

USB PD CTS ENGINEERING CHANGE NOTICE FORM

NOTICE: Any Company or Companies submitting a USB Power Delivery ECN proposal must be one of the following: a Promoter or Contributor of the USB 3.0 and 2.0 Specifications who have completed the USB Power Delivery addendum. If a group of Companies is submitting an ECR proposal, each company must be either a Promoter or Contributor of the USB 3.0 and 2.0 Specifications who have completed the USB Power Delivery addendum.

SPECIFICATION REVISIONS AND ADDENDA: At any point in time, there shall only be one current version of the USB PD CTS, termed the production version. At the same time, there may also be proposed revisions to the specification's design which are not yet approved and shall be held confidential as deemed necessary by the USB 3.0 and USB 2.0 Promoters and within the Group of Working Committee(s).

PROCEDURES FOR SUBMITTING PROPOSALS: Both members of the USB Implementers Forum as a whole and members of the USB 3.0 and USB 2.0 Promoters may submit requests to revise the USB PD CTS Specification. Such a request may be rejected or may result in a USB PD Engineering Change Notice (ECN), which is the official way USB specifications may be changed.

FORMAT OF PROPOSAL: The originator of a request to alter the USB PD CTS Specification may do so by posting this to the USB Power Delivery Compliance working group for review. Once the proposal has been reviewed by the working group it will be passed to the USB 3.0 and 2.0 Promoters for approval to publish.

RESUBMISSION AND APPEAL: The originator of a request that was not approved can redraft the original request. Rewritten proposal will be treated as a new proposal and will be evaluated using the procedures described above. The originator of a request that was not approved can also submit an appeal to the USB 3.0 and 2.0 Promoters. The appeal must be made in writing and addressed to the Secretary of the USB Implementers Forum.

ABOUT THE ENGINEERING CHANGE REQUEST FORM:

The Purpose of this Engineering Change Request Form is to expedite the review process of the proposal by providing explanations, background information, and examples of the proposed changes at a high level. This form serves as an executive summary to the actual proposal.

STEPS ON HOW TO SUBMIT A USB PD ENGINEERING CHANGE REQUEST:

- 1) Please fill out the Engineering Change Request Form on the following pages completely:
 - a) Detail the names and contact details for each of the ECR contributors
 - b) Update the ECR Title
 - c) Give a minimum of 2-3 sentences for each description on the form outlining the background to the ECR
- 2) For each section/table/figure to be updated:
 - a) Detail the section number, starting page and figure/table number to be updated as appropriate.
 - b) Detail existing text under "From Text"
 - c) Detail changed text under "To Text"
- 3) Save the file as "USB PD CTS 1.0 R 1" followed by the ECR Title as per step 1)b)
- 4) Post the ECR in the USB PD CTS Documents section under "ECR | New ECRs".
 - a) This ECR will then be reviewed by the Power Delivery Compliance Working Group.
 - b) Revisions to the ECR originating from the review should be submitted as document revision of the original ECR using "Add new document".

USB PD CTS ENGINEERING CHANGE NOTICE FORM

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USB PD CTS ENGINEERING CHANGE NOTICE FORM

Title: xxxx

Applied to: USB PD CTS Specification Version 1.4 Revision 6

Brief description of the functional changes proposed:
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Change to be aligned with main PD specification v1.7 which allows source to discover cable prior to receive EPR_mode enter

Benefits as a result of the proposed changes:
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An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
--

An analysis of the hardware implications:
--

An analysis of the software implications:
--

An analysis of the compliance testing implications:
--

Tester SW needs to be change

An analysis of the Vendor Info File (VIF) implications:
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USB PD CTS ENGINEERING CHANGE NOTICE FORM

Actual Change Requested

(a). Section x.x.x, Page x, Figure/Table x-x

From Text:

TEST.PD.EPR.SRC3.2 EPR Entry Process - Tester as VCONN Source

Description: The Tester as a sink verifies the successful EPR negotiation when Tester acts as a VCONN source.

Test Specific Tester Behavior: Tester rejects the VCONN Swap message initiated by UUT unless mentioned in the test procedure

Test Conditions:

This test is not applicable if the VIF parameter EPR_Supported_As_Src is set to No or if the Captive_Cable field in the VIF is set to Yes

	Consumer Only	Provider Only	DRP, C/P, P/C
Rev3ChkdSrc		✓	✓
Rev3UnchkdSrc		✓	✓

Test Procedures:

- There are 2 possible bring-up procedures:
 - The UUT has VIF field PD_Port_Type set to Provider Only, Provider/Consumer or DRP, the Tester behaves as a Sink Only and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.1
 - The UUT has VIF field PD_Port_Type set to Consumer/Provider, the Tester behaves as a Provider/Consumer, and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.7
- The Tester sends a *VCONN_Swap* message.
- The Tester checks the *Accept* Message response from the UUT. [TEST.PD.EPR.SRC3.2#2]
- The Tester sends a *PS_RDY* Message.
- The Tester checks that the UUT does not present VCONN at the non-CC line within *tVCONNSourceOff*. [TEST.PD.EPR.SRC3.2#3]
- Configure the Tester to accept the *VCONN_Swap* message and then Tester sends an *EPR_Mode* (Enter) Message with the Action field set to 0x01(Enter) and Data field set to 140 (140W)

USB PD CTS ENGINEERING CHANGE NOTICE FORM

7. The Tester checks that UUT responds *EPR_Mode* Message with the Action field set to 0x02(Enter Acknowledged) and Data field set to 0x0, otherwise the check fails and stops here
[TEST.PD.EPR.SRC3.2#4]
8. The Tester checks that UUT sends a *VCONN_Swap* message [TEST.PD.EPR.SRC3.2#5], else the check fails, and test stops here
9. The Tester checks that UUT completes the Vconn swap sequence using COMMON.PROC.PD.6
10. If a SOP' *Discover Identity* Command is received from the UUT, the Tester replies as Passive Cable with V_{BUS} Current Handling Capability set to 10b(5A), Maximum V_{BUS} Voltage set to 11b(50V) and EPR Mode Capable field set to 1b (EPR Mode Capable)
11. The check fails if the UUT does not send a SOP' *Discover Identity* Command. [TEST.PD.EPR.SRC3.2#6]
12. Tester checks that UUT completes the EPR entry process by sending *EPR_Mode* Message with Action field set to 0x03(Enter_Succeeded) and Data field set to 0x0 within tEnterEPR (500ms), this timing is measured from the last bit of the *GoodCRC* in response to the *EPR_Mode* (Enter) Message to the last bit of the *EPR_Mode* (Enter_Succeeded) Message [TEST.PD.EPR.SRC3.2#7]

To Text:

TEST.PD.EPR.SRC3.2 EPR Entry Process - Tester as VCONN Source

Description: The Tester as a sink verifies the successful EPR negotiation when Tester acts as a VCONN source.

Test Specific Tester Behavior: Tester rejects the VCONN Swap message initiated by UUT unless mentioned in the test procedure

Test Conditions:

This test is not applicable if the VIF parameter EPR_Supported_As_Src is set to No or if the Captive_Cable field in the VIF is set to Yes

	Consumer Only	Provider Only	DRP, C/P, P/C
Rev3ChkdSrc		✓	✓
Rev3UnchkdSrc		✓	✓

Test Procedures:

1. There are 2 possible bring-up procedures:
 - c. The UUT has VIF field PD_Port_Type set to Provider Only, Provider/Consumer or DRP, the Tester behaves as a Sink Only and it runs bring-up procedure with the UUT as a Source
COMMON.PROC.BU.1

USB PD CTS ENGINEERING CHANGE NOTICE FORM

- d. The UUT has VIF field PD_Port_Type set to Consumer/Provider, the Tester behaves as a Provider/Consumer, and it runs bring-up procedure with the UUT as a Source
COMMON.PROC.BU.7
2. The Tester sends a *VCONN_Swap* message.
3. The Tester checks the *Accept* Message response from the UUT. [TEST.PD.EPR.SRC3.2#2]
4. The Tester sends a *PS_RDY* Message.
5. The Tester checks that the UUT does not present VCONN at the non-CC line within *tVCONNSourceOff*.
[TEST.PD.EPR.SRC3.2#3]
6. Configure the Tester to accept the *VCONN_Swap* message and then Tester sends an *EPR_Mode* (Enter) Message with the Action field set to 0x01(Enter) and Data field set to 140 (140W)
7. The Tester checks that UUT responds *EPR_Mode* Message with the Action field set to 0x02(Enter Acknowledged) and Data field set to 0x0, otherwise the check fails and stops here
[TEST.PD.EPR.SRC3.2#4]
8. If UUT sends a *VCONN_Swap* message within *tEPRSourceCableDiscovery* then go to step 10
9. If UUT has already sent SOP' *Discover Identity* Command it goes to step 13 [TEST.PD.EPR.SRC3.2#5]
otherwise check fails, and test stops here
10. The Tester checks that UUT completes the Vconn swap sequence using COMMON.PROC.PD.6
11. If a SOP' *Discover Identity* Command is received from the UUT, the Tester replies as Passive Cable with V_{BUS} Current Handling Capability set to 10b(5A), Maximum V_{BUS} Voltage set to 11b(50V) and EPR Mode Capable field set to 1b (EPR Mode Capable)
12. The check fails if the UUT does not send a SOP' *Discover Identity* Command. [TEST.PD.EPR.SRC3.2#6]
13. Tester checks that UUT completes the EPR entry process by sending *EPR_Mode* Message with Action field set to 0x03(Enter_Succeeded) and Data field set to 0x0 within *tEnterEPR* (500ms), this timing is measured from the last bit of the *GoodCRC* in response to the *EPR_Mode* (Enter) Message to the last bit of the *EPR_Mode* (Enter_Succeeded) Message [TEST.PD.EPR.SRC3.2#7]

USB PD CTS ENGINEERING CHANGE NOTICE FORM

From Text:

TEST.PD.EPR.SRC3.4 EPR Entry failed – Tester as VCONN source

Description: The Tester as a sink, verifies the UUT fails the EPR entry process while Tester is acting as the VCONN source.

Test Specific Tester Behavior:

Test Conditions:

This test is not applicable if the VIF parameter EPR_Supported_As_Src is set to No or if the or Captive_Cable field in the VIF is set to Yes

	Consumer Only	Provider Only	DRP, C/P, P/C
Rev3ChkdSrc		✓	✓

Test Procedures:

- There are 2 possible bring-up procedures:
 - The UUT has VIF field PD_Port_Type set to Provider Only, Provider/Consumer or DRP, the Tester behaves as a Sink Only and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.1 (set EPR mode bit in RDO to 1).
 - The UUT has VIF field PD_Port_Type set to Consumer/Provider, the Tester behaves as a Provider/Consumer, and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.7
- The Tester sends a *VCONN_Swap* message.
- The Tester checks the *Accept* Message response from the UUT. [TEST.PD.EPR.SRC3.4#2]
- The Tester sends a *PS_RDY* Message.
- The Tester checks that the UUT does not present VCONN at the non-CC line within tvCONNSourceOff. [TEST.PD.EPR.SRC3.4#3]
- Tester sends an *EPR_Mode* (Enter) Message with the Action field set to 0x01(Enter) and Data field set to 140 (140W)
- The Tester checks that UUT responds *EPR_Mode* Message with the Action field set to 0x02(Enter Acknowledged) and Data field set to 0x0, otherwise the check fails and stops here [TEST.PD.EPR.SRC3.4#4]

USB PD CTS ENGINEERING CHANGE NOTICE FORM

8. The Tester checks that UUT sends a *VCONN_Swap* message [TEST.PD.EPR.SRC3.4#5], else the check fails, and test stops here
9. If the UUT initiates the *VCONN_Swap* Message, Tester responds with *Reject* Message
10. Tester checks that the UUT sends *EPR_Mode* with Action field set to 0x4(Enter Failed) and Data field set to 0x02(Source failed to become VCONN source). [TEST.PD.EPR.SRC3.4#6]
11. If the EPR entry process does not exit within *tEnterEPR*(500ms) (this timing is measured from the last bit of the *GoodCRC* in response to the *EPR_Mode* (Enter) Message to the last bit of the *EPR_Mode* (Enter_Failed) Message), the check fails [TEST.PD.EPR.SRC3.4#7]

To Text:

TEST.PD.EPR.SRC3.4 EPR Entry failed – Tester as VCONN source

Description: The Tester as a sink, verifies the UUT fails the EPR entry process while Tester is acting as the VCONN source.

Test Specific Tester Behavior:

Test Conditions:

This test is not applicable if the VIF parameter *EPR_Supported_As_Src* is set to No or if the or *Captive_Cable* field in the VIF is set to Yes

	Consumer Only	Provider Only	DRP, C/P, P/C
Rev3ChkdSrc		✓	✓

Test Procedures:

1. There are 2 possible bring-up procedures:
 - c. The UUT has VIF field *PD_Port_Type* set to Provider Only, Provider/Consumer or DRP, the Tester behaves as a Sink Only and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.1 (set EPR mode bit in RDO to 1).
 - d. The UUT has VIF field *PD_Port_Type* set to Consumer/Provider, the Tester behaves as a Provider/Consumer, and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.7
2. The Tester sends a *VCONN_Swap* message.
3. The Tester checks the *Accept* Message response from the UUT. [TEST.PD.EPR.SRC3.4#2]
4. The Tester sends a *PS_RDY* Message.

USB PD CTS ENGINEERING CHANGE NOTICE FORM

5. The Tester checks that the UUT does not present VCONN at the non-CC line within tvCONNSourceOff.
[TEST.PD.EPR.SRC3.4#3]
6. Tester sends an *EPR_Mode* (Enter) Message with the Action field set to 0x01(Enter) and Data field set to 140 (140W)
7. The Tester checks that UUT responds *EPR_Mode* Message with the Action field set to 0x02(Enter Acknowledged) and Data field set to 0x0, otherwise the check fails and stops here
[TEST.PD.EPR.SRC3.4#4]
8. if UUT sends a *VCONN_Swap* message [TEST.PD.EPR.SRC3.4#5] within *tEPRSourceCableDiscovery* then go to step 10
9. if UUT has already sent SOP' *Discover Identity* Command, the check pass and test stops here
[TEST.PD.EPR.SRC3.4#8] otherwise check fails, and test stops here
10. If the UUT initiates the *VCONN_Swap* Message, Tester responds with *Reject* Message
11. Tester checks that the UUT sends *EPR_Mode* with Action field set to 0x4(Enter Failed) and Data field set to 0x02(Source failed to become VCONN source). [TEST.PD.EPR.SRC3.4#6]
12. If the EPR entry process does not exit within *tEnterEPR*(500ms) (this timing is measured from the last bit of the *GoodCRC* in response to the *EPR_Mode* (Enter) Message to the last bit of the *EPR_Mode* (Enter_Failed) Message), the check fails [TEST.PD.EPR.SRC3.4#7]

From Text:

TEST.PD.EPR.SRC3.6 EPR Entry Failed - Cable not EPR capable

Description: As a Sink, the Tester emulates as a non EPR cable and verifies the UUT fails the EPR entry process

Test Specific Tester Behavior:

Test Conditions:

This test is not applicable if the VIF parameter EPR_Supported_As_Src is set to No or Captive_Cable field is set to Yes

	Consumer Only	Provider Only	DRP, C/P, P/C
Rev3ChkdSrc		✓	✓

Test Procedures:

1. There are 2 possible bring-up procedures:

USB PD CTS ENGINEERING CHANGE NOTICE FORM

- a. The UUT has VIF field PD_Port_Type set to Provider Only, Provider/Consumer or DRP, the Tester behaves as a Sink Only and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.1.

If SOP' *Discover Identity* Command is received from the UUT during bring-up, the Tester replies as a Passive Cable with:
 - i. V_{BUS} Current Handling Capability set to 10b(5A),
 - ii. Maximum V_{BUS} Voltage set to 11b(50V)
 - iii. EPR Mode Capable field set to 0b (EPR Mode not Capable)
 - b. The UUT has VIF field PD_Port_Type set to Consumer/Provider, the Tester behaves as a Provider/Consumer, and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.7
2. The Tester sends an *EPR_Mode* (Enter) Message with the Action field set to 0x01(Enter) and Data field set to 140 (140W)
 3. The Tester checks that UUT responds *EPR_Mode* Message with the Action field set to 0x02(Enter Acknowledged) and Data field set to 0x0, otherwise the check fails and stops here [TEST.PD.EPR.SRC3.6#2]
 4. If a SOP' *Discover Identity* Command is received from the UUT, the Tester replies as a Passive Cable with
 - a. V_{BUS} Current Handling Capability set to 10b(5A),
 - b. Maximum V_{BUS} Voltage set to 11b(50V),
 - c. EPR Mode Capable field set to 0b (EPR Mode Not Capable)
 5. The check fails if the UUT does not send SOP' *Discover Identity* Command [TEST.PD.EPR.SRC3.6#3]
 6. The Tester checks that UUT responds *EPR_Mode* Message with the Action field set to 0x04(Enter Failed) and Data field set to 0x01(Cable not EPR capable). [TEST.PD.EPR.SRC3.6#4]
 7. If the EPR entry process does not exit within *tEnterEPR*(500ms) (this timing is measured from the last bit of the *GoodCRC* in response to the *EPR_Mode* (Enter) Message to the last bit of the *EPR_Mode* (Enter_Failed) Message), the check fails [TEST.PD.EPR.SRC3.6#5]
 8. Repeat this test by Tester emulating as a Passive Cable
 - a. V_{BUS} Current Handling Capability set to 10b(5A),
 - b. Maximum V_{BUS} Voltage set to 00b(20V),
 - c. EPR Mode Capable field set to 1b (EPR Mode Capable)
 9. Repeat this test by Tester emulating as a Passive Cable
 - a. V_{BUS} Current Handling Capability set to 01b(3A),
 - b. Maximum V_{BUS} Voltage set to 11b(50V),
 - c. EPR Mode Capable field set to 1b (EPR Mode Capable)

USB PD CTS ENGINEERING CHANGE NOTICE FORM

To Text:

TEST.PD.EPR.SRC3.6 EPR Entry Failed - Cable not EPR capable

Description: As a Sink, the Tester emulates as a non EPR cable and verifies the UUT fails the EPR entry process

Test Specific Tester Behavior:

Test Conditions:

This test is not applicable if the VIF parameter EPR_Supported_As_Src is set to No or Captive_Cable field is set to Yes

	Consumer Only	Provider Only	DRP, C/P, P/C
Rev3ChkdSrc		✓	✓

Cable field configurations:

1. Configuration 1:
 - a. VBUS Current Handling Capability set to 10b(5A),
 - b. Maximum VBUS Voltage set to 11b(50V),
 - c. EPR Mode Capable field set to 0b (EPR Mode Not Capable)
2. Configuration 2:
 - a. VBUS Current Handling Capability set to 10b(5A),
 - b. Maximum VBUS Voltage set to 00b(20V),
 - c. EPR Mode Capable field set to 1b (EPR Mode Capable)
3. Configuration 3:
 - a. VBUS Current Handling Capability set to 01b(3A),
 - b. Maximum VBUS Voltage set to 11b(50V),
 - c. EPR Mode Capable field set to 1b (EPR Mode Capable)

Test Procedures:

1. There are 2 possible bring-up procedures:
 - a. The UUT has VIF field PD_Port_Type set to Provider Only, Provider/Consumer or DRP, the Tester behaves as a Sink Only and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.1.

If SOP' *Discover Identity* Command is received from the UUT during bring-up, the Tester replies as a Passive Cable with the cable field configuration listed above (using the appropriate configuration).
 - b. The UUT has VIF field PD_Port_Type set to Consumer/Provider, the Tester behaves as a Provider/Consumer, and it runs bring-up procedure with the UUT as a Source COMMON.PROC.BU.7

USB PD CTS ENGINEERING CHANGE NOTICE FORM

2. The Tester sends an *EPR_Mode* (Enter) Message with the Action field set to 0x01(Enter) and Data field set to 140 (140W)
3. The Tester checks that UUT responds *EPR_Mode* Message with the Action field set to 0x02(Enter Acknowledged) and Data field set to 0x0, otherwise the check fails and stops here [TEST.PD.EPR.SRC3.6#2]
4. If a SOP' *Discover Identity* Command is received from the UUT, the Tester replies as a Passive Cable with the cable field configuration listed above (using the appropriate configuration).

Else: if a SOP' *Discover Identity* Command has been already received from the UUT go to step 6
5. The check fails if the UUT does not send SOP' *Discover Identity* Command [TEST.PD.EPR.SRC3.6#3]
6. The Tester checks that UUT responds *EPR_Mode* Message with the Action field set to 0x04(Enter Failed) and Data field set to 0x01(Cable not EPR capable). [TEST.PD.EPR.SRC3.6#4]
7. If the EPR entry process does not exit within *tEnterEPR*(500ms) (this timing is measured from the last bit of the *GoodCRC* in response to the *EPR_Mode* (Enter) Message to the last bit of the *EPR_Mode* (Enter_Failed) Message), the check fails [TEST.PD.EPR.SRC3.6#5]
8. The tester moves to disconnected state.
9. Repeat the test with the next cable field configuration listed above.