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2026-03-30

USB-grænseflader for data og energi – Del 1-2: Fælles komponenter – USB-strømforsyningsspecifikation

Universal Serial Bus interfaces for data and power – Part 1-2: Common components – USB Power Delivery specification

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English Version

Universal Serial Bus interfaces for data and power - Part 1-2: Common components - USB Power Delivery specification (IEC 62680-1-2:2026)

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The text of document 100/4327/CDV, future edition 8 of IEC 62680-1-2, prepared by TC 100/Technical Area 18 "(Disbanded) - Multimedia home systems and applications for end-user networks" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62680-1-2:2026.

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Universal Serial Bus interfaces for data and power - Part 1-2: Common components - USB Power Delivery specification

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The text of this standard was prepared by the USB Implementers Forum (USB-IF). The structure and editorial rules used in this publication reflect the practice of the organization which submitted it.

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The text of this International Standard is based on the following documents:

Draft	Report on voting
100/4327/CDV	100/4380/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

A list of all parts in the IEC 62680 series, published under the general title *Universal serial bus interfaces for data and power*, can be found on the IEC website.

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Universal Serial Bus
Power Delivery Specification

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Version:	**1.1**
Release Date:	**2024-10**

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Revision	Version	Comments	Issue Date
1.0	1.0	Initial release Revision 1.0	5 July, 2012
1.0	1.1	Including errata through 31-October-2012	31 October 2012
1.0	1.2	Including errata through 26-June-2013	26 June, 2013
1.0	1.3	Including errata through 11-March-2014	11 March 2014
2.0	1.0	Initial release Revision 2.0	11 August 2014
2.0	1.1	Including errata through 7-May 2015	7 May 2015
2.0	1.2	Including errata through 25-March-2016	25 March 2016
2.0	1.3	Including errata through 11-January-2017	11 January 2017
3.0	1.0	Initial release Revision 3.0	11 December 2015
3.0	1.0a	Including errata through 25-March-2016	25 March 2016
3.0	1.1	Including errata through 12-January-2017	12 January 2017
3.0	1.2	Including errata through 21-June-2018	21 June 2018
3.0	2.0	Including errata through 29-August-2019	29 August 2019
3.1	1.0	Including errata through May 2021	May 2021
3.1	1.1	Including errata through July 2021 This version incorporates the following ECNs: • EPR Clarifications • Define AMS starting point	July 2021
3.1	1.2	Including errata through October 2021 This version incorporates the following ECNs: • Clarify use of Retries • Battery Capabilities • FRS timing problem • PPS power rule clarifications • Peak current support for EPR AVS APDO	October 2021
3.1	1.3	This version incorporates the following ECNs: • Robust EPR Source Operation • EPR Source Caps Editorial • SRC PPS behavior in low current request • Enter USB	January 2022
3.1	1.4	Editorial changes This version incorporates the following ECNs: • Capabilities Mismatch Update • Chunking Timing Issue • OT Mitigation	April 2022

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Revision	Version	Comments	Issue Date
3.1	1.5	Editorial changes This version incorporates the following ECNs: • Timer Description Corrections • Change Source_Info Requirements • AMS Update	July 2022
3.1	1.6	Editorial changes This version incorporates the following ECNs: • USB4® V2 Updates • Data Reset Issues • Increase tSenderResponse • PPS Power Limit Bit Update • Support for Asymmetric Mode • Timer Description Corrections Revisited	October 2022
3.1	1.7	Editorial Changes This version incorporates the following ECNs: • Data Reset Invalid Reject Handling • Source request • Source Transition • EPR Entry	January 2023
3.1	1.8	Editorial Changes This version incorporates the following ECNs: • Slew rate exemption for Power Role Swap. • EUDO cable speed clarification. • Update to PPS Requirements. • Deprecate Interruptibility. • Section 7.3 restructure and update.	April 2023
3.1	1.9	Editorial Changes	July 2023

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Revision	Version	Comments	Issue Date
3.2	1.0	This version incorporates the following ECNs: • VDM-use Conditions. • tTypeCSinkWaitCap. • tFirstSourceCap Clarification • Hard Reset Clarification. • Unrecognized Country Code • EPR Entry Process-1 • SPR AVS Definition • EPR Power Rules Clarifications	October 2023
3.2	1.1	This version incorporates the following ECNs: • Power Transition time from EPR to PR_Swap • Capabilities Mismatch Update • Deprecate GotoMin and GiveBack Features and Update Power Reserve • EPR Entry requirements Clarification • EPRMDO and Entry Clarification. • Remove 10.2.4 power sharing between ports • Source PDP rating field clarifications • Source Power Rules update. • Source_Info Message Clarifications. • Correction to BMC description. • EPR Source cap clarification. • Delaying of VCONN Swap. • EPR_Request in SPR Mode. • Generic transition diagram. • Removing the usage of Ping message • Sink Standby • Source Info Support	October 2024

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1 Introduction

USB has evolved from a data interface capable of supplying limited power to a primary provider of power with a data interface. Today many devices charge or get their power from USB Ports contained in laptops, cars, aircraft or even wall sockets. USB has become a ubiquitous power socket for many small devices such as cell phones and other hand-held devices. Users need USB to fulfill their requirements not only in terms of data but also to provide power to, or charge, their devices simply, often without the need to load a driver, in order to carry out "traditional" USB functions.

There are, however, still many devices which either require an additional power connection to the wall, or exceed the USB default current in order to operate. Increasingly, international regulations require better energy management due to ecological and practical concerns relating to the availability of power. Regulations limit the amount of power available from the wall which has led to a pressing need to optimize power usage. The USB Power Delivery Specification has the potential to minimize waste as it becomes a standard for charging devices that are not satisfied by ***[USBBC 1.2]*** or ***[USB Type-C 2.4]***.

Wider usage of wireless solutions is an attempt to remove data cabling but the need for "tethered" charging remains. In addition, industrial design requirements drive wired connectivity to do much more over the same connector.

USB Power Delivery is designed to enable the maximum functionality of USB by providing more flexible power delivery along with data over a single cable. Its aim is to operate with and build on the existing USB ecosystem; increasing power levels from existing USB standards, for example ***[USBBC 1.2]***, enabling new higher power use cases such as USB powered Hard Disk Drives (HDDs), laptops and monitors.

With USB Power Delivery the power direction is no longer fixed. This enables the product with the power (USB Host or Peripheral) to provide the power. For example, a display with a supply from the wall can power, or charge, a laptop. Alternatively, USB Chargers are able to supply power to laptops and other Battery powered devices through their, traditional power providing, USB Ports.

USB Power Delivery enables Hubs (including Hubs embedded in other devices such as docks or monitors) to become the means to optimize power management across multiple peripherals by allowing each device to take only the power it requires, and to get more power when required for a given application. ***Optionally*** the Hubs can communicate with the PC to enable even more intelligent and flexible management of power either automatically or with some level of user intervention.

USB Power Delivery allows low power cases such as headsets to Negotiate for only the power they require. This provides a simple solution that enables USB devices to operate at their optimal power levels.

The Power Delivery Specification, in addition to providing mechanisms to Negotiate power also can be used as a side-band channel for standard and vendor defined messaging. The specification enables discovery of cable Capabilities such as supported speeds and current levels. Power Delivery enables alternative modes of operation by providing the mechanisms to discover, enter and exit Modes such as EPR Mode, USB4® Mode or Alternate Modes.

1.1 Overview

This specification defines how USB Devices can Negotiate for more current and/or higher or lower voltages over the USB cable (using the USB Type-C® CC wire as the communications channel) than are defined in the ***[USB 2.0]***, ***[USB 3.2]***, ***[USB4]***, ***[USB Type-C 2.4]*** or ***[USBBC 1.2]*** specifications. It allows Devices with greater power requirements than can be met with today's specification to get the power they require to operate from V_{BUS} and Negotiate with external power sources (e.g., Chargers).

In addition, it allows a Source and Sink to swap Power Roles such that a USB Device could supply power to the USB Host. For example, a display could supply power to a laptop to operate or charge its Battery. This specification also adds a mechanism to swap the Data Roles such that the upstream facing Port becomes the downstream facing Port and vice versa. It also enables a swap of the end supplying V_{CONN} to a powered cable.

The USB Power Delivery Specification is guided by the following principles:

- Works seamlessly with legacy USB Devices.

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- Minimizes potential damage from non-compliant cables (e.g., 'Y' cables etc.).
- Optimized for low-cost implementations.

This specification defines mechanisms to discover, enter and exit Alternate Modes defined either by a standard or by a particular vendor. These Alternate Modes can be supported either by the Port Partner or by a cable connecting the two Port Partners.

The specification defines mechanisms to discover the Capabilities of cables which can communicate using Power Delivery.

To facilitate optimum charging, the specification defines two mechanisms a USB Charger can Advertise for the device to use:

1) A list of Fixed Supply voltages each with a maximum current. The device selects a voltage and current from the list. This is the traditional model used by devices that use internal electronics to manage the charging of their Battery including modifying the voltage and current actually supplied to the Battery. The side-effect of this model is that the charging circuitry generates heat that can be problematic for small form factor devices.

2) A list of programmable voltage ranges, in SPR PPS Mode, each with a maximum current. The device requests a voltage (in 20mV increments) that is within the Advertised range and a maximum current. The USB PPS Charger delivers the requested voltage until the maximum current is reached at which time the USB PPS Charger reduces its output voltage so as not to supply more than the requested maximum current. During the high current portion of the charge cycle, the USB PPS Charger can be directly connected (through an appropriate safety device) to the Battery. This model is used by devices that want to minimize the thermal impact of their internal charging circuitry.

3) A list of adjustable voltage ranges, in SPR AVS Mode or EPR AVS Mode, each with a maximum current. The device requests a voltage (in 100mV increments) that is within the Advertised range and a maximum current. The USB AVS Charger delivers the requested voltage.

1.2 Purpose

The USB Power Delivery specification defines a power delivery system covering all elements of a USB system including USB Hosts, USB Devices, Hubs, Chargers and cable assemblies. This specification describes the architecture, protocols, power supply behavior, connectors and cabling necessary for managing power delivery over USB at up to 100W in SPR Mode and 240W in EPR Mode. This specification is intended to be fully compatible with and extend the existing USB infrastructure. It is intended that this specification will allow system OEMs, power supply and Peripheral developers adequate flexibility for product versatility and market differentiation without losing backwards compatibility.

USB Power Delivery is designed to operate independently of the existing USB bus defined mechanisms used to Negotiate power which are:

- ***[USB 2.0]***, ***[USB 3.2]*** in band requests for high power interfaces.
- ***[USBBC 1.2]*** mechanisms for supplying higher power (not mandated by this specification).
- ***[USB Type-C 2.4]*** mechanisms for supplying higher power.

Initial operating conditions remain the USB Default Operation as defined in ***[USB 2.0]***, ***[USB 3.2]***, ***[USB Type-C 2.4]*** or ***[USBBC 1.2]***.

- The DFP sources ***vSafe5V*** over V_{BUS}.
- The UFP consumes power from V_{BUS}.

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1.2.1 Scope

This specification is intended as an extension to the existing ***[USB 2.0]***, ***[USB 3.2]***, ***[USB Type-C 2.4]*** and ***[USBBC 1.2]*** specifications. It addresses only the elements required to implement USB Power Delivery. It is targeted at power supply vendors, manufacturers of ***[USB 2.0]***, ***[USB 3.2]***, ***[USB Type-C 2.4]*** and ***[USBBC 1.2]*** platforms, devices and cable assemblies.

Normative information is provided to allow interoperability of components designed to this specification. ***Informative*** information, when provided, illustrates possible design implementation.

1.3 Section Overview

This specification contains the following sections:

Table 1.1 Section Overview

Section	Description
Section 1, "Introduction"	Introduction, conventions used in the document, list of terms and abbreviations, references, and details of parameter usage.
Section 2, "Overview"	Overview of the document including a description of the operation of *PD* and the architecture.
Section 3, "USB Type-A and USB Type-B Cable Assemblies and Connectors"	Mechanical and electrical characteristics of the cables and connectors used by *PD*. Section ***Deprecated***. See ***[USBPD 2.0]*** for legacy *PD* connector specification.
Section 4, "Electrical Requirements"	Electrical requirements for *Dead Battery* operation and cable detection.
Section 5, "Physical Layer"	Details of the *PD PHY Layer* requirements
Section 6, "Protocol Layer"	*Protocol Layer* requirements including the *Message*s, timers, counters, and state operation.
Section 7, "Power Supply"	Power supply requirements for both *Provider*s and *Consumer*s.
Section 8, "Device Policy"	*Device Policy Manager* requirements. *Policy Engine Atomic Message Sequence* (*AMS*) diagrams and state diagrams
Section 9, "States and Status Reporting"	*PDUSB Device* requirements including mapping of V_{BUS} to USB states. *System Policy Manager* requirements including descriptors, events, and requests.
Section 10, "Power Rules"	*PDP Rating* definitions for *PD*.
Section A, "CRC calculation"	Example *CRC* calculations.
Section B, "Message Sequence Examples (Deprecated)"	Scenarios illustrating *Device Policy Manager* operation. ***Deprecated***
Section C, "VDM Command Examples"	Examples of *Structured VDM* usage.Section ***Deprecated***.
Section D, "BMC Receiver Design Examples"	*BMC* Receiver Design Examples.
Section E, "FRS System Level Example"	*FRS* System Level Example.

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1.4.1 Precedence

If there is a conflict between text, figures, and tables, the precedence ***Shall*** be tables, figures, and then text.

In there is a conflict between a generic statement and a more specific statement, the more specific statement ***Shall*** apply.

1.4.2 Keywords

The following keywords differentiate between the levels of requirements and options.

Table 1.2 Keywords

Keyword	Definition
Conditional Normative	***Conditional Normative*** is a keyword used to indicate a feature that is mandatory when another related feature has been implemented. Designers are mandated to implement all such requirements, when the dependent features have been implemented, to ensure interoperability with other compliant devices.
Deprecated	***Deprecated*** is a keyword used to indicate a feature, supported in previous releases of the specification, which is no longer supported.
Discard	See ***Discarded***.
Discarded	***Discard***, ***Discards*** and ***Discarded*** are equivalent keywords indicating that a *Packet* when received ***Shall*** be thrown away by the *PHY Layer* and not passed to the *Protocol Layer* for processing. No ***GoodCRC*** *Message* ***Shall*** be sent in response to the *Packet*.
Discards	See ***Discarded***.
Ignore	See ***Ignored***.
Ignored	***Ignore***, ***Ignores*** and ***Ignored*** are equivalent keywords indicating *Message*s or *Message* fields which, when received, ***Shall*** result in no special action by the receiver. An ***Ignored*** *Message* ***Shall*** only result in returning a ***GoodCRC*** *Message* to acknowledge *Message* receipt. A *Message* with an ***Ignored*** field ***Shall*** be processed normally except for any actions relating to the ***Ignored*** field.
Ignores	See ***Ignored***.
Informative	***Informative*** is a keyword indicating text with no specific requirements, provided only to improve understanding.
Invalid	***Invalid*** is a keyword when used in relation to a *Packet* indicates that the *Packet*'s usage or fields fall outside of the defined specification usage. When ***Invalid*** is used in relation to an *Explicit Contract* it indicates that a previously established *Explicit Contract* which can no longer be maintained by the *Source*. When ***Invalid*** is used in relation to individual *K-code*s or *K-code* sequences indicates that the received *Signaling* falls outside of the defined specification.
May	***May*** is a keyword that indicates a choice with no implied preference.
May Not	***May Not*** is a keyword that is the inverse of ***May***. Indicates a choice to not implement a given feature with no implied preference.
N/A	***N/A*** is a keyword that indicates that a field or value is not applicable and has no defined value and ***Shall Not*** be checked or used by the recipient.
Normative	See ***Shall***.
Optional	***Optional***, ***Optionally*** and ***Optional Normative*** are equivalent keywords that describe features not mandated by this specification. However, if an ***Optional*** feature is implemented, the feature ***Shall*** be implemented as defined by this specification.
Optional Normative	See ***Optional***.
Optionally	See ***Optional***.

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Keyword	Definition
Reserved	***Reserved*** is a keyword indicating bits, bytes, words, fields, and code values that are set-aside for future standardization. Their use and interpretation ***May*** be specified by future extensions to this specification and ***Shall Not*** be utilized or adapted by vendor implementation. A ***Reserved*** bit, byte, word, or field ***Shall*** be set to zero by the sender and ***Shall*** be ***Ignored*** by the receiver. ***Reserved*** field values ***Shall Not*** be sent by the sender and ***Shall*** be ***Ignored*** by the receiver.
Shall	***Shall*** and ***Normative*** are equivalent keywords indicating a mandatory requirement. Designers are mandated to implement all such requirements to ensure interoperability with other compliant devices.
Shall Not	***Shall Not*** is a keyword that is the inverse of ***Shall*** indicating non-compliant operation.
Should	***Should*** is a keyword indicating flexibility of choice with a preferred alternative; equivalent to the phrase “it is recommended that…”.
Should Not	***Should Not*** is a keyword is the inverse of ***Should***; equivalent to the phrase “it is recommended that implementations do not…”.
Static	***Static*** is a keyword indicating that a field that never changes.
Valid	***Valid*** is a keyword that is the inverse of ***Invalid*** indicating either a Packet or *Signaling* that fall within the defined specification or an *Explicit Contract* that can be maintained by the *Source*.

1.4.3 Numbering

Numbers that are immediately followed by a lowercase “b” (e.g., 01b) are binary values. Numbers that are immediately followed by an uppercase “B” are byte values. Numbers that are immediately followed by a lowercase “h” (e.g., 3Ah) or are preceded by “0x” (e.g., 0xFF00) are hexadecimal values. Numbers not immediately followed by either a “b”, “B”, or “h” are decimal values.

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1.3 Related Documents

Document references listed in *Table 1.3, "Document References"* are inclusive of all approved and published ECNs and Errata.

Table 1.3 Document References

Bookmark Reference	Title
[DPTC2.1]	DisplayPort™ Alt Mode on *USB Type-C* Standard *www.vesa.org*.
[IEC 60950-1]	IEC 60950-1:2005 Information technology equipment – Safety – Part 1: General requirements: Amendment 1:2009, Amendment 2:2013. *www.iec.ch*.
[IEC 60958-1]	IEC 60958-1:2021 Digital Audio Interface Part:1 General. *www.iec.ch*.
[IEC 62368-1]	IEC 62368-1:2018 Audio/Video, information, and communication technology equipment – Part 1: Safety requirements. *www.iec.ch*.
[IEC 62368-3]	IEC 62368-3:2017 Audio/video, information, and communication technology equipment - Part 3: Safety aspects for DC power transfer through communication cables and ports *www.iec.ch*.
[IEC 63002]	IEC 63002:2021 Interoperability specifications and communication method for external power supplies used with computing and consumer electronics devices *www.iec.ch*.
[ISO 3166]	ISO 3166 international Standard for country codes and codes for their subdivisions. *http://www.iso.org/iso/home/standards/country_codes.htm*.
[TBT3]	see [USB4] Chapter 13 for Thunderbolt™ 3 device operation.
[UCSI]	*USB Type-C* Connector System Software Interface (UCSI) Specification *https://www.usb.org/documents*.
[USB 2.0]	Universal Serial Bus 2.0 Specification, *https://www.usb.org/documents*.
[USB 3.2]	Universal Serial Bus 3.2 Specification *https://www.usb.org/documents*.
[USB Type-C 2.4]	Universal Serial Bus Type-C Cable and Connector Specification, *https://www.usb.org/documents*.
[USB4]	Universal Serial Bus 4 Specification (USB4®), *https://www.usb.org/documents*.
[USBBC 1.2]	Universal Serial Bus Battery Charging Specification plus Errata (referred to in this document as the Battery Charging specification). *https://www.usb.org/documents*.
[USBPD 2.0]	Universal Serial Bus Power Delivery Specification, *https://www.usb.org/documents*.
[USBPDCompliance]	USB Power Delivery Compliance Test Specification, *https://www.usb.org/documents*.
[USBPDFirmwareUpdate 1.0]	Universal Serial Bus Power Delivery Firmware Update Specification, *https://www.usb.org/documents*.
[USBTypeCAuthentication 1.0]	Universal Serial Bus Type-C Authentication Specification, *https://www.usb.org/documents*.
[USBTypeCBridge 1.1]	Universal Serial Bus Type-C Bridge Specification, *https://www.usb.org/documents*.

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1.6 Terms and Abbreviations

This section defines terms used throughout this document. For additional terms that pertain to the Universal Serial Bus, see Chapter 2, "Terms and Abbreviations," in ***[USB 2.0]***, ***[USB 3.2]***, ***[USB Type-C 2.4]*** and ***[USBBC 1.2]***.

Table 1.4 Terms and Abbreviations

Term	Description
(A)PDO	Refers to both the *PDO* and *APDO* collectively.
AC Supply *AC Supplied*	Refers to the main AC power source typically provided to the wall AKA "mains".
Active Cable	A cable with a *USB Type-C* plug on each end that incorporates data bus signal conditioning circuits. The cable supports the Structured VDM ***Discover Identity*** *Command* to expose its characteristics in addition to other Structured VDM *Command*s (Electronically Marked Cable see ***[USB Type-C 2.4]***).
Active Cable VDO	VDO defining the Capabilities of an Active Cable.
Active Mode	A *Mode* which has been through the *Mode Entry* process but not the *Mode Exit* process.
Adjustable Voltage Supply	A power supply whose output voltage can be adjusted to an operating voltage within its Advertised range. These *Capabilities* are exposed by the *Adjustable Voltage Supply* (*AVS*) *APDO* (see *Section 6.4.1.2.4, "Augmented Power Data Object (APDO)"*). **Note:** Unlike the *SPR PPS*, the *SPR AVS* and *EPR AVS* do not support current limit.
Advertise	An offer made by a *Source* in the ***Source_Capabilities***/***EPR_Source_Capabilities*** *Message* (e.g., an *APDO* or *PDO*).
Alternate Mode	Operation defined by a Vendor or Standard's organization, which is associated with a *SVID*. The definition of *Alternate Mode*s is outside the scope of USB-IF specifications. Entry to and exit from the *Alternate Mode* uses the *Mode Entry* and *Mode Exit* processes. As defined in ***[USB Type-C 2.4]***.
Alternate Mode Adapter	A *PDUSB Device* which supports *Alternate Mode*s as defined in ***[USB Type-C 2.4]***. **Note:** Since an *AMA* is a *PDUSB Device*, it has a single *UFP* that is only addressable by *SOP Packet*s.
Alternate Mode Controller	A *DFP* that supports connection to *AMA*s as defined in ***[USB Type-C 2.4]***. A *DFP* that is an *AMC* can also be a *PDUSB Host*.
AMA	See *Alternate Mode Adapter*.
AMC	See *Alternate Mode Controller*.
AMS	See *Atomic Message Sequence*.
APDO	See *Augmented Power Data Object*.
Assured Capacity Charger	As defined in ***[USB Type-C 2.4]***. This maps to a *Charger* with one or more *Guaranteed Capability Port*s.
Assured Capacity Group	As defined in ***[USB Type-C 2.4]***. This maps to a group of *Guaranteed Capability Port*s.
Atomic Message Sequence	A fixed sequence of *Message*s as defined in *Section 8.3.2, "Atomic Message Sequence Diagrams"* typically starting and ending in one of the following states: ***PE_SRC_Ready***, ***PE_SNK_Ready*** or ***PE_CBL_Ready***. An *AMS* is *Non-interruptible*.
Attach	Mechanical joining of the *Port Pair* by a cable.
Attached	USB Power Delivery *Port*s which are mechanically joined with USB cable.
Attachment	See *Attach*.
Augmented Power Data Object	*Data Object* used to expose a *Source Port*'s or *Sink Port*'s power *Capabilities* as part of a ***Source_Capabilities***/***EPR_Source_Capabilities*** or ***Sink_Capabilities***/***EPR_Sink_Capabilities*** *Message* respectively. An *SPR PPS Data Object*, *SPR AVS Data Object* and *EPR AVS Data Object* are defined.
AVS	See *Adjustable Voltage Supply*.
AVS Mode	A power supply, currently operating as an *AVS*, is said to be operating in *AVS Mode*.
Battery	A power storage device residing behind a *Port* that can either be a *Source* or *Sink* of power.

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Term	Description
Battery Slot	A physical location where a *Hot Swappable Battery* can be installed. A *Battery Slot* might or might not have a *Hot Swappable Battery* present in a *Battery Slot* at any given time.
Battery Supply	A power supply that directly applies the output of a *Battery* to *VBUS*. This is exposed by the *Battery Supply PDO* (see Section 6.4.1.2.3, "Battery Supply Power Data Object").
BDO	See *BIST Data Object*.
BFSK	See *Binary Frequency Shift Keying*.
Bi-phase Mark Coding	Modification of Manchester coding where each zero has one transition and a one has two transitions (see ***[IEC 60958-1]***).
Binary Frequency Shift Keying	A *Signaling Scheme* now ***Deprecated*** in this specification. *BFSK* used a pair of discrete frequencies to transmit binary (0s and 1s) information over *VBUS*. See ***[USBPD 2.0]*** for further details.
BIST	Built-In Self-Test - Power Delivery testing mechanism for the *PHY Layer*.
BIST Data Object	*Data Object* used by *BIST Messages*.
BIST Mode	A *BIST* receiver or transmitter test mode enabled by a *BIST Message*.
BIST Carrier Mode	A *BIST Mode* in which the *PHY Layer* sends out a *BMC* encoded continuous string of alternating "1"s and "0"s.
BIST Test Data Mode	A *BIST Mode* in which the *PHY Layer* sends out a ***GoodCRC*** *Message* and then enters a test mode where it sends no further *Messages*, except ***GoodCRC*** *Messages*, in response to received *Messages*.
BIST Shared Capacity Test Mode	A *BIST Mode* applicable only to a *Shared Capacity Group* of *Ports* where the maximum *Source Capabilities* are always offered on every *Port*, regardless of the availability of shared power i.e., all shared power management is disabled.
BMC	See *Bi-phase Mark Coding*.
Cable Capabilities	*Capabilities* offered by a *Cable Plug*.
Cable Discovered	USB Power Delivery *Ports* that have exchanged a *Message* and a ***GoodCRC*** *Message* response with a *Cable Plug* or a *VPD* using the USB Power Delivery protocol so that both the *Port* and the *Cable Plug* know that each is *PD Capable* and which *Revision* they each support.
Cable Discovery	See *Cable Discovered*.
Cable Plug	Term used to describe a *PD Capable* element in a *Multi-Drop* system addressed by *SOP' Packets*/ *SOP'' Packets*. Logically the *Cable Plug* is associated with a *USB Type-C* 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 ***Cable Reset*** *Signaling* from the *DFP*. It restores the *Cable Plugs* to their default, power up condition and resets the *PD* communications engine in the cable to its default state. It does not reset the *Port Partners* but does restore *VCONN* to its *Attachment* state.
Cable VDO	*VDO* returned by the *Cable Plug* containing *Cable Capabilities*.
Capabilities	Features supported by a product. These can include, for example, power levels supplied/ needed, cable type, *Battery* support or ***[USB4]*** support.
Capabilities Mismatch	Indication from the *Sink* that the *Source*'s *Advertised Capabilities* don't match the *Sink*'s needs.
CC	See *Configuration Channel*.
Cert Stat VDO	The *Cert Stat VDO* contains the XID assigned by USB-IF to the product before certification in binary format.
Charge Through	A mechanism for a *VCONN Powered USB Device* (*VPD*) to pass power and *CC* communication from one *Port* to the other without any interference or re-regulation.
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 to which it is *Attached*. Most common use is to allow a single *Port USB Host* to support a *USB Device* while being charged.
Charger	*Provider* whose primary purpose is to supply power to a *Consumer* or *Consumers* in order to charge their *Battery*.
Chunk	A ***MaxExtendedMsgChunkLen*** (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
Chunked	See *Chunking*.
Chunked Extended Message	*Extended Message* which has been broken up into *Chunk*s.
Chunking	The process of breaking up a *Data Block* larger than ***MaxExtendedMsgLegacyLen*** (26-bytes) into two or more *Chunk*s.
Chunking Layer	Part of the *Protocol Layer* responsible for *Chunking*.
CL	See *Current Limit*.
Cold Socket	A *Port* that does not apply ***vSafe5V*** on *VBUS* until a *Sink* is *Attached*.
Collision Avoidance	Mechanisms to prevent simultaneous communication by the *Source*, *Sink* and *Cable Plug* on *CC*.
Command	Request and response pair defined as part of a *Structured Vendor Defined Message* (see *Section 6.4.4.2, "Structured VDM"*).
Configuration Channel	Single wire used by the *BMC PHY Layer Signaling Scheme* (see ***[USB Type-C 2.4]***).
Connect	See *Connected*.
Connected	USB Power Delivery ports that have exchanged a *Message* and a ***GoodCRC*** *Message* response using the USB Power Delivery protocol so that both *Port Partner*s know that each is *PD Capable*.
Constant Voltage	A constant voltage feature of an *SPR PPS Source*. The *SPR PPS Source* output voltage remains constant as the load changes up to its *Current Limit*.
Consumer	The capability of a *PD Port* (typically a *Device*'s *UFP*) to sink power from the power conductor (e.g., *VBUS*). This corresponds to a *USB Type-C Port* with R_d asserted on its *CC* wire.
Consumer/Provider	A *Consumer* with the additional capability to function as a *Provider*. This corresponds to a *Dual-Role Power Port* with R_d asserted on its *CC* wire.
Continuous BIST Mode	The *BIST Mode* where the *Port* or *Cable Plug* being tested sends a continuous stream of test data.
Contract	An agreement on both power level and direction is 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 Contract* or *Implicit Contract* in place. The *Contract* can only be altered in the case of a *Negotiation*/*Re-negotiation*, *Power Role Swap*, *Fast Role Swap*, *Hard Reset*, *Error Recovery* or failure of the *Source*.
Control Message	A *Control Message* is defined as a *Message* with the ***Number of Data Objects*** field in the *Message Header* is set to zero. The *Control Message* consists only of a *Message Header* and a *CRC*.
CRC	*CRC* stands for Cyclic Redundancy Check. It is an error-detecting code used to determine if a block of data has been corrupted.
CT-VPD	See *VCONN Powered USB Charge Through Device*.
Current Limit	A current limiting feature of an *SPR PPS Source*. When a *Sink* operating in *SPR PPS* mode attempts to draw more current from the *Source* than the requested *Current Limit* value, the *Source* reduces its output voltage so the current it supplies remains at or below the requested value. **Note:** *Current Limit* is not supported by *SPR AVS* and *EPR AVS Source*s.
CV	See *Constant Voltage*.
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 ***MaxExtendedMsgLen*** 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 Message*s are easily identifiable because the ***Number of Data Objects*** field in the *Message Header* is always 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*. For example Power, Request, *BIST*, and Vendor *Data Object*s are defined.
Data Reset	Process which resets USB Communication.
Data Role	A *Port Partner* will be in one of two *Data Role*s; either *DFP* (*USB Host*) or *UFP* (*USB Device*).
Data Role Swap	Process of exchanging the *Data Role*s between *Port Partner*s.
Dead Battery	A device has a *Dead Battery* when the *Battery* in a device is unable to power its functions.

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Term	Description
Default Contract	An agreement on current at 5V is reached between a *Port Pair* based on *USB Type-C* current (***[USB Type-C 2.4]***).
Detach	Mechanical unjoining of the *Port Pair* by removal of the cable.
Detached	USB Power Delivery *Port*s which are no longer mechanically joined with USB cable.
Detaches	See *Detach*.
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	Policy applied across multiple *Port*s in a *Source* or *Sink*.
Device Policy Manager	Module running in a *Source* or *Sink* that applies *Device Policy* to each *Port* in the device, as *Local Policy*, via the *Policy Engine*.
DFP	See *Downstream Facing Port*.
DFP VDO	*VDO* returned by the *DFP* containing *Capabilities*.
Differential Non-Linearity	The difference between an ideal *LSB* step, and the real observable *LSB* step when the Power *Source* is operating in either *PPS* or *AVS* mode. A ***DNL*** of 0 indicates that the step is ideal. If ***DNL*** is positive the step is larger than the ideal *LSB*, and if it is negative then the step is smaller than ideal.
Discovery Process	*Command* sequence using *Structured Vendor Defined Message*s resulting in identification of the *Port Partner* and *Cable Plug*, and their supported *SVID*s and *Alternate Mode*s.
DNL	See *Differential Non-Linearity*.
Downstream Facing Port	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 ***[USB Type-C 2.4]***. At connection, the *Port* defaults to operation as the *Source* and as a *USB Host* (when *USB Communication* is supported).
DPM	See *Device Policy Manager*.
DRD	See *Dual-Role Data*.
DRP	See *Dual-Role Power*.
Dual-Role Data	Capability of operating as either a *DFP* or *UFP*.
Dual-Role Data Port	A *Port* capable of operating as *DRD*.
Dual-Role Power	Capability of operating as either a *Source* or *Sink*.
Dual-Role Power Device	A product containing one or more *Dual-Role Power Port*s that can operate as either a *Source* or a *Sink*.
Dual-Role Power Port	A *Port* capable of operating as a *DRP*.
EM	See *Extended Message*.
End of Packet	*K-code* marker used to delineate the end of a *Packet*.
EOP	See *End of Packet*.
EPR	See *Extended Power Range*.
EPR AVS	A power supply operating in *EPR Mode* whose output voltage can be adjusted to an operating voltage within its *Advertised* range. Unlike *SPR PPS* it does not support current limit. The *AVS Capabilities* are exposed by the *Adjustable Voltage Supply APDO* (see *Section 6.4.1.2.4, "Augmented Power Data Object (APDO)"*).
EPR AVS Mode	A *EPR Source*, currently operating in an *EPR AVS Contract*, is said to be operating in *EPR AVS Mode*.
EPR Cable	A cable which is rated to operate in both *SPR Mode* and *EPR Mode*.
EPR Capabilities	The *EPR Capabilities Message*s (***EPR_Source_Capabilities*** and ***EPR_Sink_Capabilities***) are *Extended Message*s with the first seven positions filled with the same *SPR (A)PDO*s returned by the *SPR Capabilities Message*s (***Source_Capabilities*** and ***Sink_Capabilities***) followed by the *EPR (A)PDO*s starting in the eighth position.
EPR Capable	A product which has the ability to operate in *EPR Mode*.

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Term	Description
EPR Mode	A Power Delivery mode of operation where maximum allowable voltage is 48V. The *Sink* complies to the requirements of ***[IEC 62368-1]*** for operation with a PS3 *Source*. The *Source* complies to the requirements of ***[IEC 62368-1]*** for operation with a PS3 *Sink*. The cable complies with ***[IEC 62368-1]***. Entry into the *EPR Mode* requires that an *EPR Source* is *Attached* to an *EPR Sink* with an *EPR Cable*. The *EPR Source* will only enter the *EPR Mode* when requested to do so by the *Sink* and it has determined it is *Attached* to an *EPR Sink* with an *EPR Capable* cable. Only the ***EPR_Source_Capabilities*** and the ***EPR_Request*** *Message*s are allowed to *Negotiate EPR Explicit Contract*s. The *SPR Mode Message*s (***Source_Capabilities*** and ***Request***) are not allowed to be used while in *EPR Mode*.
EPR (A)PDO	*Fixed Supply PDO* that offers either 28V, 36V or 48V. *Adjustable Voltage Supply* (*AVS*) *APDO* whose Maximum voltage is the highest *Fixed Supply PDO* voltage in the ***EPR_Source_Capabilities*** *Message* and no more than 240W.
EPR Sink	A *Sink* that supports both *SPR Mode* and *EPR Mode*.
EPR Sink Port	A *Port* exposed on an *EPR Sink*.
EPR Source	A *Source* that supports both *SPR Mode* and *EPR Mode*.
EPR Source Port	A *Port* exposed on an *EPR Source*.
Error Recovery	*Port* enters the ***ErrorRecovery*** *State* as defined in ***[USB Type-C 2.4]***.
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 ***Accept*** *Message* in response to a ***Request*** *Message* sent by a *Sink* followed by a ***PS_RDY*** *Message* sent by the *Source* to indicate that the power supply is ready. This corresponds to the ***PE_SRC_Ready*** *State* for a *Source Policy Engine* and the ***PE_SNK_Ready*** *State* for a *Source Policy Engine*. The *Explicit Contract* can be altered through the *Re-negotiation* process.
Extended Capabilities	An *Extended Message* containing *Capabilities* information.
Extended Control Message	An *Extended Message* containing control information only.
Extended Message	A *Message* containing *Data Block*s. The *Extended Message* is defined by the ***Extended*** 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.
Extended Power Range	Extends the power range from a maximum of 100W (*SPR*) to a maximum of 240W (*EPR*). When operating in the *EPR Mode*, only *EPR* specific *Message*s (the ***EPR_Source_Capabilities*** *Message* and the ***EPR_Request*** *Message*) are used to *Negotiate Explicit Contract*s.
External Supply	Power supply external to the device. This could be powered from the wall or from any other power source.
Fast Role Swap	Process of exchanging the *Source* and *Sink Power Role*s between *Port Partner*s rapidly due to the disconnection of an external power supply.
Fast Role Swap Request	An indication from an *Initial Source* to the *Initial Sink* that a *Fast Role Swap* is needed. The *Fast Role Swap Request* is indicated by driving the *CC* line to ground for a short period; it is not a *Message* or *Signaling*.
First Explicit Contract	The *Explicit Contract* that immediately follows an *Attach*, power on *Hard Reset*, *Power Role Swap* or *Fast Role Swap* event.
Fixed Battery *Fixed Batteries*	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 6.4.1.2.1, "Fixed Supply Power Data Object"*)
Frame	Generic term referring to an atomic communication transmitted by *PD* such as a *Packet*, *Test Frame* or *Signaling*.
FRS	See *Fast Role Swap*.

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Term	Description
Guaranteed Capability Port	A *Guaranteed Capability Port* is always capable of delivering its ***Port Maximum PDP*** and indicates this by setting its ***Port Present PDP*** to be the same as its ***Port Maximum PDP*** except when limited by the cable's *Capabilities*. This is a ***Static*** capability.
Hard Reset	This is initiated by ***Hard Reset*** *Signaling* from either *Port Partner*. It restores *VBUS* to *USB Default Operation* and resets the *PD* communications engine to its default *State* in both *Port Partner*s as well as in any *Attached Cable Plug*s. It restores both *Port Partner*s to their default *Data Role*s and returns the *VCONN Source* to the *Source Port*. A *DRP Source Port* operating as a *Source* will continue to operate as a *Source*.
Host	See *USB Host*.
Hot Swappable Battery	A *Battery* that is easily accessible for a user to remove or change for another *Battery*.
Hub	A *USB Device* that provides additional connections to the USB.
ID Header VDO	The *VDO* in a ***Discover Identity*** *Command* immediately following the *VDM Header*. The *ID Header VDO* contains information corresponding to the Power Delivery Product.
Idle	Condition on *CC* where there are no signal transitions within a given time window. See *Section 5.8.6.1, "Definition of Idle"*.
Implicit Contract	An agreement on power levels between a *Port Pair* which occurs, not because of the Power Delivery *Negotiation* process, but because of a *Power Role Swap* or *Fast Role Swap*. *Implicit Contract*s are transitory since the *Port Pair* is required to immediately *Negotiate* an *Explicit Contract* after the *Power Role Swap*. An *Implicit Contract* ***Shall*** be limited to *USB Type-C* current (see ***[USB Type-C 2.4]***).
Initial Sink	*Sink* at the start of a *Power Role Swap* or *Fast Role Swap* which transitions to being the *New Source*.
Initial Source	*Source* at the start of a *Power Role Swap* or *Fast Role Swap* which transitions to being the *New Sink*.
Initiator	The initial sender of a *Command* request in the form of a query.
Invariant PDOs	A *Source Port* that offers *Invariant PDOs* will always Advertise the same *PDO*s except when limited by the cable.
IoC	The *Negotiated* current value as defined in ***[IEC 63002]***.
IR Drop	The voltage drop across the cable and connectors between the *Source* and the *Sink* as defined in ***[USB Type-C 2.4]***. 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-code*s 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 *USB Host* or some combination of these. The *Local Policy* ***Optionally*** can be changed by a *System Policy Manager*.
LPS	Limited Power Supply as defined in ***[IEC 62368-1]***.
LSB	An abbreviation for Least Significant Bit.
Managed Capability Port	A *Managed Capability Port* can have its ***Port Present PDP*** set to a different value than its ***Port Maximum PDP***. Its ***Port Present PDP*** value can be dynamic and change during normal operation.
Message	The *Packet Payload* consisting of a *Message Header* for *Control Message*s and a *Message Header* and data for *Data Message*s and *Extended Message*s as defined in *Section 6.2, "Messages"*.
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 *Message*s as defined in *Section 6, "Protocol Layer"*.
Modal Operation	Operation where there are one or more *Active Mode*s. *Modal Operation* ends when there are no longer any *Active Mode*s.
Mode	*Mode* is a general term used to describe a particular type of operation of a given device. Examples of modes are: *Alternate Mode*, *EPR Mode*, *SPR Mode*.

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Term	Description
Mode Entry	Process to start operation in a particular *Mode*.
Mode Exit	Process to end operation in a particular *Mode*.
Multi-Drop	PD is a *Multi-Drop* system sharing the Power Delivery communication channel between the *Port Partner*s and the cable.
Negotiate	See *Negotiation*.
Negotiated	See *Negotiation*.
Negotiation	This is the PD process whereby: 1) The *Source Advertise*s its *Capabilities*. 2) The *Sink* requests one of the *Advertise*d *Capabilities*. 3) The *Source* acknowledges the request, alters its output to satisfy the request and informs the *Sink*. The result of the *Negotiation* is a *Contract* for power delivery/consumption between the *Port Pair*.
New Sink	*Sink* at the end of a *Power Role Swap* or *Fast Role Swap* which has transition from being the *Initial Source*.
New Source	*Source* at the end of a *Power Role Swap* or *Fast Role Swap* which has transition from being the *Initial Sink*.
Non-interruptible	There cannot be any unexpected *Message*s during an *AMS*; it is therefore *Non-interruptible*. An *AMS* starts when the first *Message* in the *AMS* has been sent (i.e., a ***GoodCRC*** *Message* has been received acknowledging the *Message*). See *Section 8.3.2.1.3, "Atomic Message Sequences"*.
OCP	Over-Current Protection.
OTP	Over-Temperature Protection.
OVP	Over-Voltage Protection.
Packet	One entire unit of PD communication including a *Preamble*, *SOP**, *Payload*, *CRC* and *EOP* as defined in *Section 5.6, "Packet Format"*.
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* ***Discover Identity*** to determine its characteristics (Electronically Marked Cable see ***[USB Type-C 2.4]***). **Note:** This specification does not discuss *Passive Cable*s that are not Electronically Marked.
Passive Cable VDO	VDO defining the Capabilities of a Passive Cable.
Payload	Data content of a *Packet*, provided to/from the *Protocol Layer*.
PD	USB Power Delivery
PD Capable	A *Port* that supports USB Power Delivery.
PD Connection	See *Connected*.
PD Power	The output power, in Watts, of a *Source*, as specified by the manufacturer and expressed in *Fixed Supply PDO*s as defined in *Section 10, "Power Rules"*.
PD SID	See *USB-IF PD SID*.
PDO	See *Power Data Object*.
PDP	See *PD Power*.
PDP Rating	The *PDP Rating* is the same as the Manufacturer declared *PDP* for a *Source Port* except where there is a fractional value, in which case the *PDP Rating* corresponds to the integer part of the Manufacturer declared *PDP Rating* (see *Section 6.4.11.2, "Port Maximum PDP Field"*).
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 Packet*s.
PDUSB Host	A *USB Host* which is *PD Capable* on at least one of its *DFP*s. A *PDUSB Host* is only addressed by *SOP Packet*s.

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Term	Description
PDUSB Hub	A port expander *USB Device* with a *UFP* and one or more *DFP*s which is *PD Capable* on at least one of its *Port*s. A *PDUSB Hub* is only addressed by *SOP Packet*s. A self-powered *PDUSB Hub* is treated as a *USB Type-C Multi-Port Charger*.
PDUSB Peripheral	A *USB Device* with a *PD Capable UFP* which is not a *PDUSB Hub*. A *PDUSB Peripheral* is only addressed by *SOP Packet*s.
PE	See *Policy Engine*.
Peripheral	A physical entity that is *Attached* to a USB cable and is currently operating as a *USB Device*.
PHY Layer	The Physical Layer responsible for sending and receiving *Message*s 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 *Advertise*s, requests made to (re)*Negotiate* power and the responses made to requests received.
Policy Engine	The *Policy Engine* interprets the *Device Policy Manager*'s input to implement *Policy* for a given *Port* and directs the *Protocol Layer* to send appropriate *Message*s.
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 Port*s.
Port Partner	A *Contract* is *Negotiated* between a *Port Pair* connected by a USB cable. These ports are known as *Port Partner*s.
Power Conductor	The wire that delivers power from the *Source* to *Sink*. For example, USB's *VBUS*.
Power Consumer	See *Consumer*.
Power Data Object	*Data Object* used to expose a *Source Port*'s or *Sink Port*'s power *Capabilities* as part of a ***Source_Capabilities*** / ***EPR_Source_Capabilities*** or ***Sink_Capabilities*** / ***EPR_Sink_Capabilities*** *Message* respectively. *Fixed Supply*, *Variable Supply* and *Battery Supply Power Data Object*s are defined; *SPR Mode* uses all four while *EPR Mode* uses only *Fixed Supply* and *AVS PDO*s.
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 Delivery Mode*. *Power Delivery Mode* can only be exited by *Detach*ing the *Port*s, applying a *Hard Reset* or by the *Source* removing power (except when the *Initial Source* removes power from *VBUS* during the *Power Role Swap* procedure).
Power Provider	See *Provider*.
Power Role	A *Port Partner* will be in one of two *Power Role*s; either *Source* or *Sink*.
Power Role Swap	Process of exchanging the *Source* and *Sink Power Role*s between *Port Partner*s.
Power Rules	Define voltages and current ranges that are offered by compliant USB Power Delivery *Source*s and used by a USB Power Delivery *Sink* for a given value of PDP Rating. See *Section 10, "Power Rules"*.
PPS	See *Programmable Power Supply*.
PPS Mode	An *SPR Source*, currently operating as an *PPS*, is said to be operating in *PPS Mode*.
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 ***Discover Identity*** *Command*.
Product Type VDO	*VDO* identifying a certain *Product Type* in the *ID Header VDO* of a ***Discover Identity*** *Command*.
Product VDO	The *Product VDO* contains identity information relating to the product.
Programmable Power Supply	A power supply, operating in *SPR Mode*, whose output voltage can be programmatically adjusted in small increments over its *Advertise*d range and has a programmable output current fold back (note that the *SPR AVS* and *EPR AVS* does not).The *Capabilities* are exposed by the *SPR Programmable Power Supply APDO* (see *Section 6.4.1.2.4, "Augmented Power Data Object (APDO)"*).
Protocol Error	An unexpected *Message* during an *Atomic Message Sequence*. A *Protocol Error* during an *AMS* will result in either a *Soft Reset* or a *Hard Reset*.

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Term	Description
Protocol Layer	The entity that forms the *Message*s used to communicate information between *Port Partner*s.
Provider	A *PD Port* (typically a *USB Host*, *Hub*, or *Charger DFP*) that can source power over the power conductor (e.g., *VBUS*). This corresponds to a *USB Type-C Port* with R_p 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 R_p asserted on its *CC* wire.
PS1 *PS2* *PS3*	Classification of electrical power as defined in ***[IEC 62368-1]***.
PSD	*Sink* which draws power but has no other USB or *Alternate Mode* communication function e.g., a power bank.
R_a	Prior to application of *VCONN*, a powered cable applies a pull-down resistor R_a on its *VCONN* pin.
R_d	Pull-down resistor on the *USB Type-C CC* wire used to indicate that the *Port* is a *Sink* (see ***[USB Type-C 2.4]***).
RDO	See *Request Data Object*.
Re-attach	*Attach* of the *Port Pair* by a cable after a previous *Detach*.
Re-negotiate	See *Re-negotiation*.
Re-negotiated	See *Re-negotiation*.
Re-negotiation	A process wherein one of the *Port Partner*s wants to alter the *Negotiated Contract*.
Request	*Message* used by a *Sink Port* to *Negotiate* a *Contract*; refers to either a ***Request***/***EPR_Request*** *Message*.
Request Data Object	*Data Object* used by a *Sink Port* to *Negotiate* a *Contract* as a part of a ***Request***/***EPR_Request*** *Message*.
Responder	The receiver of a *Command* request sent by an *Initiator* that replies with a *Command* response.
Revision	Major release of the USB Power Delivery specification. Each *Revision* will have various*Version*s associated with it.
Revision 1.0	***Deprecated*** major *Revision* of the USB Power Delivery Specification.
Revision 2.0	Superseded major *Revision* of the USB Power Delivery Specification as defined in ***[USBPD 2.0]***, with which this specification is compatible.
Revision 3.x	Current major *Revision*s of the USB Power Delivery Specification.
R_p	Pull-up resistor on the *USB Type-C CC* wire used to indicate that the *Port* is a *Source* (see *[USB Type-C 2.4]*).
Safe Operation	*Source*s must have the ability to tolerate ***vSafe5V*** applied by both *Port Partner*s.
Shared Capacity Charger	As defined in ***[USB Type-C 2.4]***. This maps to a *Charger* with multiple *Managed Capability Port*s.
Shared Capacity Group	As defined in ***[USB Type-C 2.4]***. This maps to a group with *Managed Capability Port*s.
SID	See *Standard ID*.
Signaling	A Preamble followed by an ordered set of four *K-code*s used to indicate a particular line symbol e.g., *Hard Reset* as defined in Section 5.4, "Ordered Sets".
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 *Revision 1.0* of this specification has been ***Deprecated***.
Single-Role Port	A *Port* that is only capable of operating either as a *Source* or *Sink*, but not both. E.g., the port is not a *DRP*.
Sink	The *Port* consuming power from *VBUS*; most commonly a *USB Device*.
Sink Capabilities	*Capabilities* wanted by a *Sink*.
Sink Directed Charge	A charging scheme whereby the *Sink* connects the *Source* to its *Battery* through safety and other circuitry. When the *SPR PPS Current Limit* feature is activated, the *Source* automatically controls its output current by adjusting its output voltage.

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Term	Description
Sink Port	*Port* operating as a *Sink*.
Sink Standby	During *Sink Standby* the Sink reduces its current draw to ***iSnkStdby***
Soft Reset	A process that resets the *PD* communications engine to its default state.
SOP	*K-code* marker used for communication between *Port Partner*s. See also *Start of Packet*.
SOP Communication	Communication using *SOP Packet*s also implies that an *AMS* is being followed.
SOP Packet	Any Power Delivery *Packet* which starts with an *SOP*.
SOP' Communication	Communication with a *Cable Plug* using *SOP' Packet*s, also implies that an *AMS* is being followed.
SOP' Packet	Any Power Delivery *Packet* which starts with an *SOP'* used to communicate with a *Cable Plug*.
SOP'' Communication	Communication with a *Cable Plug* using *SOP'' Packet*s, also implies that an *AMS* is being followed.
SOP'' Packet	Any Power Delivery *Packet* which starts with an *SOP''* used to communicate with a *Cable Plug* when *SOP' Packet*s are being used to communicate with the other *Cable Plug*.
SOP' *SOP''*	*K-code* marker used for communication between a *Port* and a *Cable Plug*. See also *Start of Packet*.
*SOP**	Used to generically refer to *K-code* markers: *SOP*, *SOP'* and *SOP''*. See also *Start of Packet*.
SOP Communication*	Communication using *SOP* Packet*s, also implies an *AMS* is being followed.
SOP Packet*	A term referring to any Power Delivery *Packet* starting with either *SOP*, *SOP'*, or *SOP''*.
Source	The *Power Role* a *Port* is operating in to supply power over *VBUS*; most commonly a *USB Host* or *Hub* downstream port.
Source Capabilities	*Capabilities* offered by a *Source*.
Source Port	*Port* operating as a *Source*.
Specification Revision	See *Revision*.
SPM	See *System Policy Manager*.
SPR	See *Standard Power Range*.
SPR AVS	An *SPR Source* whose output voltage can be adjusted to an operating voltage within its *Advertise*d range. Unlike *SPR PPS*, it does not support current limit. The *SPR AVS Capabilities* are exposed by the *SPR AVS APDO* (see *Section 6.4.1.2.4.2, "SPR Adjustable Voltage Supply APDO"*).
SPR AVS Mode	A *SPR Source*, currently operating in an *SPR AVS Contract*, is said to be operating in *SPR AVS Mode*.
SPR Capabilities	An *SPR Capabilities Message* (***Source_Capabilities*** *Message* or ***Sink_Capabilities*** *Message*) has at least one *Power Data Object* for ***vSafe5V*** followed by up to 6 additional *Power Data Object*s.
SPR Contract	*Explicit Contract Negotiate*d, in *SPR Mode*, based on *SPR (A)PDO*s.
SPR Mode	The classic mode of PD operation where *Explicit Contract*s are *Negotiated* using *SPR (A)PDO*s.
SPR (A)PDO	*Fixed Supply PDO* that offers up to 20V and no more than 100W. *Variable Supply PDO* whose Maximum voltage offers up to 21V and no more than 100W. *Battery Supply PDO* whose Maximum voltage offers up to 21V and no more than 100W. *Adjustable Voltage Supply* (*AVS*) *APDO* whose Maximum voltage is up to 20V and no more than 100W. *Programmable Power Supply* (*PPS*) *APDO* whose Maximum voltage is up to 21V and no more than 100W.
SPR PPS	A power supply whose output voltage and output current can be programmatically adjusted in small increments over its *Advertise*d range. It supports current limit unlike *SPR AVS* and *EPR AVS*. The *Capabilities* are exposed by the *Programmable Power Supply APDO*s (see *Section 6.4.1.2.4, "Augmented Power Data Object (APDO)"*).
SPR PPS Mode	A power supply, currently operating in an *SPR PPS Contract*, is said to be operating in *SPR PPS Mode*.
SPR Sink	A *Sink* which only supports *SPR Mode* and does not support *EPR Mode*.
SPR Sink Port	A *Port* exposed on an *SPR Sink*.
SPR Source	A *Source* which only supports *SPR Mode* and does not support *EPR Mode*.

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Term	Description
SPR Source Port	A *Port* exposed on an *SPR Source*.
Standard ID	16-bit unsigned value assigned by the USB-IF to a given industry standards organization's specification.
Standard or Vendor ID	Generic term referring to either a *VID* or a *SID*. *SVID* is used in place of the phrase "Standard or Vendor ID."
Standard Power Range	Only the ***Source_Capabilities*** and the ***Request*** *Message*s are allowed to *Negotiate SPR Explicit Contract*s. The *EPR Message*s (the ***EPR_Source_Capabilities*** *Message* and the ***EPR_Request*** *Message*) are not allowed to be used while in *SPR Mode*.
Start of Packet	*K-code* marker used to delineate the start of a *Packet*.
State	*PD* state machine state as defined in *Section 6.12, "State behavior"* and *Section 8.3.3, "State Diagrams"* state machines.
Structured VDM	See *Structured Vendor Defined Message*.
Structured VDM Header	The *VDM Header* for a *Structured Vendor Defined Message*.
Structured Vendor Defined Message	A *Vendor Defined Message* where the contents and usage of bits 14...0 of the *VDM Header* are defined by this specification.
SVDM	See *Structured Vendor Defined Message*.
SVID	See *Standard or Vendor ID*.
Swap Standby	During *Swap Standby* the *Source* does not drive *VBUS* and the Sink's current draw does not exceed ***iSnkSwapStdby***.
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 Engine*s.
System Policy Manager	Module running on the *USB Host*. It applies the *System Policy* through communication with *PD Capable Consumer*s and *Provider*s that are also connected to the *USB Host* via USB.
Test Frame	*Frame* consisting of a *Preamble*, *SOP**, followed by test data (See *Section 5.9, "Built in Self-Test (BIST)"*).
Test Pattern	Continuous stream of test data in a given sequence (See *Section 5.9, "Built in Self-Test (BIST)"*).
Tester	The *Tester* is assumed to be a piece of test equipment that manages the *BIST* testing process of a *PD UUT*.
UFP	See *Upstream Facing Port*.
UFP VDO	*VDO* returned by the *UFP* containing *Capabilities*.
UI	See *Unit Interval*.
Unchunked	See *Unchunked Extended Message*.
Unchunked Extended Message	*Extended Message* that has been transmitted whole without using *Chunking*.
Unexpected Message	*Message* that a *Port* supports but has been received in an incorrect *State*.
Unit Interval	The time to transmit a single data bit on the wire.
Unit Under Test	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 ***Reserved*** *Message* type, a *Message* defined by a higher specification *Revision* than the *Revision* this *Port* supports, or an *Unstructured Vendor Defined Message* for which the *VID* is not recognized.
Unstructured VDM	See *Unstructured Vendor Defined Message*.
Unstructured VDM Header	The *VDM Header* for an *Unstructured Vendor Defined Message*.
Unstructured Vendor Defined Message	A *Vendor Defined Message* where the contents of bits 14...0 of the *VDM Header* are undefined.
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*.

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Term	Description
Upstream Facing Port	Indicates the *Port*'s position in the USB topology typically a *Port* on a *Device* as defined in ***[USB Type-C 2.4]***. At connection, the *Port* defaults to operation as a *USB Device* (when *USB Communication* is supported) and *Sink*.
USB Attached State	Synonymous with the ***[USB 2.0]*** and ***[USB 3.2]*** definition of the *Attached* state
USB Communication	Transfer of USB data *Packet*s as defined in ***[USB 2.0]*** and ***[USB 3.2]***.
USB Default Operation	Operation of a *Port* at *Attach* or after a *Hard Reset* where the *DFP Source* applies ***vSafe5V*** on *VBUS* and the *UFP Sink* is operating at ***vSafe5V*** as defined in ***[USB 2.0]***, ***[USB 3.2]***, ***[USB Type-C 2.4]*** or ***[USBBC 1.2]***.
USB Device	Either a *Hub* or a *Peripheral* device as defined in ***[USB 2.0]***, ***[USB 3.2]*** and ***[USB4]***.
USB Host	The computer system where the *USB Host* controller is installed as defined in ***[USB 2.0]***, ***[USB 3.2]*** and ***[USB4]***.
USB Hub	See *Hub*.
USB Powered State	Synonymous with the ***[USB 2.0]*** and ***[USB 3.2]*** definition of the powered state.
USB Safe State	State of the *USB Type-C* connector when there are pins to be re-purposed (see ***[USB Type-C 2.4]***) 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 USB Micro-A plugs and USB Standard-A plugs and receptacles. USB 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 USB Micro-B plugs and USB Standard-B plugs and receptacles, including the PD and non-PD versions. USB 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 ***[USB Type-C 2.4]***.
USB Type-C Multi-Port Charger	A product that exposes multiple *USB Type-C Source Port*s for the purpose of charging multiple connected *USB Device*s as defined in ***[USB Type-C 2.4]***.
USB-C® Port Control	Module in a *PD Capable* device which controls *Attach*/*Detach* and either detects or sets the R_p value.
USB-IF PD SID	Standard ID allocated to this specification by the USB Implementer's Forum.
USB4® Mode	Device is operating in a *Mode* as defined in ***[USB4]***.
UUT	See *Unit Under Test*.
Variable Supply	A poorly regulated power supply that is not a *Battery*. This is exposed by the *Variable Supply PDO* (see *Section 6.4.2, "Request Message"*).
VBUS	The *VBUS* wire delivers power from a *Source* to a *Sink*.
VCONN	Once the connection between *USB Host* and device is established, the *CC* pin (CC1 or CC2) in the receptacle that is not connected via the *CC* wire through the standard cable is re-purposed to source *VCONN* to power circuits in a *Cable Plug*, *VCONN Powered Accessory* or *VCONN Powered USB Device* (see ***[USB Type-C 2.4]***).
VCONN Powered Accessory	An accessory that is powered from *VCONN* to operate in an *Alternate Mode* (see ***[USB Type-C 2.4]***).
VCONN Powered USB Charge Through Device	A *CT-VPD* is a *VPD* with an additional port for connecting a *Source* (e.g., a *Charger*) as defined in ***[USB Type-C 2.4]***. When no *Charger* is connected, a *CT-VPD* behaves as a *VPD*. When a *Charger* is connected, no *PD* communication to the *CT-VPD* itself is possible as *CC* is connected to the *Charger* port. Hence all PD communication then is with the *Charger* and the cable with which it is connected.

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Term	Description
VCONN Powered USB Device	A captive cable *USB Device* that can be powered by either *VCONN* or *VBUS* as defined in ***[USB Type-C 2.4]***. A *VPD* is a captive cable *USB Device* that can be powered by either *VCONN* or *VBUS* and only responds to *SOP' Communication* as defined in the Tables in *Section 6.12, "State behavior"*. It only responds to *Messages* sent with a *Specification Revision* of at least *Revision 3.x*. A *VPD* is not allowed to support *Alternate Modes*. The term *VPD* refers to either a *VPD* or a *CT-VPD* with no *Charger* connected.
VCONN Source	The *USB Type-C Port* responsible for sourcing *VCONN*.
VCONN Swap	Process of exchanging the *VCONN Source* between *Port Partners*.
VDEM	See *Vendor Defined Extended Message*.
VDM	See *Vendor Defined Message*.
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 Defined Message"*).
VDO	See *Vendor Data Object*.
Vendor Data Object	*Data Object* used to send Vendor specific information as part of a *Message*.
Vendor Defined Extended Message	*PD Extended Message* defined for vendor/standards usage. A *VDEM* does not define any structure and *Messages* can be created in any manner that the vendor chooses.
Vendor Defined Message	*PD Data Message* defined for vendor/standards usage. These are further partitioned into *Structured Vendor Defined Messages*, where *Commands* are defined in this specification, and *Unstructured Vendor Defined Messages* which are entirely vendor defined (see *Section 6.4.4, "Vendor Defined Message"*).
Vendor ID	16-bit unsigned value assigned by the USB-IF to a given Vendor.
Version	A minor release of the USB Power Delivery specification associated with a particular *Revision*. *Version* numbers are also defined in *VDMs*.
VI	Same as power (i.e., voltage * current = power)
VID	See *Vendor ID*.
VPD	See *VCONN Powered USB Device*.

1.7 Parameter Values

The parameters in this specification are expressed in terms of absolute values. For details of how each parameter is measured in compliance please see ***[USBPDCompliance]***.

1.8 Changes from Revision 3.0

Extended Power Range (EPR) including Adjustable Voltage Supply (AVS) has been added.

1.9 Compatibility with Revision 2.0

This Revision of the USB Power Delivery specification is designed to be fully inter-operable with ***[USBPD 2.0]*** systems using BMC Signaling over the ***[USB Type-C 2.4]*** connector and to be compatible with Revision 2.0 hardware.

Please see *Section 2.3, "USB Power Delivery Capable Devices"* for more details of the mechanisms defined to enable compatibility.