

# USB Power Delivery ENGINEERING CHANGE NOTICE

**Title: Add VPD Product Type**

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

<b>Brief description of the functional changes proposed:</b>
Add features in support of Vconn Powered USB Devices (VPDs) recently added to the Newark Spec.

<b>Benefits as a result of the proposed changes:</b>
These features are required to support VPDs in the USB Type-C Specification.

<b>An assessment of the impact to the existing revision and systems that currently conform to the USB specification:</b>
None as these features are required only for systems that choose to support VPDs.

<b>An analysis of the hardware implications:</b>
Host system – None Device – Must minimally support PD and the DiscoverID message. See the related USB Type-C specification ECR for more detail

<b>An analysis of the software implications:</b>
Host – FW update to PD engine to recognize VPD devices and to take advantage of the feature. Device – Depends on implementation

<b>An analysis of the compliance testing implications:</b>
Device – verify device supports the Discover ID and returns the required information. Supplemental check that the series resistance indicated in the ID is correct.

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## Actual Change Requested

### (a). Section 1.6, Page 45, Table 1-1

#### From Text:

Term	Description
Active Cable	A cable with a USB Plug on each end at least one of which is a Cable Plug supporting SOP', that also incorporates data bus signal conditioning circuits. The cable supports the Structured VDM <i>Discover Identity</i> Command to determine its characteristics in addition to other Structured VDM Commands (Electronically Marked Cable see <a href="#">[USB Type-C 1.2]</a> ).
Active Mode	A Mode which has been entered and not exited.
Alternate Mode	As defined in <a href="#">[USB Type-C 1.2]</a> . Equivalent to Mode in the PD Specification.
Alternate Mode Adapter (AMA)	A PDUSB Device which supports Alternate Modes as defined in <a href="#">[USB Type-C 1.2]</a> . Note that since an AMA is a PDUSB Device it has a single UFP that is only addressable by SOP Packets.
Alternate Mode Controller (AMC)	A DFP that supports connection to AMAs as defined in <a href="#">[USB Type-C 1.2]</a> . A DFP that is an AMC can also be a PDUSB Host.
Augmented Power Data Object (APDO)	Data Object used to expose a Source Port's power capabilities or a Sink's power requirements as part of a <i>Source_Capabilities</i> or <i>Sink_Capabilities</i> Message respectively. Programmable Power Supply Data Object is defined.
Atomic Message Sequence (AMS)	A fixed sequence of Messages as defined in Section 8.3.2 typically starting and ending in one of the following states: <i>PE_SRC_Ready</i> , <i>PE_SNK_Ready</i> or <i>PE_CBL_Ready</i> . An AMS can be Interruptible or Non-interruptible.
Attach	Mechanical joining of the Port Pair by a cable.
Attached	USB Power Delivery ports which are mechanically joined with USB cable.
Battery	A power storage device residing behind a Port that can either be a source or sink of power.
Battery Supply	A power supply that directly applies the output of a Battery to V <sub>BUS</sub> . This is exposed by the Battery Supply PDO (see Section 6.4.1.2.4)
Binary Frequency Shift Keying (BFSK)	A Signaling Scheme now <i>Deprecated</i> in this specification. BFSK used a pair of discrete frequencies to transmit binary (0s and 1s) information over V <sub>BUS</sub> . See <a href="#">[USBPD 2.0]</a> for further details.
Biphase Mark Coding (BMC)	Modification of Manchester coding where each zero has one transition and a one has two transitions (see <a href="#">[IEC 60958-1]</a> ).
BIST	Built In Self-Test – Power Delivery testing mechanism for the PHY Layer.
BIST Data Object (BDO)	Data Object used by <i>BIST</i> Messages.
BIST Mode	A BIST receiver or transmitter test mode enabled by a <i>BIST</i> Message.
Cable Plug	Term used to describe a PD Capable element in a Multi-Drop system addressed by SOP'/SOP'' Packets. Logically the Cable Plug is associated with a USB plug at one end of the cable. In a practical implementation the electronics might reside anywhere in the cable.
Cable Reset	This is initiated by <i>Cable Reset</i> Signaling from the DFP. It restores the Cable Plugs to their default, power up condition and resets the PD communications engine to its default state. It does not reset the Port Partners but does restore V <sub>CONN</sub> to its Attachment state.
Chunk	A <i>MaxExtendedMsgChunkLen</i> (26 byte) or less portion of a Data Block. Data Blocks can be sent either as a single Message or as a series of Chunks.

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Term	Description
Chunking	The process of breaking up a Data Block larger than <i>MaxExtendedMsgLegacyLen</i> (26-bytes) into two or more Chunks.
Cold Socket	A Port that does not apply <i>vSafe5V</i> on $V_{BUS}$ until a Sink is Attached.
Command	Request and response pair defined as part of a Structured Vendor Defined Message (see Section 6.4.4.2)
Configuration Channel (CC)	Single wire used by the BMC PHY Layer Signaling Scheme (see <i>[USB Type-C 1.2]</i> ).
Connected	USB Power Delivery ports that have exchanged a Message and a <i>GoodCRC</i> Message response using the USB Power Delivery protocol so that both Port Partners know that each is PD Capable.
Consumer	The capability of a PD Port (typically a Device's UFP) to sink power from the power conductor (e.g. $V_{BUS}$ ). This corresponds to a USB Type-C Port with Rd asserted on its CC Wire.
Consumer/Provider	A Consumer with the additional capability to act as a Provider. This corresponds to a Dual-Role Port with Rd asserted on its CC Wire.
Continuous BIST Mode	A BIST Mode where the Port or Cable Plug being tested sends a continuous stream of test data.
Constant Voltage (CV)	A mode in which the Source output Voltage remains constant as the load changes.
Contract	An agreement on both power level and direction reached between a Port Pair. A Contract could be explicitly negotiated between the Port Pair or could be an Implicit power level defined by the current state. While operating in Power Delivery mode there will always be either an Explicit or Implicit Contract in place. The Contract can only be altered in the case of a (re-)negotiation, Power Role Swap, Data Role Swap, Hard Reset or failure of the Source.
Control Message	A Message is defined as a Control Message when the <i>Number of Data Objects</i> field in the Message Header is set to 0. The Control Message consists only of a Message Header and a CRC.
Current Foldback (CF)	A current limiting feature for a Source. When the Sink attempts to draw more current from the Source than the requested current foldback value, the Source reduces its output voltage so the current it supplies remains at or below the requested value.
Data Block	An Extended Message payload data unit. The size of each type of Data Block is specified as a series of bytes up to <i>MaxExtendedMsgLen</i> bytes in length. This is distinct from a Data Object used by a Data Message which is always a 32-bit object.
Data Message	A Data Message consists of a Message Header followed by one or more Data Objects. Data Messages are easily identifiable because the <i>Number of Data Objects</i> field in the Message Header is a non-zero value.
Data Object	A Data Message payload data unit. This 32 bit object contains information specific to different types of Data Message. Power, Request, BIST and Vendor Data Objects are defined.
Data Role Swap	Process of exchanging the DFP (Host) and UFP (Device) roles between Port Partners using the <i>[USB Type-C 1.2]</i> connector.
Dead Battery	A device has a Dead Battery when the Battery in a device is unable to power its functions.
Detach	Mechanical unjoining of the Port Pair by removal of the cable.
Detached	USB Power Delivery ports which are no longer mechanically joined with USB cable.
Device	When lower cased (device), it refers to any USB product, either USB Device or USB Host. When in upper case refers to a USB Device (Peripheral or Hub).
Device Policy Manager (DPM)	Module running in a Source or Sink that applies Local Policy to each Port in the Device via the Policy Engine.
Discovery Process	Command sequence using Structured Vendor Defined Messages resulting in identification of the Port Partner, its supported SVIDs and Modes.

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Term	Description
Downstream Facing Port (DFP)	Indicates the Port's position in the USB topology which typically corresponds to a USB Host root Port or Hub downstream Port as defined in <a href="#">[USB Type-C 1.2]</a> . At connection the Port defaults to operation as a USB Host (when USB Communication is supported) and Source.
Dual-Role Data (DRD)	Capability of operating as either a DFP or UFP.
Dual-Role Data Port	A Port Capable of operating as DRD..
Dual-Role Power (DRP)	Capability of operating as either a Source or Sink.
Dual-Role Power Device	A product containing one or more Dual-Role Power Ports that are capable of operating as either a Source or a Sink.
Dual-Role Power Port	A Port capable of operating as a DRP.
End of Packet (EOP)	K-code marker used to delineate the end of a packet.
Enter Mode Process	Command sequence using Structured Vendor Defined Messages resulting in the Port Partners entering a Mode.
Error Recovery	Error recovery process as defined in <a href="#">[USB Type-C 1.2]</a> .
Exit Mode Process	Command sequence using Structured Vendor Defined Messages resulting in the Port Partners exiting a Mode.
Explicit Contract	An agreement reached between a Port Pair as a result of the Power Delivery negotiation process. An Explicit Contract is established (or continued) when a Source sends an <a href="#">Accept</a> Message in response to a <a href="#">Request</a> Message sent by a Sink followed by a <a href="#">PS_RDY</a> Message indicating that the power supply is ready; this corresponds to the <a href="#">PE_SRC_Ready</a> state for a Source Policy Engine and the <a href="#">PE_SNK_Ready</a> state for a Sink Policy Engine. The Explicit Contract can be altered through the re-negotiation process. All Port pairs are required to make an Explicit Contract.
Extended Message (EM)	A Message containing Data Blocks. The Extended Message is defined by the <a href="#">Extended</a> field in the Message Header being set to one and contains an Extended Message Header immediately following the Message Header.
Extended Message Header	Every Extended Message contains a 16-bit Extended Message Header immediately following the Message Header containing information about the Data Block and any Chunking being applied.
Fast Role Swap	Process of exchanging the Source and Sink roles between Port Partners rapidly due to the disconnection of an external power supply.
Fixed Battery	A Battery that is not easily removed or replaced by an end user e.g. requires a special tool to access or is soldered in.
Fixed Supply	A well-regulated fixed voltage power supply. This is exposed by the Fixed Supply PDO (see Section 6.4.1.2.2)
Frame	Generic term referring to an atomic communication transmitted by PD such as a Packet, Test Frame or Signaling.
Hard Reset	This is initiated by <a href="#">Hard Reset</a> Signaling from either Port Partner. It restores V <sub>BUS</sub> to USB Default Operation and resets the PD communications engine to its default state in both Port Partners as well as in any Attached Cable Plugs. It restores both Port Partners to their default Data Roles and returns the VCONN Source to the Source Port.
HDD	A Hard Disk Drive.
Hot Swappable Battery	A Battery that is easily accessible for a user to remove or change for another Battery.
ID Header VDO	The VDO in a <a href="#">Discover Identity</a> Command immediately following the VDM Header. The ID Header VDO contains information corresponding to the Power Delivery Product.
Implicit Contract	An agreement on power levels between a Port Pair which occurs, not as a result of the Power Delivery negotiation process, but as a result of a Power Role Swap or Fast Role Swap. Implicit Contracts are transitory since the Port pair is required to immediately negotiate an Explicit Contract after the Power Role Swap. An Implicit Contract <b>shall</b> be limited to USB Type-C Current (see <a href="#">[USB Type-C 1.2]</a> ).
Initiator	The initial sender of a Command request in the form of a query.

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Term	Description
Interruptible	An AMS that, on receiving a Protocol Error, returns to the appropriate ready state in order to process the incoming Message is said to be Interruptible. Every AMS is Interruptible until the first Message in the AMS has been sent (a <b>GoodCRC</b> Message has been received). An AMS of Vendor Messages is Interruptible during the entire sequence.
IoC	The negotiated current value as defined in <a href="#">[IEC 63002]</a> .
IR Drop	The voltage drop across the cable and connectors between the Source and the Sink. It is a function of the resistance of the ground and power wire in the cable plus the contact resistance in the connectors times the current flowing over the path.
K-code	Special symbols provided by the 4b5b coding scheme. K-codes are used to signal Hard Reset and Cable reset, and delineate Packet boundaries.
Local Policy	Every PD Capable device has its own Policy, called the Local Policy that is executed by its Policy Engine to control its power delivery behavior. The Local Policy at any given time might be the default policy, hard coded or modified by changes in operating parameters or one provided by the system Host or some combination of these. The Local Policy <b>Optionally</b> can be changed by a System Policy Manager.
LPS	Limited Power Supply as defined in <a href="#">[IEC 62368-1]</a> .
Message	The packet payload consisting of a Message Header for Control Messages and a Message Header and data for Data Messages and Extended Messages as defined in Section 6.
Message Header	Every Message starts with a 16-bit Message Header containing basic information about the Message and the PD Port's Capabilities.
Messaging	Communication in the form of Messages as defined in Chapter 6.
Modal Operation	State where there are one or more Active Modes. Modal Operation ends when there are no longer any Active Modes.
Mode	Operation defined by a Vendor or Standard's organization, which is associated with a SVID, whose definition is outside the scope of USB-IF specifications. Entry to and exit from the Mode uses the Enter Mode and Exit Mode Processes. Modes are equivalent to "Alternate Modes" as described in <a href="#">[USB Type-C 1.2]</a> .
Multi-Drop	Refers to a Power Delivery system with one or more Cable Plugs where communication is to the Cable Plugs rather than the Port Partner. Multi-Drop systems share the Power Delivery communication channel with the Port Partners.
Negotiation	This is the PD process whereby: <ol style="list-style-type: none"> <li>1. The Source advertises its capabilities.</li> <li>2. The Sink requests one of the advertised capabilities.</li> <li>3. The Source acknowledges the request and alters its output to satisfy the request.</li> </ol> The result of the negotiation is a Contract for power delivery/consumption between the Port Pair.
Non-interruptible	An AMS that, on receiving a Protocol Error, generates either a Soft Reset or Hard Reset. Any power related AMS is Non-interruptible once the first Message in the AMS has been sent (a <b>GoodCRC</b> Message has been received).
OCP	Over-Current Protection
OTP	Over-Temperature Protection
OVP	Over-Voltage Protection
Packet	One entire unit of PD communication including a Preamble, <b>SOP*</b> , payload, CRC and <b>EOP</b> as defined in Section 5.6.
Passive Cable	Cable with a USB Plug on each end at least one of which is a Cable Plug supporting SOP' that does not incorporate data bus signal conditioning circuits. Supports the Structured VDM <b>Discover Identity</b> to determine its characteristics (Electronically Marked Cable see <a href="#">[USB Type-C 1.2]</a> ). Note this specification does not discuss Passive Cables which are not Electronically Marked Cables.
PD	USB Power Delivery
PD Capable	A Port that supports USB Power Delivery.

# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
PD Connection	See Connected.
PD Power (PDP)	The output power of a Source, as specified by the manufacturer and expressed in Fixed Supply PDOs as defined in Section 10.
PDUSB	USB Device Port or USB Host Port that is both PD capable and capable of USB Communication. See also PDUSB Host, PDUSB Device and PDUSB Hub.
PDUSB Device	A USB Device with a PD Capable UFP. A PDUSB Device is only addressed by SOP Packets.
PDUSB Host	A USB Host which is PD Capable on at least one of its DFPs. A PDUSB Host is only addressed by SOP Packets.
PDUSB Hub	A port expander USB Device with a UFP and one or more DFPs which is PD Capable on at least one of its Ports. A PDUSB Hub is only addressed by SOP Packets.
PDUSB Peripheral	A USB Device with a PD Capable UFP which is not a PDUSB Hub. A PDUSB Peripheral is only addressed by SOP Packets.
PHY Layer	The Physical Layer responsible for sending and receiving Messages across the USB Type-C CC wire between a Port Pair.
Policy	Policy defines the behavior of PD capable parts of the system and defines the capabilities it advertises, requests made to (re)negotiate power and the responses made to requests received.
Policy Engine (PE)	The Policy Engine interprets the Device Policy Manager's input in order to implement Policy for a given Port and directs the Protocol Layer to send appropriate Messages.
Port	An interface typically exposed through a receptacle, or via a plug on the end of a hard-wired captive cable. USB Power Delivery defines the interaction between a Port Pair.
Port Pair	Two Attached PD Capable Ports.
Port Partner	A Contract is negotiated between a Port Pair connected by a USB cable. These ports are known as Port Partners.
Power Conductor	The wire delivering power from the Source to Sink. For example USB's $V_{BUS}$ .
Power Consumer	See Consumer
Power Data Object (PDO)	Data Object used to expose a Source Port's power capabilities or a Sink's power requirements as part of a <i>Source_Capabilities</i> or <i>Sink_Capabilities</i> Message respectively. Fixed, Variable and Battery Power Data Objects are defined.
Power Delivery Mode	Operation after a Contract has initially been established between a Port pair. This mode persists during normal Power Delivery operation, including after a Power Role Swap. Power Delivery mode can only be exited by Detaching the ports, applying a Hard Reset or by the Source removing power (except when power is removed during the Power Role Swap procedure).
Power Provider	See Provider
Power Reserve	Power which is kept back by a Source in order to ensure that it can meet total power requirements of Attached Sinks on at least one Port.
Power Role Swap	Process of exchanging the Source and Sink roles between Port Partners.
Preamble	Start of a transmission which is used to enable the receiver to lock onto the carrier. The Preamble consists of a 64-bit sequence of alternating 0s and 1s starting with a "0" and ending with a "1" which is not 4b5b encoded.
Product Type	Product categorization returned as part of the <i>Discover Identity</i> Command.
Product Type VDO	VDO identifying a certain Product Type in the ID Header VDO of a <i>Discover Identity</i> Command.
Programmable Power Supply (PPS)	A power supply whose output voltage can be programmatically adjusted in small increments over its advertised range. The PPS also has a programmable output current fold back. The capabilities of the PPS are exposed by the Programmable Power Supply APDO (see Section 6.4.1.2.5).
Protocol Error	An unexpected Message during an Atomic Message Sequence. A Protocol Error during a Non-interruptible AMS will result in either a Soft Reset or a Hard Reset. A Protocol Error during an Interruptible AMS will result in a return to the appropriate ready state where the Message will be handled.

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Term	Description
Protocol Layer	The entity that forms the Messages used to communicate information between Port Partners.
Provider	A capability of a PD Port (typically a Host, Hub, or Wall Wart DFP) to source power over the power conductor (e.g. $V_{BUS}$ ). This corresponds to a USB Type-C Port with Rp asserted on its CC Wire.
Provider/Consumer	A Provider with the additional capability to act as a Consumer. This corresponds to a Dual-Role Power Port with Rp asserted on its CC Wire.
PS1, PS2	Classification of electrical power as defined in <a href="#">[IEC 62368-1]</a> .
Rd	Pull-down resistor on the USB Type-C CC wire used to indicate that the Port is a Sink (see <a href="#">[USB Type-C 1.2]</a> ).
Reattach	Attach of the Port Pair by a cable after a previous Detach.
Re-negotiation	A process wherein one of the Port Partners wants to alter the negotiated Contract.
Request Data Object (RDO)	Data Object used by a Sink Port to negotiate a Contact as a part of a <a href="#">Request</a> Message.
Re-run	Start an Interruptible AMS again from the beginning after a Protocol Error.
Responder	The receiver of a Command request sent by an Initiator that replies with a Command response.
Rp	Pull-up resistor on the USB Type-C CC wire used to indicate that the Port is a Source (see <a href="#">[USB Type-C 1.2]</a> ).
Safe Operation	Sources must have the ability to tolerate <a href="#">vSafe5V</a> applied by both Port Partners.
Signaling	A Preamble followed by an ordered set of four K-codes used to indicate a particular line symbol e.g. <a href="#">Hard Reset</a> as defined in Section 5.4.
Signaling Scheme	Physical mechanism used to transmit bits. Only the BMC Signaling Scheme is defined in this specification. Note: the BFSK Signaling Scheme supported in previous Revisions of this specification has been <b>Deprecated</b> .
Single-Role Port	A Port that is a Port only capable of operating as a Source or Sink, but not both.
Sink	The Port consuming power from $V_{BUS}$ ; most commonly a Device.
Sink Directed Charge	<p>A charging scheme whereby the Sink connects the Source to its battery through safety and other circuitry.</p> <p>Sink Directed Charge has two different modes of operation:</p> <ul style="list-style-type: none"> <li>When the Current Foldback feature is not activated, the Sink controls the Source's output current by adjusting the Source's output voltage</li> <li>When the Current Foldback feature is activated, the Source automatically controls its output current by adjusting its output voltage.</li> </ul> <p>The Sink is responsible for managing the current so as not to exceed the advertised capability of the Source and to protect itself from over-current events.</p>
Soft Reset	A process that resets the PD communications engine to its default state.
SOP Communication	Communication using SOP Packets also implies that a Message sequence is being followed.
SOP Packet	Any Power Delivery Packet which starts with an <a href="#">SOP</a> .
SOP* Communication	Communication with a Cable Plug using SOP* Packets, also implies a Message sequence is being followed.
SOP* Packet	A term referring to any Power Delivery Packet starting with either <a href="#">SOP</a> , <a href="#">SOP'</a> or <a href="#">SOP''</a> .
SOP' Communication	Communication with a Cable Plug using SOP' Packets, also implies that a Message sequence is being followed.
SOP' Packet	Any Power Delivery Packet which starts with an <a href="#">SOP'</a> used to communicate with a Cable Plug.
SOP'' Communication	Communication with a Cable Plug using SOP'' Packets, also implies that a Message sequence is being followed.
SOP'' Packet	Any Power Delivery Packet which starts with an <a href="#">SOP''</a> used to communicate with a Cable Plug when SOP' Packets are being used to communicate with the other Cable Plug.



# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
Source	A role a Port is currently taking to supply power over V <sub>BUS</sub> ; most commonly a Host or Hub downstream port.
Standard ID (SID)	16-bit unsigned value assigned by the USB-IF to a given industry standard.
Standard or Vendor ID (SVID)	Generic term referring to either a VID or a SID. SVID is used in place of the phrase “Standard or Vendor ID”.
Start of Packet (SOP)	K-code marker used to delineate the start of a packet. Three start of packet sequences are defined: <i>SOP</i> , <i>SOP'</i> and <i>SOP''</i> , with <i>SOP*</i> used to refer to all three in place of <i>SOP/SOP'/SOP''</i> .
System Policy	Overall system policy generated by the system, broken up into the policies required by each Port Pair to affect the system policy. It is programmatically fed to the individual devices for consumption by their Policy Engines.
System Policy Manager (SPM)	Module running on the USB Host. It applies the System Policy through communication with PD capable Consumers and Providers that are also connected to the Host via USB.
Test Frame	Frame consisting of a Preamble, <i>SOP*</i> , followed by test data (See Section 5.9).
Test Pattern	Continuous stream of test data in a given sequence (See Section 5.9)
Tester	The Tester is assumed to be a piece of test equipment that manages the BIST testing process of a PD UUT.
Unexpected Message	Message that a Port supports but has been received in an incorrect state.
Unit Interval (UI)	The time to transmit a single data bit on the wire.
Unit Under Test (UUT)	The PD device that is being tested by the Tester and responds to the initiation of a particular BIST test sequence.
Unrecognized Message	Message that a Port does not understand e.g. a Message using a ReservedMessage type, a Message defined by a higher specification Revision than the Revision this Port supports, or an Unstructured Message for which the VID is not recognized.
Unsupported Message	Message that a Port recognizes but does not support. This is a Message defined by the specification but which is not supported by this Port.
Upstream Facing Port (UFP)	Indicates the Port's position in the USB topology typically a Port on a Device as defined in <a href="#">[USB Type-C 1.2]</a> . At connection the Port defaults to operation as a USB Device (when USB Communication is supported) and Sink.
USB Attached State	Synonymous with the <a href="#">[USB 2.0]</a> and <a href="#">[USB 3.1]</a> definition of the Attached state
USB Default Operation	Operation of a Port at Attach or after a Hard Reset where the DFP Source applies <i>vSafe0V</i> or <i>vSafe5V</i> on V <sub>BUS</sub> and the UFP Sink is operating at <i>vSafe5V</i> as defined in <a href="#">[USB 2.0]</a> , <a href="#">[USB 3.1]</a> , <a href="#">[USB Type-C 1.2]</a> or <a href="#">[USBBC 1.2]</a> .
USB Device	Either a hub or a peripheral device as defined in <a href="#">[USB 2.0]</a> and <a href="#">[USB 3.1]</a> .
USB Host	The host computer system where the USB host controller is installed as defined in <a href="#">[USB 2.0]</a> and <a href="#">[USB 3.1]</a> .
USB Powered State	Synonymous with the <a href="#">[USB 2.0]</a> and <a href="#">[USB 3.1]</a> definition of the powered state.
USB Safe State	State of the USB Type-C connector when there are pins to be re-purposed (see <a href="#">[USB Type-C 1.2]</a> ) so they are not damaged by and do not cause damage to their Port Partner.
USB Type-A	Term used to refer to any A plug or receptacle including Micro-A plugs and Standard-A plugs and receptacles. Micro-AB receptacles are assumed to be a combination of USB Type-A and USB Type-B.
USB Type-B	Terms used to refer to any B-plug or receptacle including Micro-B plugs and Standard-B plugs and receptacles, including the PD and non-PD versions. Micro-AB receptacles are assumed to be a combination of USB Type-A and USB Type-B.
USB Type-C	Term used to refer to the USB Type-C connector plug or receptacle as defined in <a href="#">[USB Type-C 1.2]</a> .
USB-IF PD SID (PD SID)	Standard ID allocated to this specification by the USB Implementer's Forum.
Variable Supply	A very poorly regulated power supply that is not a Battery. This is exposed by the Variable Supply PDO (see Section 6.4.1.2.3).



# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
VCONN Powered Accessory	An accessory that is powered from VCONN to operate in a Mode (see <a href="#">[USB Type-C 1.2]</a> ).
VCONN Source	The USB Type-C Port responsible for sourcing VCONN.
V <sub>CONN</sub> Swap	Process of exchanging the VCONN Source between Port Partners.
VDM Header	The first Data Object following the Message Header in a Vendor Defined Message. The VDM Header contains the SVID relating to the VDM being sent and provides information relating to the Command in the case of a Structured VDM (see Section 6.4.4).
Vendor Data Object (VDO)	Data Object used to send Vendor specific information as part of a <i>Vendor_Defined</i> Message.
Vendor Defined Message (VDM)	PD Data Message defined for vendor/standards usage. These are further partitioned into Structured VDM Messages, where Commands are defined in this specification, and Unstructured VDM Messages which are entirely Vendor Defined (see Section 6.4.4).
Vendor ID (VID)	16-bit unsigned value assigned by the USB-IF to a given Vendor.
VI	Same as power (i.e. voltage * current = power)
Wall Wart	A power supply or “power brick” that is plugged into an AC outlet. It supplies DC power to power a device or charge a Battery.

## To Text:

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Battery	A power storage device residing behind a Port that can either be a source or sink of power.
Battery Supply	A power supply that directly applies the output of a Battery to V <sub>BUS</sub> . This is exposed by the Battery Supply PDO (see Section 6.4.1.2.4)
Binary Frequency Shift Keying (BFSK)	A Signaling Scheme now <i>Deprecated</i> in this specification. BFSK used a pair of discrete frequencies to transmit binary (0s and 1s) information over V <sub>BUS</sub> . See <a href="#">[USBPD 2.0]</a> for further details.

# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
Biphase Mark Coding (BMC)	Modification of Manchester coding where each zero has one transition and a one has two transitions (see <a href="#">[IEC 60958-1]</a> ).
BIST	Built In Self-Test – Power Delivery testing mechanism for the PHY Layer.
BIST Data Object (BDO)	Data Object used by <a href="#">BIST</a> Messages.
BIST Mode	A BIST receiver or transmitter test mode enabled by a <a href="#">BIST</a> Message.
Cable Plug	Term used to describe a PD Capable element in a Multi-Drop system addressed by SOP'/SOP'' Packets. Logically the Cable Plug is associated with a USB plug at one end of the cable. In a practical implementation the electronics might reside anywhere in the cable.
Cable Reset	This is initiated by <a href="#">Cable Reset</a> Signaling from the DFP. It restores the Cable Plugs to their default, power up condition and resets the PD communications engine to its default state. It does not reset the Port Partners but does restore VCONN to its Attachment state.
Charge Through	A mechanism for a VCONN-powered USB Device to pass power and CC communication from one Port to the other without any interference or re-regulation. This will be defined in a future specification.
Charge Through Port	The USB Type-C receptacle on a USB Device that is designed to allow a Source to be connected through the USB Device to charge a system it is Attached to. Most common use is to allow a single Port Host to support a USB device while being charged.
Chunk	A <a href="#">MaxExtendedMsgChunkLen</a> (26 byte) or less portion of a Data Block. Data Blocks can be sent either as a single Message or as a series of Chunks.
Chunking	The process of breaking up a Data Block larger than <a href="#">MaxExtendedMsgLegacyLen</a> (26-bytes) into two or more Chunks.
Cold Socket	A Port that does not apply <a href="#">vSafe5V</a> on V <sub>BUS</sub> until a Sink is Attached.
Command	Request and response pair defined as part of a Structured Vendor Defined Message (see Section 6.4.4.2)
Configuration Channel (CC)	Single wire used by the BMC PHY Layer Signaling Scheme (see <a href="#">[USB Type-C 1.2]</a> ).
Connected	USB Power Delivery ports that have exchanged a Message and a <a href="#">GoodCRC</a> Message response using the USB Power Delivery protocol so that both Port Partners know that each is PD Capable.
Consumer	The capability of a PD Port (typically a Device's UFP) to sink power from the power conductor (e.g. V <sub>BUS</sub> ). This corresponds to a USB Type-C Port with Rd asserted on its CC Wire.
Consumer/Provider	A Consumer with the additional capability to act as a Provider. This corresponds to a Dual-Role Port with Rd asserted on its CC Wire.
Continuous BIST Mode	A BIST Mode where the Port or Cable Plug being tested sends a continuous stream of test data.
Constant Voltage (CV)	A mode in which the Source output Voltage remains constant as the load changes.
Contract	An agreement on both power level and direction reached between a Port Pair. A Contract could be explicitly negotiated between the Port Pair or could be an Implicit power level defined by the current state. While operating in Power Delivery mode there will always be either an Explicit or Implicit Contract in place. The Contract can only be altered in the case of a (re-)negotiation, Power Role Swap, Data Role Swap, Hard Reset or failure of the Source.
Control Message	A Message is defined as a Control Message when the <a href="#">Number of Data Objects</a> field in the Message Header is set to 0. The Control Message consists only of a Message Header and a CRC.
Current Foldback (CF)	A current limiting feature for a Source. When the Sink attempts to draw more current from the Source than the requested current foldback value, the Source reduces its output voltage so the current it supplies remains at or below the requested value.

# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
Data Block	An Extended Message payload data unit. The size of each type of Data Block is specified as a series of bytes up to <i>MaxExtendedMsgLen</i> bytes in length. This is distinct from a Data Object used by a Data Message which is always a 32-bit object.
Data Message	A Data Message consists of a Message Header followed by one or more Data Objects. Data Messages are easily identifiable because the <i>Number of Data Objects</i> field in the Message Header is a non-zero value.
Data Object	A Data Message payload data unit. This 32 bit object contains information specific to different types of Data Message. Power, Request, BIST and Vendor Data Objects are defined.
Data Role Swap	Process of exchanging the DFP (Host) and UFP (Device) roles between Port Partners using the <i>[USB Type-C 1.2]</i> connector.
Dead Battery	A device has a Dead Battery when the Battery in a device is unable to power its functions.
Detach	Mechanical unjoining of the Port Pair by removal of the cable.
Detached	USB Power Delivery ports which are no longer mechanically joined with USB cable.
Device	When lower cased (device), it refers to any USB product, either USB Device or USB Host. When in upper case refers to a USB Device (Peripheral or Hub).
Device Policy Manager (DPM)	Module running in a Source or Sink that applies Local Policy to each Port in the Device via the Policy Engine.
Discovery Process	Command sequence using Structured Vendor Defined Messages resulting in identification of the Port Partner, its supported SVIDs and Modes.
Downstream Facing Port (DFP)	Indicates the Port's position in the USB topology which typically corresponds to a USB Host root Port or Hub downstream Port as defined in <i>[USB Type-C 1.2]</i> . At connection the Port defaults to operation as a USB Host (when USB Communication is supported) and Source.
Dual-Role Data (DRD)	Capability of operating as either a DFP or UFP.
Dual-Role Data Port	A Port Capable of operating as DRD..
Dual-Role Power (DRP)	Capability of operating as either a Source or Sink.
Dual-Role Power Device	A product containing one or more Dual-Role Power Ports that are capable of operating as either a Source or a Sink.
Dual-Role Power Port	A Port capable of operating as a DRP.
End of Packet (EOP)	K-code marker used to delineate the end of a packet.
Enter Mode Process	Command sequence using Structured Vendor Defined Messages resulting in the Port Partners entering a Mode.
Error Recovery	Error recovery process as defined in <i>[USB Type-C 1.2]</i> .
Exit Mode Process	Command sequence using Structured Vendor Defined Messages resulting in the Port Partners exiting a Mode.
Explicit Contract	An agreement reached between a Port Pair as a result of the Power Delivery negotiation process. An Explicit Contract is established (or continued) when a Source sends an <i>Accept</i> Message in response to a <i>Request</i> Message sent by a Sink followed by a <i>PS_RDY</i> Message indicating that the power supply is ready; this corresponds to the <i>PE_SRC_Ready</i> state for a Source Policy Engine and the <i>PE_SNK_Ready</i> state for a Sink Policy Engine. The Explicit Contract can be altered through the re-negotiation process. All Port pairs are required to make an Explicit Contract.
Extended Message (EM)	A Message containing Data Blocks. The Extended Message is defined by the <i>Extended</i> field in the Message Header being set to one and contains an Extended Message Header immediately following the Message Header.
Extended Message Header	Every Extended Message contains a 16-bit Extended Message Header immediately following the Message Header containing information about the Data Block and any Chunking being applied.
Fast Role Swap	Process of exchanging the Source and Sink roles between Port Partners rapidly due to the disconnection of an external power supply.

# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
Fixed Battery	A Battery that is not easily removed or replaced by an end user e.g. requires a special tool to access or is soldered in.
Fixed Supply	A well-regulated fixed voltage power supply. This is exposed by the Fixed Supply PDO (see Section 6.4.1.2.2)
Frame	Generic term referring to an atomic communication transmitted by PD such as a Packet, Test Frame or Signaling.
Hard Reset	This is initiated by <b>Hard Reset</b> Signaling from either Port Partner. It restores $V_{BUS}$ to USB Default Operation and resets the PD communications engine to its default state in both Port Partners as well as in any Attached Cable Plugs. It restores both Port Partners to their default Data Roles and returns the VCONN Source to the Source Port.
HDD	A Hard Disk Drive.
Hot Swappable Battery	A Battery that is easily accessible for a user to remove or change for another Battery.
ID Header VDO	The VDO in a <b>Discover Identity</b> Command immediately following the VDM Header. The ID Header VDO contains information corresponding to the Power Delivery Product.
Implicit Contract	An agreement on power levels between a Port Pair which occurs, not as a result of the Power Delivery negotiation process, but as a result of a Power Role Swap or Fast Role Swap. Implicit Contracts are transitory since the Port pair is required to immediately negotiate an Explicit Contract after the Power Role Swap. An Implicit Contract <b>Shall</b> be limited to USB Type-C Current (see <b>[USB Type-C 1.2]</b> ).
Initiator	The initial sender of a Command request in the form of a query.
Interruptible	An AMS that, on receiving a Protocol Error, returns to the appropriate ready state in order to process the incoming Message is said to be Interruptible. Every AMS is Interruptible until the first Message in the AMS has been sent (a <b>GoodCRC</b> Message has been received). An AMS of Vendor Messages is Interruptible during the entire sequence.
IoC	The negotiated current value as defined in <b>[IEC 63002]</b> .
IR Drop	The voltage drop across the cable and connectors between the Source and the Sink. It is a function of the resistance of the ground and power wire in the cable plus the contact resistance in the connectors times the current flowing over the path.
K-code	Special symbols provided by the 4b5b coding scheme. K-codes are used to signal Hard Reset and Cable reset, and delineate Packet boundaries.
Local Policy	Every PD Capable device has its own Policy, called the Local Policy that is executed by its Policy Engine to control its power delivery behavior. The Local Policy at any given time might be the default policy, hard coded or modified by changes in operating parameters or one provided by the system Host or some combination of these. The Local Policy <b>Optionally</b> can be changed by a System Policy Manager.
LPS	Limited Power Supply as defined in <b>[IEC 62368-1]</b> .
Message	The packet payload consisting of a Message Header for Control Messages and a Message Header and data for Data Messages and Extended Messages as defined in Section 6.
Message Header	Every Message starts with a 16-bit Message Header containing basic information about the Message and the PD Port's Capabilities.
Messaging	Communication in the form of Messages as defined in Chapter 6.
Modal Operation	State where there are one or more Active Modes. Modal Operation ends when there are no longer any Active Modes.
Mode	Operation defined by a Vendor or Standard's organization, which is associated with a SVID, whose definition is outside the scope of USB-IF specifications. Entry to and exit from the Mode uses the Enter Mode and Exit Mode Processes. Modes are equivalent to "Alternate Modes" as described in <b>[USB Type-C 1.2]</b> .
Multi-Drop	Refers to a Power Delivery system with one or more Cable Plugs where communication is to the Cable Plugs rather than the Port Partner. Multi-Drop systems share the Power Delivery communication channel with the Port Partners.

# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
Negotiation	This is the PD process whereby: 4. The Source advertises its capabilities. 5. The Sink requests one of the advertised capabilities. 6. The Source acknowledges the request and alters its output to satisfy the request. The result of the negotiation is a Contract for power delivery/consumption between the Port Pair.
Non-interruptible	An AMS that, on receiving a Protocol Error, generates either a Soft Reset or Hard Reset. Any power related AMS is Non-interruptible once the first Message in the AMS has been sent (a <i>GoodCRC</i> Message has been received).
OCP	Over-Current Protection
OTP	Over-Temperature Protection
OVP	Over-Voltage Protection
Packet	One entire unit of PD communication including a Preamble, <i>SOP*</i> , payload, CRC and <i>EOP</i> as defined in Section 5.6.
Passive Cable	Cable with a USB Plug on each end at least one of which is a Cable Plug supporting SOP' that does not incorporate data bus signal conditioning circuits. Supports the Structured VDM <i>Discover Identity</i> to determine its characteristics (Electronically Marked Cable see <i>[USB Type-C 1.2]</i> ). Note this specification does not discuss Passive Cables which are not Electronically Marked Cables.
PD	USB Power Delivery
PD Capable	A Port that supports USB Power Delivery.
PD Connection	See Connected.
PD Power (PDP)	The output power of a Source, as specified by the manufacturer and expressed in Fixed Supply PDOs as defined in Section 10.
PDUSB	USB Device Port or USB Host Port that is both PD capable and capable of USB Communication. See also PDUSB Host, PDUSB Device and PDUSB Hub.
PDUSB Device	A USB Device with a PD Capable UFP. A PDUSB Device is only addressed by SOP Packets.
PDUSB Host	A USB Host which is PD Capable on at least one of its DFPs. A PDUSB Host is only addressed by SOP Packets.
PDUSB Hub	A port expander USB Device with a UFP and one or more DFPs which is PD Capable on at least one of its Ports. A PDUSB Hub is only addressed by SOP Packets.
PDUSB Peripheral	A USB Device with a PD Capable UFP which is not a PDUSB Hub. A PDUSB Peripheral is only addressed by SOP Packets.
PHY Layer	The Physical Layer responsible for sending and receiving Messages across the USB Type-C CC wire between a Port Pair.
Policy	Policy defines the behavior of PD capable parts of the system and defines the capabilities it advertises, requests made to (re)negotiate power and the responses made to requests received.
Policy Engine (PE)	The Policy Engine interprets the Device Policy Manager's input in order to implement Policy for a given Port and directs the Protocol Layer to send appropriate Messages.
Port	An interface typically exposed through a receptacle, or via a plug on the end of a hard-wired captive cable. USB Power Delivery defines the interaction between a Port Pair.
Port Pair	Two Attached PD Capable Ports.
Port Partner	A Contract is negotiated between a Port Pair connected by a USB cable. These ports are known as Port Partners.
Power Conductor	The wire delivering power from the Source to Sink. For example USB's $V_{BUS}$ .
Power Consumer	See Consumer
Power Data Object (PDO)	Data Object used to expose a Source Port's power capabilities or a Sink's power requirements as part of a <i>Source_Capabilities</i> or <i>Sink_Capabilities</i> Message respectively. Fixed, Variable and Battery Power Data Objects are defined.

# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
Power Delivery Mode	Operation after a Contract has initially been established between a Port pair. This mode persists during normal Power Delivery operation, including after a Power Role Swap. Power Delivery mode can only be exited by Detaching the ports, applying a Hard Reset or by the Source removing power (except when power is removed during the Power Role Swap procedure).
Power Provider	See Provider
Power Reserve	Power which is kept back by a Source in order to ensure that it can meet total power requirements of Attached Sinks on at least one Port.
Power Role Swap	Process of exchanging the Source and Sink roles between Port Partners.
Preamble	Start of a transmission which is used to enable the receiver to lock onto the carrier. The Preamble consists of a 64-bit sequence of alternating 0s and 1s starting with a "0" and ending with a "1" which is not 4b5b encoded.
Product Type	Product categorization returned as part of the <i>Discover Identity</i> Command.
Product Type VDO	VDO identifying a certain Product Type in the ID Header VDO of a <i>Discover Identity</i> Command.
Programmable Power Supply (PPS)	A power supply whose output voltage can be programmatically adjusted in small increments over its advertised range. The PPS also has a programmable output current fold back. The capabilities of the PPS are exposed by the Programmable Power Supply APDO (see Section 6.4.1.2.5).
Protocol Error	An unexpected Message during an Atomic Message Sequence. A Protocol Error during a Non-interruptible AMS will result in either a Soft Reset or a Hard Reset. A Protocol Error during an Interruptible AMS will result in a return to the appropriate ready state where the Message will be handled.
Protocol Layer	The entity that forms the Messages used to communicate information between Port Partners.
Provider	A capability of a PD Port (typically a Host, Hub, or Wall Wart DFP) to source power over the power conductor (e.g. $V_{BUS}$ ). This corresponds to a USB Type-C Port with Rp asserted on its CC Wire.
Provider/Consumer	A Provider with the additional capability to act as a Consumer. This corresponds to a Dual-Role Power Port with Rp asserted on its CC Wire.
PS1, PS2	Classification of electrical power as defined in <a href="#">[IEC 62368-1]</a> .
Rd	Pull-down resistor on the USB Type-C CC wire used to indicate that the Port is a Sink (see <a href="#">[USB Type-C 1.2]</a> ).
Reattach	Attach of the Port Pair by a cable after a previous Detach.
Re-negotiation	A process wherein one of the Port Partners wants to alter the negotiated Contract.
Request Data Object (RDO)	Data Object used by a Sink Port to negotiate a Contract as a part of a <i>Request</i> Message.
Re-run	Start an Interruptible AMS again from the beginning after a Protocol Error.
Responder	The receiver of a Command request sent by an Initiator that replies with a Command response.
Rp	Pull-up resistor on the USB Type-C CC wire used to indicate that the Port is a Source (see <a href="#">[USB Type-C 1.2]</a> ).
Safe Operation	Sources must have the ability to tolerate <i>vSafe5V</i> applied by both Port Partners.
Signaling	A Preamble followed by an ordered set of four K-codes used to indicate a particular line symbol e.g. <i>Hard Reset</i> as defined in Section 5.4.
Signaling Scheme	Physical mechanism used to transmit bits. Only the BMC Signaling Scheme is defined in this specification. Note: the BFSK Signaling Scheme supported in previous Revisions of this specification has been <i>Deprecated</i> .
Single-Role Port	A Port that is a Port only capable of operating as a Source or Sink, but not both.
Sink	The Port consuming power from $V_{BUS}$ ; most commonly a Device.



# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
Sink Directed Charge	<p>A charging scheme whereby the Sink connects the Source to its battery through safety and other circuitry.</p> <p>Sink Directed Charge has two different modes of operation:</p> <ul style="list-style-type: none"> <li>When the Current Foldback feature is not activated, the Sink controls the Source's output current by adjusting the Source's output voltage</li> <li>When the Current Foldback feature is activated, the Source automatically controls its output current by adjusting its output voltage.</li> </ul> <p>The Sink is responsible for managing the current so as not to exceed the advertised capability of the Source and to protect itself from over-current events.</p>
Soft Reset	A process that resets the PD communications engine to its default state.
SOP Communication	Communication using SOP Packets also implies that a Message sequence is being followed.
SOP Packet	Any Power Delivery Packet which starts with an <b>SOP</b> .
SOP* Communication	Communication with a Cable Plug using SOP* Packets, also implies a Message sequence is being followed.
SOP* Packet	A term referring to any Power Delivery Packet starting with either <b>SOP</b> , <b>SOP'</b> or <b>SOP''</b> .
SOP' Communication	Communication with a Cable Plug using SOP' Packets, also implies that a Message sequence is being followed.
SOP' Packet	Any Power Delivery Packet which starts with an <b>SOP'</b> used to communicate with a Cable Plug.
SOP'' Communication	Communication with a Cable Plug using SOP'' Packets, also implies that a Message sequence is being followed.
SOP'' Packet	Any Power Delivery Packet which starts with an <b>SOP''</b> used to communicate with a Cable Plug when SOP' Packets are being used to communicate with the other Cable Plug.
Source	A role a Port is currently taking to supply power over V <sub>BUS</sub> ; most commonly a Host or Hub downstream port.
Standard ID (SID)	16-bit unsigned value assigned by the USB-IF to a given industry standard.
Standard or Vendor ID (SVID)	Generic term referring to either a VID or a SID. SVID is used in place of the phrase "Standard or Vendor ID".
Start of Packet (SOP)	K-code marker used to delineate the start of a packet. Three start of packet sequences are defined: <b>SOP</b> , <b>SOP'</b> and <b>SOP''</b> , with <b>SOP*</b> used to refer to all three in place of <b>SOP/SOP'/SOP''</b> .
System Policy	Overall system policy generated by the system, broken up into the policies required by each Port Pair to affect the system policy. It is programmatically fed to the individual devices for consumption by their Policy Engines.
System Policy Manager (SPM)	Module running on the USB Host. It applies the System Policy through communication with PD capable Consumers and Providers that are also connected to the Host via USB.
Test Frame	Frame consisting of a Preamble, <b>SOP*</b> , followed by test data (See Section 5.9).
Test Pattern	Continuous stream of test data in a given sequence (See Section 5.9)
Tester	The Tester is assumed to be a piece of test equipment that manages the BIST testing process of a PD UUT.
Unexpected Message	Message that a Port supports but has been received in an incorrect state.
Unit Interval (UI)	The time to transmit a single data bit on the wire.
Unit Under Test (UUT)	The PD device that is being tested by the Tester and responds to the initiation of a particular BIST test sequence.
Unrecognized Message	Message that a Port does not understand e.g. a Message using a ReservedMessage type, a Message defined by a higher specification Revision than the Revision this Port supports, or an Unstructured Message for which the VID is not recognized.
Unsupported Message	Message that a Port recognizes but does not support. This is a Message defined by the specification but which is not supported by this Port.



# USB Power Delivery ENGINEERING CHANGE NOTICE

Term	Description
Upstream Facing Port (UFP)	Indicates the Port's position in the USB topology typically a Port on a Device as defined in <a href="#">[USB Type-C 1.2]</a> . At connection the Port defaults to operation as a USB Device (when USB Communication is supported) and Sink.
USB Attached State	Synonymous with the <a href="#">[USB 2.0]</a> and <a href="#">[USB 3.1]</a> definition of the Attached state
USB Default Operation	Operation of a Port at Attach or after a Hard Reset where the DFP Source applies <i>vSafe0V</i> or <i>vSafe5V</i> on V <sub>BUS</sub> and the UFP Sink is operating at <i>vSafe5V</i> as defined in <a href="#">[USB 2.0]</a> , <a href="#">[USB 3.1]</a> , <a href="#">[USB Type-C 1.2]</a> or <a href="#">[USBBC 1.2]</a> .
USB Device	Either a hub or a peripheral device as defined in <a href="#">[USB 2.0]</a> and <a href="#">[USB 3.1]</a> .
USB Host	The host computer system where the USB host controller is installed as defined in <a href="#">[USB 2.0]</a> and <a href="#">[USB 3.1]</a> .
USB Powered State	Synonymous with the <a href="#">[USB 2.0]</a> and <a href="#">[USB 3.1]</a> definition of the powered state.
USB Safe State	State of the USB Type-C connector when there are pins to be re-purposed (see <a href="#">[USB Type-C 1.2]</a> ) so they are not damaged by and do not cause damage to their Port Partner.
USB Type-A	Term used to refer to any A plug or receptacle including Micro-A plugs and Standard-A plugs and receptacles. Micro-AB receptacles are assumed to be a combination of USB Type-A and USB Type-B.
USB Type-B	Terms used to refer to any B-plug or receptacle including Micro-B plugs and Standard-B plugs and receptacles, including the PD and non-PD versions. Micro-AB receptacles are assumed to be a combination of USB Type-A and USB Type-B.
USB Type-C	Term used to refer to the USB Type-C connector plug or receptacle as defined in <a href="#">[USB Type-C 1.2]</a> .
USB-IF PD SID (PD SID)	Standard ID allocated to this specification by the USB Implementer's Forum.
Variable Supply	A very poorly regulated power supply that is not a Battery. This is exposed by the Variable Supply PDO (see Section 6.4.1.2.3).
VCONN Powered Accessory	An accessory that is powered from VCONN to operate in a Mode (see <a href="#">[USB Type-C 1.2]</a> ).
VCONN Powered USB Device (VPD)	A captive cable USB Device that may be powered by either VCONN or V <sub>BUS</sub> as defined in <a href="#">[USB Type-C 1.2]</a> . Note a VPD is only addressable by SOP' Packets.
VCONN Source	The USB Type-C Port responsible for sourcing VCONN.
VCONN Swap	Process of exchanging the VCONN Source between Port Partners.
VDM Header	The first Data Object following the Message Header in a Vendor Defined Message. The VDM Header contains the SVID relating to the VDM being sent and provides information relating to the Command in the case of a Structured VDM (see Section 6.4.4).
Vendor Data Object (VDO)	Data Object used to send Vendor specific information as part of a <i>Vendor Defined</i> Message.
Vendor Defined Message (VDM)	PD Data Message defined for vendor/standards usage. These are further partitioned into Structured VDM Messages, where Commands are defined in this specification, and Unstructured VDM Messages which are entirely Vendor Defined (see Section 6.4.4).
Vendor ID (VID)	16-bit unsigned value assigned by the USB-IF to a given Vendor.
VI	Same as power (i.e. voltage * current = power)
Wall Wart	A power supply or "power brick" that is plugged into an AC outlet. It supplies DC power to power a device or charge a Battery.

## (b). Section 6.4.4.3.1.1, Page 135, Table 6-29

### From Text:

Bit(s)	Description	Reference
B31	USB Communications Capable as USB Host:	Section 6.4.4.3.1.1.1

# USB Power Delivery ENGINEERING CHANGE NOTICE

Bit(s)	Description	Reference
	<ul style="list-style-type: none"> <li><b>Shall</b> be set to one if the product is capable of enumerating USB Devices.</li> <li><b>Shall</b> be set to zero otherwise</li> </ul>	
B30	USB Communications Capable as a USB Device: <ul style="list-style-type: none"> <li><b>Shall</b> be set to one if the product is capable of being enumerated as a USB Device.</li> <li><b>Shall</b> be set to zero otherwise</li> </ul>	Section 6.4.4.3.1.1.2
B29...27	Product Type (UFP): <ul style="list-style-type: none"> <li>000b – Undefined</li> <li>001b – PDUSB Hub</li> <li>010b – PDUSB Peripheral</li> <li>011b...100b – <b>Reserved, Shall Not</b> be used.</li> <li>101b – Alternate Mode Adapter (AMA)</li> <li>110b...111b – <b>Reserved, Shall Not</b> be used.</li> </ul> Product Type (Cable Plug): <ul style="list-style-type: none"> <li>000b – Undefined</li> <li>001b...010b – <b>Reserved, Shall Not</b> be used.</li> <li>011b – Passive Cable</li> <li>100b – Active Cable</li> <li>101b...111b – <b>Reserved, Shall Not</b> be used.</li> </ul>	Section 6.4.4.3.1.1.3
B26	Modal Operation Supported: <ul style="list-style-type: none"> <li><b>Shall</b> be set to one if the product supports Modal Operation.</li> <li><b>Shall</b> be set to zero otherwise</li> </ul>	Section 6.4.4.3.1.1.4
B25...23	Product Type (DFP): <ul style="list-style-type: none"> <li>000b – Undefined</li> <li>001b – PDUSB Hub</li> <li>010b – PDUSB Host</li> <li>011b – Power Brick</li> <li>100b – Alternate Mode Controller (AMC)</li> <li>101b...111b – <b>Reserved, Shall Not</b> be used.</li> </ul>	
B22...16	<b>Reserved. Shall</b> be set to zero.	
B15...0	16-bit unsigned integer. USB Vendor ID	<a href="#">[USB 2.0]</a> / <a href="#">[USB 3.1]</a>

## To Text:

Bit(s)	Description	Reference
B31	USB Communications Capable as USB Host: <ul style="list-style-type: none"> <li><b>Shall</b> be set to one if the product is capable of enumerating USB Devices.</li> <li><b>Shall</b> be set to zero otherwise</li> </ul>	Section 6.4.4.3.1.1.1
B30	USB Communications Capable as a USB Device: <ul style="list-style-type: none"> <li><b>Shall</b> be set to one if the product is capable of being enumerated as a USB Device.</li> <li><b>Shall</b> be set to zero otherwise</li> </ul>	Section 6.4.4.3.1.1.2
B29...27	Product Type (UFP): <ul style="list-style-type: none"> <li>000b – Undefined</li> <li>001b – PDUSB Hub</li> <li>010b – PDUSB Peripheral</li> <li>011b...100b – <b>Reserved, Shall Not</b> be used.</li> <li>101b – Alternate Mode Adapter (AMA)</li> </ul>	Section 6.4.4.3.1.1.3

# USB Power Delivery ENGINEERING CHANGE NOTICE

Bit(s)	Description	Reference
	<ul style="list-style-type: none"> <li>110b – VCONN Powered USB Device (VPD)</li> <li>111b – <b>Reserved, Shall Not</b> be used.</li> </ul> <p>Product Type (Cable Plug):</p> <ul style="list-style-type: none"> <li>000b – Undefined</li> <li>001b...010b – <b>Reserved, Shall Not</b> be used.</li> <li>011b – Passive Cable</li> <li>100b – Active Cable</li> <li>101b...111b – <b>Reserved, Shall Not</b> be used.</li> </ul>	
B26	<p>Modal Operation Supported:</p> <ul style="list-style-type: none"> <li><b>Shall</b> be set to one if the product supports Modal Operation.</li> <li><b>Shall</b> be set to zero otherwise</li> </ul>	Section 6.4.4.3.1.1.4
B25...23	<p>Product Type (DFP):</p> <ul style="list-style-type: none"> <li>000b – Undefined</li> <li>001b – PDUSB Hub</li> <li>010b – PDUSB Host</li> <li>011b – Power Brick</li> <li>100b – Alternate Mode Controller (AMC)</li> <li>101b...111b – <b>Reserved, Shall Not</b> be used.</li> </ul>	
B22...16	<b>Reserved. Shall</b> be set to zero.	
B15...0	16-bit unsigned integer. USB Vendor ID	<a href="#">[USB 2.0]</a> / <a href="#">[USB 3.1]</a>

## (c). Section 6.4.4.3.1.1.3, Page 135, Table 6-30

### From Text:

Product Type	Description	Product Type VDO	Reference
Undefined	<b>Shall</b> be used where no other Product Type value is appropriate.	None	
PDUSB Hub	<b>Shall</b> be used when the Product is a PDUSB Hub.	None	
PDUSB Peripheral	<b>Shall</b> be used when the Product is a PDUSB Device other than a PDUSB Hub.	None	
Alternate Mode Adapter	<b>Shall</b> be used when the Product is a PDUSB Device that supports one or more Alternate Modes.	AMA VDO	Section 6.4.4.3.1.5

### To Text:

Product Type	Description	Product Type VDO	Reference
Undefined	<b>Shall</b> be used where no other Product Type value is appropriate.	None	
PDUSB Hub	<b>Shall</b> be used when the Product is a PDUSB Hub.	None	
PDUSB Peripheral	<b>Shall</b> be used when the Product is a PDUSB Device other than a PDUSB Hub.	None	
Alternate Mode Adapter	<b>Shall</b> be used when the Product is a PDUSB Device that supports one or more Alternate Modes.	AMA VDO	Section 6.4.4.3.1.5
VPD	<b>Shall</b> be used when the Product is a PDUSB VCONN Powered USB Device (VPD).	VPD VDO	Section 6.4.4.3.1.6

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## (d). New Section 6.4.4.3.1.6

### From Text:

None – new section

### To Text:

#### 6.4.4.3.1.6 Vconn Powered USB Device VDO

The VCONN Powered USB Device (VPD) VDO defined in this section *Shall* be sent when the Product Type is given as VCONN Powered USB Device. Table 6-38 defines the VPD VDO which *Shall* be sent.

Table 6-38 VPD VDO

Bit(s)	Field	Description
B31...28	HW Version	0000b...1111b assigned by the VID owner
B27...24	Firmware Version	0000b...1111b assigned by the VID owner
B23...21	VDO Version	Version Number of the VDO (not this specification Version): <ul style="list-style-type: none"><li>• Version 1.0 = 000b</li></ul> Values 001b...111b are <i>Reserved</i> and <i>Shall Not</i> be used
B20...17	<i>Reserved</i>	<i>Shall</i> be set to zero.
B16...15	Maximum $V_{BUS}$ Voltage	Maximum Cable $V_{BUS}$ Voltage: 00b – 20V 01b – 30V 10b – 40V 11b – 50V
B14...13	<i>Reserved</i>	<i>Shall</i> be set to zero.
B12...7	$V_{BUS}$ Impedance	Charge Through Support bit = 1b: $V_{bus}$ impedance through the VPD in 2 m $\Omega$ increments. Values less than 10 m $\Omega$ are <i>Reserved</i> and shall not be used. Charge Through Support bit = 0b: <i>Reserved Shall</i> be set to zero
B6...1	Ground Impedance	Charge Through Support bit = 1b: Ground impedance through the VPD in 1 m $\Omega$ increments. Values less than 10 m $\Omega$ are <i>Reserved</i> and <i>Shall Not</i> be used. Charge Through Support bit = 0b: <i>Reserved Shall</i> be set to zero
B0	Charge Through Support	1b – the VPD supports Charge Through 0b – the VPD does not support Charge Through

The HW Version field (B31...28) contains a HW Version assigned by the VID owner.

The FW Version field (B27...24) contains a FW Version assigned by the VID owner.

The VDO Version field (B23...20) contains a VDO version for this VDM version number. This field indicates the expected content for this VDO.

The Maximum  $V_{BUS}$  Voltage field (B16...15) *Shall* contain the maximum voltage that a Sink *Shall* negotiate through the VPD Charge Through port as part of an Explicit Contract. Note: the maximum voltage that will be applied to the cable is *vSrcNew* max + *vSrcValid* max. For example when the Maximum  $V_{BUS}$  Voltage field is 20V, a Fixed Supply of 20V can be negotiated as part of an Explicit Contract where the absolute maximum voltage that can be applied to the cable is 21.5V.

The  $V_{BUS}$  Impedance field (B12...7) *Shall* contain the impedance the VPD adds in series between the Source and the Sink. The Sink *Shall* take this value into account when requesting current so as to not to exceed the  $V_{BUS}$  IR drop limit of 0.5V between the Source and itself. If the Sink can tolerate a larger IR drop on  $V_{BUS}$  it *May* do so.

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Ground Impedance field (B6...1) **Shall** contain the impedance the VPD adds in series between the Source and the Sink. The Sink **Shall** take this value into account when requesting current so as to not to exceed the Ground IR drop limit of 0.25V between the Source and itself.

The Charge Through field (B0) **Shall** be set to 1b when the VPD supports Charge Through and 0b otherwise.

## (e). New Section 6.4.4.3.1.6.1

### From Text:

None – new section

### To Text:

#### 6.4.4.3.1.6.1 Vconn Powered USB Device VDO

For a DFP that supports VPDs, upon discovering that the Product Type is a VPD and that the VPD only supports *[USBPD 2.0]*, **Shall** issue *Cable Reset* Signaling and **Shall** revert to *[USBPD 2.0]* operation. Otherwise the Initiator **Shall** follow the Revision requirements as specified in Section 6.2.1.1.5.