Message has been received or
- A Protocol Error occurs.

8.3.3.5.2.2 PE_UDR_Data_Reset_Received State

The ***PE_UDR_Data_Reset_Received*** State ***Shall*** be entered from either the ***PE_SRC_Ready*** or ***PE_SNK_Ready*** State when a ***Data_Reset*** Message is received.

On entry to the ***PE_UDR_Data_Reset_Received*** State the Policy Engine ***Shall*** inform the Device Policy Manager and then ***Shall*** send an ***Accept*** Message.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Turn_Off_VCONN*** State when:

- An ***Accept*** Message has been sent and
- The UFP is presently the VCONN Source.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Wait_For_Data_Reset_Complete*** State when:

- An ***Accept*** Message has been sent and
- The UFP is not presently the VCONN Source.

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:

- A Protocol Error occurs.

8.3.3.5.2.3 PE_UDR_Turn_Off_VCONN State

On entry to the ***PE_UDR_Turn_Off_VCONN*** State the Policy Engine ***Shall*** request the Device Policy Manager to turn off VCONN.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Send_Ps_Rdy*** State when:

- The DPM indicates that VCONN has been turned off (VCONN below vRaReconnect see ***[USB Type-C 2.1]***).

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:

- A Protocol Error occurs.

8.3.3.5.2.4 PE_UDR_Send_Ps_Rdy State

On entry to the ***PE_UDR_Send_Ps_Rdy*** State the Policy Engine ***Shall*** send a ***PS_RDY*** Message.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Wait_For_Data_Reset_Complete*** State when:

- The ***PS_RDY*** Message has been sent.

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:

- A Protocol Error occurs.

8.3.3.5.2.5 PE_UDR_Wait_For_Data_Reset_Complete State

On entry to the ***PE_UDR_Wait_For_Data_Reset_Complete*** State the Policy Engine ***Shall*** wait for the ***Data_Reset_Complete*** Message.

The Policy Engine ***Shall*** transition back to either the ***PE_SRC_Ready*** or ***PE_SNK_Ready*** State depending on the UFP's Power Role when:

- The ***Data_Reset_Complete*** Message is received.

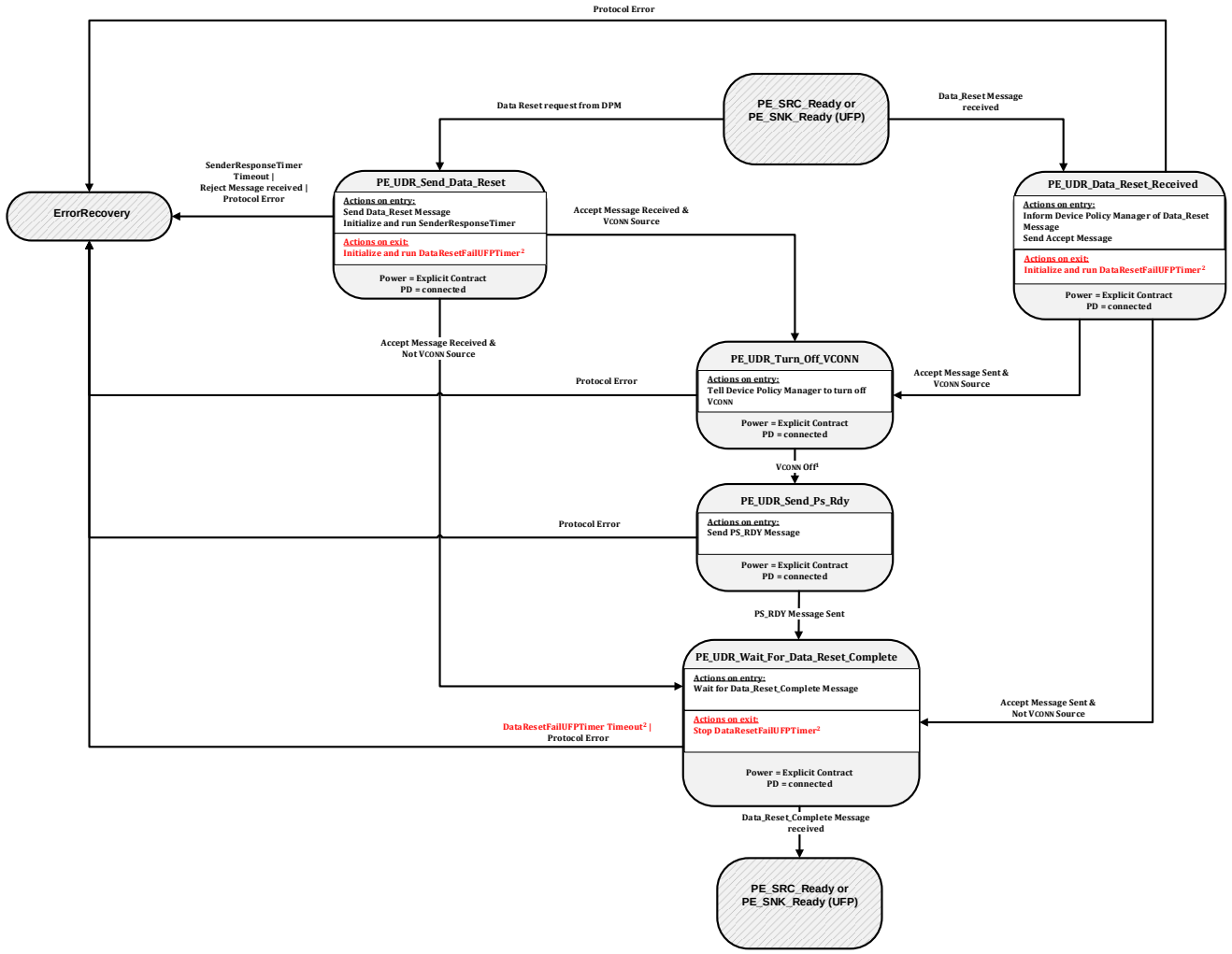
The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:

- A Protocol Error occurs.

To Text:

Figure 8-89 shows the state diagram for a ***Data_Reset*** Message sent or received by a UFP.

Figure 8-139 UFP Data_Reset Message State Diagram



[1] VCONN ***Shall*** be fully discharged see Section 7.1.15.

[2] Note that the ***DataResetFailUFPTimer Shall*** continue to run in every state until it is stopped or times out.

8.3.3.5.2.1 PE_UDR_Send_Data_Reset State

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On entry to the ***PE_UDR_Send_Data_Reset*** State the Policy Engine ***Shall*** request the Protocol Layer to send a ***Data_Reset*** Message and then initialize and run the ***SenderResponseTimer***.

On exit from the ***PE_UDR_Send_Data_Reset*** State the Policy Engine ***Shall*** initialize and run the ***DataResetFailUFPTimer***.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Turn_Off_VCONN*** State when:

- An ***Accept*** Message has been received and
- The UFP is presently the VCONN Source.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Wait_For_Data_Reset_Complete*** State when:

- An ***Accept*** Message has been received and
- The UFP is not presently the VCONN Source.

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:

- The ***SenderResponseTimer*** has timed out or
- A ***Reject*** Message has been received or
- A Protocol Error occurs.

8.3.3.5.2.2 PE_UDR_Data_Reset_Received State

The ***PE_UDR_Data_Reset_Received*** State ***Shall*** be entered from either the ***PE_SRC_Ready*** or ***PE_SNK_Ready*** State when a ***Data_Reset*** Message is received.

On entry to the ***PE_UDR_Data_Reset_Received*** State the Policy Engine ***Shall*** inform the Device Policy Manager and then ***Shall*** send an ***Accept*** Message.

On exit from the ***PE_UDR _Data_Reset_Received*** State the Policy Engine ***Shall*** initialize and run the ***DataResetFailUFPTimer***.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Turn_Off_VCONN*** State when:
- An ***Accept*** Message has been sent and
- The UFP is presently the VCONN Source.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Wait_For_Data_Reset_Complete*** State when:
- An ***Accept*** Message has been sent and
- The UFP is not presently the VCONN Source.

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:
- A Protocol Error occurs.

8.3.3.5.2.3 PE_UDR_Turn_Off_VCONN State

On entry to the ***PE_UDR_Turn_Off_VCONN*** State the Policy Engine ***Shall*** request the Device Policy Manager to turn off VCONN.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Send_Ps_Rdy*** State when:
- The DPM indicates that VCONN has been turned off (VCONN below vRaReconnect see ***[USB Type-C 2.1]***).

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:
- A Protocol Error occurs.

8.3.3.5.2.4 PE_UDR_Send_Ps_Rdy State

On entry to the ***PE_UDR_Send_Ps_Rdy*** State the Policy Engine ***Shall*** send a ***PS_RDY*** Message.

The Policy Engine ***Shall*** transition to the ***PE_UDR_Wait_For_Data_Reset_Complete*** State when:
- The ***PS_RDY*** Message has been sent.

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:
- A Protocol Error occurs.

8.3.3.5.2.5 PE_UDR_Wait_For_Data_Reset_Complete State

On entry to the ***PE_UDR_Wait_For_Data_Reset_Complete*** State the Policy Engine ***Shall*** wait for the ***Data_Reset_Complete*** Message.

On exit from the ***PE_UDR_Wait_For_Data_Reset_Complete*** State the Policy Engine ***Shall*** stop the ***DataResetFailUFPTimer***.

The Policy Engine ***Shall*** transition back to either the ***PE_SRC_Ready*** or ***PE_SNK_Ready*** State depending on the UFP's Power Role when:
- The ***Data_Reset_Complete*** Message is received.

The Policy Engine ***Shall*** transition to ***ErrorRecovery*** when:
- The ***DataResetFailUFPTimer*** times out or
- A Protocol Error occurs.