

# USB Power Delivery ENGINEERING CHANGE NOTICE

## Title: Specification Revision Interoperability

### Applied to: USB Power Delivery Specification Revision 3.0 Version 1.1

#### Brief description of the functional changes proposed:

The ECR allows communication with a cable when no Explicit Contract exists, which allows the first Source Capabilities Message to be consistent with the capabilities of the cable, also after a PR\_Swap.

The ECR adds text to clarify when the Specification Revision handshaking between Source and Sink ports shall take place.

A new requirement is introduced to require that all components of a device have the same revision between attach and detach.

#### Benefits as a result of the proposed changes:

**The following implementations may fail or not work as intended with the current rules in the specification:**

##### First example:

A device having a PD3 source and a PD2 sink merged into one.

If this port starts as a Source with a PD3 Sink, they will agree to speak in PD3, but after a PR\_Swap the new Sink can only speak PD2 and if there is no redetection of versions, this will not function.

*Resolution* - In this case an Error Recovery is now allowed to initiate a new detection of Revisions.

##### Second example:

A system consisting of a DRP (PD2), a Cable (PD3) and a DRP (PD3).

The PD2 DRP is the Source, so the ports speak PD2.

After a PR\_Swap, the new Source (PD3) wants to query the Cable in PD3 to get the information that is not available in PD2 versions of the Discover Identity Message (e.g. Max.Voltage) in order to use that information for the Capabilities Messages.

*Resolution* - Allowing the VCONN Source to communicate with the Cable at any Specification revision level while no explicit contract exist will now resolve this situation.

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

Few systems are ready, minor impact is expected.

The known existing systems have been considered and accommodated as far as known.

#### An analysis of the hardware implications:

None

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<b>An analysis of the software implications:</b>
Possible software modification to include Specification Revision handshaking after Hard Reset.

<b>An analysis of the compliance testing implications:</b>
Possible test case addition to confirm Specification Revision handshaking takes place after Hard Reset.
The testers have to accommodate a variation of possible Cable communication while no explicit contract exist.

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## Actual Change Requested

### . (a). Section 6.2.1.1.5, Page 98

#### From Text:

The *Specification Revision* field *Shall* be one of the following values (except 11b):

- 00b –Revision 1.0
- 01b –Revision 2.0
- 10b – Revision 3.0
- 11b – **Reserved, Shall Not** be used

To ensure interoperability with existing USBPD Products, USBPD Products *Shall* support every PD Specification Revision starting from *[USBPD 2.0]*.

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The *Specification Revision* field *Shall* apply to all SOP\* Packet types.

When the Source Port first communicates with the Sink Port the *Specification Revision* field *Shall* be used as described by the following steps:

1. The Source Port sends a *Source\_Capabilities* Message to the Sink Port setting the *Specification Revision* field to the highest Revision of the Power Delivery Specification the Source Port supports.
2. The Sink Port responds with a *Request* Message setting the *Specification Revision* field to the highest Revision of the Power Delivery Specification the Sink Port supports that is equal to or lower than the *Specification Revision* received from the Source Port.
3. The Source and Sink Ports *Shall* use the *Specification Revision* in the *Request* Message from the Sink in step 2 in all subsequent communications until they are Detached.

When a VCONN Source first communicates with a Cable Plug the *Specification Revision* field *Shall* be used as described by the following steps:

1. The VCONN Source sends a *Discover Identity* REQ to the Cable Plug (SOP') setting the *Specification Revision* field in the Message to the highest Revision of the Power Delivery Specification the VCONN Source supports. After a VCONN Swap the required *Soft\_Reset / Accept* message exchange is used for the same purpose (see Section 6.3.13).
2. The Cable Plug responds with a *Discover Identity* ACK setting the *Specification Revision* field in the Message to the highest Revision of the Power Delivery Specification the VCONN Source supports that is equal to or lower than the *Specification Revision* it received from the Source Port.
3. The Cable Plug and VCONN Source *Shall* communicate using the lower of the two revisions until an Explicit Contract has been established.
4. Table 6-2 shows the *Specification Revision* that *Shall* be used between the Port Partners and the Cable Plugs when the *Specification Revision* has been discovered and an Explicit Contract is in place.

Note: when a Cable Plug does not respond to a Revision 3.0 *Discover Identity* REQ with a *Discover Identity* ACK or BUSY the VCONN Source *May* repeat steps 1-4 using a Revision 2.0 *Discover Identity* REQ in step 1 before establishing that there is no Cable Plug to communicate with.

A VCONN Source that supports Revision 3.0 of the Power Delivery Specification *May* communicate with a Cable Plug also supporting Revision 3.0 using Revision 3.0 Compliant Communications regardless of the *Specification Revision* of its Port Partner until it enters an Explicit Contract. After the Explicit Contract has been established the Port Partners and Cable Plug(s) *Shall* use Table 6-2 to determine the Revision to be used.

All data in all Messages *Shall* be consistent with the *Specification Revision* field in the Message Header for that particular Message.

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A Cable Plug **Shall Not** save the state of the agreed **Specification Revision**. A Cable Plug **Shall** respond with the highest **Specification Revision** it supports that is equal to or lower than the **Specification Revision** contained in the Message received from the VCONN Source.

Cable Plugs **Shall** operate using the same Specification Revision for both SOP' and SOP''. Cable assemblies with two Cable Plugs **Shall** operate using the same Specification Revision for both Cable Plugs.

## To Text:

The **Specification Revision** field **Shall** be one of the following values (except 11b):

- 00b –Revision 1.0
- 01b –Revision 2.0
- 10b – Revision 3.0
- 11b – **Reserved, Shall Not** be used

To ensure interoperability with existing USBPD Products, USBPD Products **Shall** support every PD Specification Revision starting from **[USBPD 2.0]**.

After a physical or logical (Type-C Error Recovery) Attach, a Port discovers the common Specification Revision level between itself and its Port Partner and/or the Cable Plug(s), and uses this Specification Revision level until a Detach, Hard Reset or Error Recovery happens.

After detection of the Specification Revision to be used, all PD communications **Shall** comply with the relevant Revision of the PD specification.

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The **Specification Revision** field **Shall** apply to all SOP\* Packet types.

An Attach event or a Hard Reset **Shall** cause the detection of the applicable Specification Revision to be performed for both Ports and Cable Plugs according to the rules stated below:

When the Source Port first communicates with the Sink Port the **Specification Revision** field **Shall** be used as described by the following steps:

1. The Source Port sends a **Source\_Capabilities** Message to the Sink Port setting the **Specification Revision** field to the highest Revision of the Power Delivery Specification the Source Port supports.
2. The Sink Port responds with a **Request** Message setting the **Specification Revision** field to the highest Revision of the Power Delivery Specification the Sink Port supports that is equal to or lower than the **Specification Revision** received from the Source Port.
3. The Source and Sink Ports **Shall** use the **Specification Revision** in the **Request** Message from the Sink in step 2 in all subsequent communications until a Detach, Hard Reset or Error Recovery happens.

Prior to entering an explicit contract the VCONN Source **Shall** use the following steps to establish a Specification Revision level:

1. The VCONN Source sends a **Discover Identity** REQ to the Cable Plug (SOP') setting the **Specification Revision** field in the Message to the highest Revision of the Power Delivery Specification the VCONN Source supports. After a VCONN Swap the required **Soft\_Reset / Accept** message exchange is used for the same purpose (see Section 6.3.13).
2. The Cable Plug responds with a **Discover Identity** ACK setting the **Specification Revision** field in the Message to the highest Revision of the Power Delivery Specification the VCONN Source supports that is equal to or lower than the **Specification Revision** it received from the Source Port.
3. The Cable Plug and VCONN Source **Shall** communicate using the lower of the two revisions until an Explicit Contract has been established.
4. Table 6-2 shows the **Specification Revision** that **Shall** be used between the Port Partners and the Cable Plugs when the **Specification Revision** has been discovered and an Explicit Contract is in place.

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Notes:

- a) A VCONN Source that does not communicate with the Cable Plug(s) **May** skip the above procedure.
- b) When a Cable Plug does not respond to a Revision 3.0 **Discover Identity** REQ with a **Discover Identity** ACK or BUSY the VCONN Source **May** repeat steps 1-4 using a Revision 2.0 **Discover Identity** REQ in step 1 before establishing that there is no Cable Plug to communicate with.

A VCONN Source that supports Revision 3.0 of the Power Delivery Specification **May** communicate with a Cable Plug also supporting Revision 3.0 using Revision 3.0 Compliant Communications regardless of the **Specification Revision** of its Port Partner **while no Explicit Contract exists**. After an Explicit Contract has been established the Port Partners and Cable Plug(s) **Shall** use Table 6-2 to determine the Revision to be used.

All data in all Messages **Shall** be consistent with the **Specification Revision** field in the Message Header for that particular Message.

A Cable Plug **Shall Not** save the state of the agreed **Specification Revision**. A Cable Plug **Shall** respond with the highest **Specification Revision** it supports that is equal to or lower than the **Specification Revision** contained in the Message received from the VCONN Source.

Cable Plugs **Shall** operate using the same Specification Revision for both SOP' and SOP''. Cable assemblies with two Cable Plugs **Shall** operate using the same Specification Revision for both Cable Plugs.