



BSI Standards Publication

Universal serial bus interfaces for data and power

Part 1-2: Common components — USB Power Delivery specification

National foreword

This British Standard is the UK implementation of EN IEC 62680-1-2:2021. It is identical to IEC 62680-1-2:2021. It supersedes [BS EN IEC 62680-1-2:2020](#), which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio-visual equipment.

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Amendments/corrigenda issued since publication

Date	Text affected
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English Version

Universal serial bus interfaces for data and power - Part 1-2:
Common components - USB Power Delivery specification
(IEC 62680-1-2:2021)

Interfaces de bus universel en série pour les données et
l'alimentation électrique - Partie 1-2: Composants communs
- Spécification de l'alimentation électrique par port USB
(IEC 62680-1-2:2021)

Schnittstellen des Universellen Seriellen Busses für Daten
und Energie - Teil 1-2: Gemeinsame Komponenten -
Festlegung für die USB-Stromversorgung
(IEC 62680-1-2:2021)

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The text of document 100/3440/CDV, future edition 5 of IEC 62680-1-2, prepared by IEC/TC 100 "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62680-1-2:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022-01-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-04-20

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

Interfaces de bus universel en série pour les données et l'alimentation électrique
Partie 1-2: Composants communs – Spécification de l'alimentation électrique
par port USB

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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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International Standard IEC 62680-1-2 has been prepared by technical area 18: Multimedia home systems and applications for end-user networks, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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.

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

CDV	Report on voting
100/3440/CDV	100/3505/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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- withdrawn,
- replaced by a revised edition, or
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This standard is the USB-IF publication Universal Serial Bus Power Delivery Specification Revision 3.0, Version 2.0.

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Universal Serial Bus Power Delivery Specification

Revision: ***3.0***
Version: ***2.0***
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Yoram Rimoni	Qualcomm, Inc.	Satish Anand Verkila	SiliConch Systems Private Limited
Fan-Hau Hsu	Realtek Semiconductor Corp.	Shubham Paliwal	SiliConch Systems Private Limited
Tsung-Peng Chuang	Realtek Semiconductor Corp.	Vishnu Pusuluri	SiliConch Systems Private Limited
Atsushi Mitamura	Renesas Electronics Corp.	John Sisto	SMSC
Bob Dunstan	Renesas Electronics Corp.	Ken Gay	SMSC
Brian Allen	Renesas Electronics Corp.	Mark Bohm	SMSC
Dan Aoki	Renesas Electronics Corp.	Richard Wahler	SMSC
Hajime Nozaki	Renesas Electronics Corp.	Shannon Cash	SMSC
John Carpenter	Renesas Electronics Corp.	Tim Knowlton	SMSC
Kiichi Muto	Renesas Electronics Corp.	William Chiechi	SMSC
Masami Katagiri	Renesas Electronics Corp.	Shigenori Tagami	Sony Corporation
Nobuo Furuya	Renesas Electronics Corp.	Shinichi Hirata	Sony Corporation
Patrick Yu	Renesas Electronics Corp.	Amanda Hosler	Specwerkz
Peter Teng	Renesas Electronics Corp.	Bob Dunstan	Specwerkz
Philip Leung	Renesas Electronics Corp.	Diane Lenox	Specwerkz
Steve Roux	Renesas Electronics Corp.	Michael Munn	StarTech.com Ltd.
Tetsu Sato	Renesas Electronics Corp.	Fabien Friess	ST-Ericsson
Toshifumi Yamaoka	Renesas Electronics Corp.	Giuseppe Platania	ST-Ericsson
Chunan Kuo	Richtek Technology Corporation	Jean-Francois Gatto	ST-Ericsson
Heinz Wei	Richtek Technology Corporation	Milan Stamenkovic	ST-Ericsson
TZUHSIEN CHUANG	Richtek Technology Corporation	Nicolas Florenchie	ST-Ericsson
Tatsuya Irisawa	Ricoh Company Ltd.	Patrizia Milazzo	ST-Ericsson
Akihiro Ono	Rohm Co. Ltd.	Christophe Cochard	STMicroelectronics
Chris Lin	Rohm Co. Ltd.	Christophe Lorin	STMicroelectronics
Hidenori Nishimoto	Rohm Co. Ltd.	Filippo Bonaccorso	STMicroelectronics
Kris Bahar	Rohm Co. Ltd.	Jessy Guilbot	STMicroelectronics
Manabu Miyata	Rohm Co. Ltd.	Joel Huloux	STMicroelectronics
Ruben Balbuena	Rohm Co. Ltd.	John Bloomfield	STMicroelectronics
Takashi Sato	Rohm Co. Ltd.	Massimo Panzica	STMicroelectronics
Vijendra Kuroodi	Rohm Co. Ltd.	Meriem Mersel	STMicroelectronics
Yusuke Kondo	Rohm Co. Ltd.	Nathalie Ballot	STMicroelectronics
Kazuomi Nagai	ROHM Co., Ltd.	Pascal Legrand	STMicroelectronics

Patrizia Milazzo	STMicroelectronics
Richard O'Connor	STMicroelectronics
Morten Christiansen	Synopsys, Inc.
Nivin George	Synopsys, Inc.
Zongyao Wen	Synopsys, Inc.
Joan Marrinan	Tektronix
Kimberley McKay	Teledyne-LeCroy
Matthew Dunn	Teledyne-LeCroy
Tony Minchell	Teledyne-LeCroy
Anand Dabak	Texas Instruments
Bill Waters	Texas Instruments
Bing Lu	Texas Instruments
Deric Waters	Texas Instruments
Grant Ley	Texas Instruments
Gregory Watkins	Texas Instruments
Ingolf Frank	Texas Instruments
Ivo Huber	Texas Instruments
Javed Ahmad	Texas Instruments
Jean Picard	Texas Instruments
John Perry	Texas Instruments
Martin Patoka	Texas Instruments
Mike Campbell	Texas Instruments
Scott Jackson	Texas Instruments
Shafiuddin Mohammed	Texas Instruments
Srinath Hosur	Texas Instruments
Steven Tom	Texas Instruments
Yoon Lee	Texas Instruments
Tim Wilhelm	The Silanna Group Pty. Ltd.
Tod Wolf	The Silanna Group Pty. Ltd.
Chris Yokum	Total Phase
Brad Cox	Ventev Mobile
Colin Vose	Ventev Mobile
Dydron Lin	VIA Technologies, Inc.
Fong-Jim Wang	VIA Technologies, Inc.
Jay Tseng	VIA Technologies, Inc.
Rex Chang	VIA Technologies, Inc.
Terrance Shih	VIA Technologies, Inc.
Ho Wen Tsai	Weltrend Semiconductor
Hung Chiang	Weltrend Semiconductor
Jeng Cheng Liu	Weltrend Semiconductor
Priscilla Lee	Weltrend Semiconductor
Wayne Lo	Weltrend Semiconductor
Charles Neumann	Western Digital Technologies, Inc.
Curtis Stevens	Western Digital Technologies, Inc.
John Maroney	Western Digital Technologies, Inc.
Joe O'Brien	Wilder Technologies
Will Miller	Wilder Technologies
Juejia Zhou	Xiaomi Communications Co., Ltd.
Xiaoxing Yang	Xiaomi Communications Co., Ltd.

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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, MP3 players 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 rated 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 [\[USBBC 1.2\]](#).

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 Battery Charging, enabling new higher power use cases such as USB powered Hard Disk Drives (HDDs) and printers.

With USB Power Delivery the power direction is no longer fixed. This enables the product with the power (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 power bricks or chargers are able to supply power to laptops and other battery powered devices through their, traditionally power providing, USB ports.

USB Power Delivery enables hubs 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. For example, battery powered devices can get increased charging current and then give it back temporarily when the user’s HDD requires spinning up. **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. Power Delivery enables alternative modes of operation by providing the mechanisms to discover, enter and exit Alternate Modes. The specification also enables discovery of cable capabilities such as supported speeds and current levels.

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 [\[USB 2.0\]](#), [\[USB 3.2\]](#), [\[USB Type-C 2.0\]](#) 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. Wall Warts). In addition, it allows a Source and Sink to swap power roles such that a Device could supply power to the Host. For example, a display could supply power to a notebook to charge its battery.

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

- Works seamlessly with legacy USB Devices
- Compatible with existing spec-compliant USB cables
- 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 Modes defined either by a standard or by a particular vendor. These 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.

This specification 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.

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

1. A list of fixed 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 may be problematic for small form factor devices.
2. A list of programmable voltage ranges each with a maximum current (PPS). The Device requests a voltage (in 20 mV increments) that is within the advertised range and a maximum current. The USB Charger delivers the requested voltage until the maximum current is reached at which time the USB 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 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.

1.2 Purpose

The USB Power Delivery specification defines a power delivery system covering all elements of a USB system including: Hosts, 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. This specification is intended to be fully compatible 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).
- [\[USB Type-C 2.0\]](#) mechanisms for supplying higher power

Initial operating conditions remain the USB Default Operation as defined in [\[USB 2.0\]](#), [\[USB 3.2\]](#), [\[USB Type-C 2.0\]](#) or [\[USBBC 1.2\]](#).

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

1.3 Scope

This specification is intended as an extension to the existing [\[USB 2.0\]](#), [\[USB 3.2\]](#), [\[USB Type-C 2.0\]](#) 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 [\[USB 2.0\]](#), [\[USB 3.2\]](#), [\[USB Type-C 2.0\]](#) 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.

1.4 Conventions

1.4.1 Precedence

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

1.4.2 Keywords

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

1.4.2.1 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.

1.4.2.2 Deprecated

Deprecated is a keyword used to indicate a feature, supported in previous releases of the specification, which is no longer supported.

1.4.2.3 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.

1.4.2.4 Ignored

Ignore, **Ignores** and **Ignored** are equivalent keywords indicating Messages 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.

1.4.2.5 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-codes or K-code sequences indicates that the received Signaling falls outside of the defined specification.

1.4.2.6 May

May is a keyword that indicates a choice with no implied preference.

1.4.2.7 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.

1.4.2.8 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.

1.4.2.9 Optional/Optionally/Optional Normative

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.

1.4.2.10 Reserved

Reserved is a keyword indicating reserved 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.

1.4.2.11 Shall/Normative

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.

1.4.2.12 Shall Not

Shall Not is a keyword that is the inverse of **Shall** indicating non-compliant operation.

1.4.2.13 Should

Should is a keyword indicating flexibility of choice with a preferred alternative; equivalent to the phrase “it is recommended that...”.

1.4.2.14 Should Not

Should Not is a keyword is the inverse of **Should**; equivalent to the phrase “it is recommended that implementations do not...”.

1.4.2.15 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.

1.5 Related Documents

- **[USB 2.0]** – Universal Serial Bus Specification, Revision 2.0, plus ECN and Errata http://www.usb.org/developers/docs/usb20_docs/.
- **[USB 3.2]** – Universal Serial Bus 3.2 Specification, Revision 1.0, September 22, 2017. www.usb.org/developers/docs.
- **[USBTypeCAuthentication 1.0]**, Universal Serial Bus Type-C Authentication Specification, Revision 1.0, March 25, 2016. www.usb.org/developers/docs.
- **[USBPDFirmwareUpdate 1.0]**, Universal Serial Bus Power Delivery Firmware Update Specification, Revision 1.0, September 15, 2016. <http://www.usb.org/developers/powerdelivery/>
- **[USBBC 1.2]** – Universal Serial Bus Battery Charging Specification, Revision 1.2 plus Errata (referred to in this document as the Battery Charging specification). www.usb.org/developers/devclass_docs#approved.
- **[USBBridge 1.1]** – Universal Serial Bus Type-C Bridge Specification, Revision 1.1, October 10, 2017. www.usb.org/developers/docs.
- **[USBTypeCBridge 1.0]** – Universal Serial Bus Type-C Bridge Specification, Revision 1.0, March 25, 2016. www.usb.org/developers/docs.
- **[USBPDP 2.0]** – Universal Serial Bus Power Delivery Specification, Revision 2, Version 1.2, March 25, 2016. www.usb.org/developers/docs.

- **[USBPDCompliance]** – USB Power Delivery Compliance Plan Revision 1.02, Version 2.0, 8 March 2017 http://www.usb.org/developers/docs/devclass_docs/.
- **[USB Type-C 2.0]** – Universal Serial Bus Type-C Cable and Connector Specification, Revision 2.0, TBD August 2019. www.usb.org/developers/docs.
- **[IEC 60958-1]** IEC 60958-1 Digital Audio Interface Part:1 General Edition 3.0 2008-09 www.iec.ch
- **[IEC 60950-1]** IEC 60950-1:2005 Information technology equipment – Safety – Part 1: General requirements: Amendment 1:2009, Amendment 2:2013
- **[IEC 62368-1]** IEC 62368-1 Audio/Video, information and communication technology equipment – Part 1: Safety requirements
- **[IEC 63002]** Draft CD for IEC 63002 Identification and Communication Interoperability Method for External DC Power Supplies Used with Portable Computing Devices.
- **[ISO 3166]** ISO 3166 international Standard for country codes and codes for their subdivisions. http://www.iso.org/iso/home/standards/country_codes.htm.
- **[USB4]** – Universal Serial Bus 4 Specification (USB4™), Version 1.0, August 2019. www.usb.org/developers/docs.
- **[DPTC1.0]** DisplayPort™ Alt Mode on USB Type-C® Standard, Version 1.0b, 03 November 2017. www.vesa.org.
- **[TBT3]** see **[USB4]** Chapter 13 for Thunderbolt™ 3 device operation.

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 2.0]** and **[USBBC 1.2]**.

Table 1-1 Terms and Abbreviations

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 Discover Identity Command to determine its characteristics in addition to other Structured VDM Commands (Electronically Marked Cable see [USB Type-C 2.0]).
Active Mode	A Mode which has been entered and not exited.
Alternate Mode	As defined in [USB Type-C 2.0] . Equivalent to Mode in the PD Specification.
Alternate Mode Adapter (AMA)	A PDUSB Device which supports Alternate Modes as defined in [USB Type-C 2.0] . 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 [USB Type-C 2.0] . 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 Source Capabilities or Sink Capabilities 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: PE_SRC_Ready , PE_SNK_Ready or PE_CBL_Ready . 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 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 V _{BUS} . This is exposed by the Battery Supply PDO (see Section 6.4.1.2.4)

Term	Description
Binary Frequency Shift Keying (BFSK)	A Signaling Scheme now Deprecated in this specification. BFSK used a pair of discrete frequencies to transmit binary (0s and 1s) information over V _{BUS} . See [USBD 2.0] for further details.
Biphase Mark Coding (BMC)	Modification of Manchester coding where each zero has one transition and a one has two transitions (see [IEC 60958-1]).
BIST	Built-In Self-Test – Power Delivery testing mechanism for the PHY Layer.
BIST Data Object (BDO)	Data Object used by BIST Messages.
BIST Mode	A BIST receiver or transmitter test mode enabled by a BIST 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 Cable Reset 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 (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 it is Attached to. Most common use is to allow a single Port Host to support a USB device while being charged.
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.
Chunking	The process of breaking up a Data Block larger than MaxExtendedMsgLegacyLen (26-bytes) into two or more Chunks.
Cold Socket	A Port that does not apply vSafe5V 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 [USB Type-C 2.0]).
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 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 Number of Data Objects field in the Message Header is set to 0. The Control Message consists only of a Message Header and a CRC.
Current Limit (CL)	A current limiting feature for a Source. When the Sink 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.

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 2.0]</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 2.0]</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 2.0]</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.

Term	Description
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; it is not a Message or a Signal.
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 Hard Reset 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 V_{CONN} 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 Discover Identity 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 shall be limited to USB Type-C Current (see [USB Type-C 2.0]).
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 GoodCRC Message has been received). An AMS of Vendor Messages is Interruptible during the entire sequence.
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. 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 Optionally can be changed by a System Policy Manager.
LPS	Limited Power Supply as defined in [IEC 62368-1] .
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.