Vendor Info File Definition

Version 3.23

Version 3.23

November 18, 2022

Revision History

Revision	Version	Issue Date	Comment
0.5	1.0	Aug 23, 2016	Initial release Revision 0.5.
0.51	1.0	Aug 24, 2016	Editorial fixes.
0.52	1.0	Aug 31, 2016	SVID/SVID Mode definitions added. SSSTX/RX_dir_support parameters marked as reserved/shall not be tested.
0.53	1.0	Sept 6, 2016	$VIF_Specification and $VIF_Producer fields added.
0.54	1.0	Sept 27, 2016	Editorial fixes.
0.90	1.0	Nov 18, 2016	Added new fields and tightened constraints among existing fields. Removed SSSTX/RX_dir_support fields.
0.91	1.0	Nov 22, 2016	Added additional constraints.
0.92	1.0	Nov 25, 2016	Editorial fixes.
0.93	1.0	Nov 30, 2016	Added new fields and tightened constraints among existing fields.
0.94	1.0	Dec 6, 2016	Editorial fixes.
0.95	1.0	Dec 7, 2016	Renamed Externally_Powered field to Unconstrained_Power.
0.96	1.0	Dec 7, 2016	Updated description of Unconstrained_Power field. Updated this Revision History.
1.00	1.0	Dec 8, 2016	Official release.
1.10	1.0	Mar 15, 2017	Renamed two fields and tightened constraints on another two.
1.11	1.0	Mar 21, 2017	Added support for PPS. Expanded support for Chunking.
1.20	1.0	June 13, 2017	Added additional support for PD 3.
1.21	1.0	June 30, 2017	Moved field to correct field group.

Revision	Version	Issue Date	Comment
1.22	1.0	Sept 14, 2017	Added additional constraints to PDP fields. Set the Max Voltage to 21000 mV for all PDO Supply Types that have a Max Voltage field.
1.30	1.0	Dec 5, 2017	Added support for BC 1.2, Link Layer and Type-C Functional tests.
1.31	1.0	Jan 16, 2018	Changed lower limit to PD_Power_As_Sink to 0. Editorial fixes.
1.32	1.0	Jan 26, 2018	Clarified requirements for Type_C_Can_Act_As_Device and Type_C_Can_Act_As_Host
1.33	1.0	Feb 7, 2018	Two new fields added to USB Host Fields.
1.34	1.0	Apr 26, 2018	Added new fields for OCP testing. Replaced Responds_To_Discov_SOP with two new fields Responds_To_Discov_SOP_UFP and Responds_To_Discov_SOP_DFP. Removed Structured_VDM_Version and Structured_VDM_Version_SOP Added new Product Power Fields section. Added new fields to USB Device section.
1.35	1.0	May 3, 2018	Clarified requirements for Product_Total_Source_Power.
1.36	1.0	May 9, 2018	Removed fields related to PD Consumer Port Capability Descriptor from section 3.2.5.
1.37	1.0	September 4, 2018	Converted Product_Total_Source_Power from watts to milliwatts. Removed constraint from Src_PD_OCP_UV_Threshold_Type<X>. Added support for non-CT VPDs Added new Port_Source_Power_Gang_Max_Power field to Product Power section. Renamed options for Type_C_Power_Source and Port_Source_Power_Type fields.

Revision	Version	Issue Date	Comment
1.38	1.0	December 3, 2018	If Type_C_State_Machine is SRC, and Type_C_Can_Act_As_Device is YES, then both DR_Swap_To_*_Supported fields must be set to YES. The same for SNK/Hosts. Type_C_Sources_VCONN and Captive_Cable cannot both be set to YES. Added new Micro A/B option to Connector_Type. Made Captive_Cable field applicable to Type-B connectors.
1.39	1.0	January 15, 2019	Clarified language in *_Enter_Mode* fields. Added PSD as an option to Product_Type_UFP_SOP. Micro-A/B ports are possible on BC 1.2 Portable Devices. Renamed FR_Swap_Reqd_Type_C_Current to FR_Swap_Reqd_Type_C_Current_As_Initial_Source. Clarified the interaction between Connector_Type and Captive_Cable. Removed FR_Swap_Supported_As_Source. Added FR_Swap_Supported_As_Initial_Sink (to Dual Role section) which is to be set to YES in those situations wherein FR_Swap_Supported_As_Source would have been set to YES.
1.40	1.0	February 1, 2019	Fixed numeric value of PSD option in Product_Type_UFP_SOP.
2.00	1.0	April 2, 2019	Defined XML format for VIFs. Added support for VIFs that contain multiple ports. As part of this, added constraints to a number of fields that are sensitive to the contents of ports other than the one they're on. Do not require Type-A ports to support USB data when they are on a product that has a Type-C port that can act as a Source. Added new field Host_Supports_USB_Data to characterize this.

Revision	Version	Issue Date	Comment
2.01	1.0	June 4, 2019	Errata: Added Host_Supports_USB_Data to the Schema in Appendix A. Added Requests_PR_Swap_As_Snk back. It was removed inadvertently from version 1.39.
2.02	1.0	August 7, 2019	Clarified language for Product_Type_UFP_SOP, and removed “0 – Undefined” as an option when Type_C_Can_Act_As_Device is set to YES.
2.03	1.0	September 10, 2019	In the Schema, relaxed the requirement that fields and field groups appear in a particular order. Removed requirements that Hub_Port_Number be unique. Added two new fields: FR_Swap_Type_C_Current_Capability_As_Initial_Sink and Master_Port.
2.04	1.0	November 21, 2019	Removed constraint on USB Device fields: The DFP of an embedded host can act as the UFP of a USB Device (think smartphones).
3.00	1.0	April 21, 2020	Added USB4 support for ports and cables. Constrain Micro A/B ports to USB2 speeds. Micro A/B ports may, but do not have to, act as USB Devices. Added new field Device_Supports_USB_Data to handle that. Clarified text for Accepts_PR_Swap_As_Src and Accepts_PR_Swap_As_Snk. Clarified that Cables must support SOP’.
3.01	1.0	July 27, 2020	Updates to PD_Specification_Revision: removed option 3 (Rev 3.0, Version 2.0), and updated language for the other two options.

Revision	Version	Issue Date	Comment
3.10	1.0	September 9, 2020	Added support for VPDs. Added additional support for Active Cables. Added support for more granular PD Revision/Version numbers. Updated constraints for SVID Mode fields (both SOP and Cable). Editorial: specify the ranges of hexadecimal fields in both hex and decimal format. Editorial: add new Editorial Conventions section to the introduction. Added one section which specifies hex, decimal, and binary literals. Added a new appendix for the names of fields that have been removed from the spec.
3.11	1.0	October 5, 2020	Brought wording in line with source ECRs. Added new section 1.3.2 referencing potential errata. Removed requirement that USB4 host ports act as USB data devices.
3.12	1.0	October 9, 2020	Renamed field: from Active_Cable_USB2_Hub_Hops_Supported to Active_Cable_USB2_Hub_Hops_Consumed.
3.13	1.0	March 22, 2021	Added new field Device_Max_USB2_Speed. Added support for optional non-USB-related content. Relaxed constraints on Vendor ID fields. Require that source-only non-data USB4 Ports on USB4 Hosts set Product_Type_UFP_SOP to Peripheral. Remove constraints on Host_Is_Embedded. Added USB4_Device_HiFi_Bi_TMU_Mode_Required Added new field Captive_Cable_Is_eMarked. Relax constraint on Is_DFP_On_Hub. Removed deprecated AMA and AMC options from Product_Type_..._SOP fields. Deprecated all AMA fields.

Revision	Version	Issue Date	Comment
3.14	1.0	April 5, 2021	Restored AMA fields, updated the dependencies, and clarified that they're only relevant to components operating in PD 2 mode.
3.15	1.0	June 7, 2021	Support for text-format is now optional: moved text format definition into appendix, moved definitions of text format-only fields to XML format definition (3.1.4.1). Updated XML format definition to reflect latest schema. Moved USB4 Product Fields section into Product Fields (3.2.2), and renumbered sections accordingly. Added Power_Interruption_Available field to provide FRS support. Tightened up constraints on alternate mode support for on ports. Added Power_Interruption_Available field to provide FRS support. Added EPR support.
3.16	1.0	July 7, 2021	Clarified Complete PD Specification Number definition. Set EPR_Supported_As_* fields to NO, when the PD version is too low. Loosen constraints on Product_Type_UFP_SOP for DFPs that are not USB devices. DFP_VDO_Port_Number is supported in PD r3.0v2.0, not just USB4. Mark VBUS Voltage field options deprecated as appropriate.

Revision	Version	Issue Date	Comment
3.17	1.0	September 8, 2021	Added new EPR_Mode_Capable field. Require that Type_C_Is_Alt_Mode_Adapter takes a value in all PD products. Constrain Data_Capable_As_USB_Host and Data_Capable_As_USB_Device to specific values. Num_Src_PDOs and Num_Snk_PDOs apply only to SPR PDOs. Add new fields: Data_Reset_Supported and Enter_USB_Supported. Updated dependencies and clarified text of FRS fields.
3.18	1.0	November 15, 2021	Removed Active Cable Temperature Supported Y/N fields. Adjusted ranges of Temperature fields. Language clarification for Source and Sink fields. VCONN-Powered Devices must have a captive cable.
3.19	1.0	March 9, 2022	Updated Product_Type_UFP_SOP options for USB4 hosts which do not have device capability. Corrected constraints on SBU_Type. Editorial: added note to the effect that in field descriptions, YES means true, and NO means false. Added document name and version to page footers. Announced that Text format will be removed in a future version of the specification.
3.20	1.0	May 19, 2022	Removed Text Format from the specification. The text format definition in Appendix D has been marked as informational but otherwise kept as is. Added new field Src_PDO_PDP_Rating. Added PD CTS to list of reference documents.

Revision	Version	Issue Date	Comment
3.21	1.0	September 12, 2022	Moved contents of section 3.1.1 to top of section 1 and removed section 3.1.1. Added new field Hub_Billboard_DSPort_Num to provide route to port on which Billboard device is attached. Removed support for PD 2 products. Removed PD CTS to list of reference documents.
3.22	1.0	October 17, 2022	Added new field USB4_Host_Is_Standalone_AIC to determine if a USB4 Host is implemented as a standalone Add-in-card. Added Has_Invariant_PDOs field to determine whether a Source ever offers different PDOs (except when attached to a table with different specs). A USB4 Peripheral is not required to have a PCIe DN adapter when USB4_PCIe_Tunneling_Supported is set to YES.
3.23	Next	November 14, 2022	Relax constraints on PCIe-related router fields which are valid when products support PCIe, but don't have PCIe DN adapters.

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1 INTRODUCTION

In order to expedite the compliance testing process for Qualifying Products that support USB, product vendors are required to provide one or more Vendor Info Files (VIF's) that describe, in detail, the product to be tested.

One VIF is required for each significantly different configuration.

Note: an example of a product which would require multiple VIFs would be a product that can function both with and without an external power source. In this instance, the vendor would need to provide two VIFs.

1.1 Scope of the Document

This document tests and/or checks for compliance with requirements specified in ***[PowerDelivery2.0]***, ***[PowerDelivery3.0]***, ***[USBType-C2.0]***, ***[USB3.2]***, and ***[USB4]***.

1.2 Intended Audience

This specification is intended for developers of Hosts, Hubs, Peripherals and Cables which have support for Power Delivery, USB Type-C™, or USB 3.2 capability.

1.3 Document Conventions

1.3.1 Numbers

In this document, a number with 'h' appended is hexadecimal. A number with 'b' appended is binary. A number with no suffix is decimal.

1.3.2 Errata

It may be necessary to issue corrections to this specification from time to time. They can be found at https://compliance.usb.org/cv/VendorInfoFile/Errata/Current/.

1.4 Reference Documents

The following referenced documents can be found on the USB-IF website www.usb.org:

[BatteryCharging1.2]	*Battery Charging Specification Revision 1.2*
[Micro-USB1.01]	*Universal Serial Bus Micro-USB Cables and Connectors Supplement to the USB 2.0 Specification, revision 1.01.*
[OTG&EH2.0]	*On-The-Go and Embedded Host Supplement to the USB 2.0 Specification, Revision 2.0 plus errata and ECR*
[OTG&EH2.0ComplianceChecklist]	*OTG&EH 2.0 Compliance Checklist*

[OTG&EH3.0]	*On-The-Go and Embedded Host Supplement to the USB 3.0 Specification, Revision 1.0 plus errata and ECR*
[OTG&EH3.0ComplianceChecklist]	*OTG&EH 3.0 Compliance Checklist*
[PDCommunicationsEngineMOI]	*Communications Engine PD Compliance MOI, developed by MQP Electronics Ltd.*
[PDDeterministicMOI]	*Deterministic PD Compliance MOI, developed by Ellisys*
[PowerDelivery2.0]	*USB Power Delivery Specification Revision 2.0*
[PowerDelivery3.1]	*USB Power Delivery Specification Revision 3.1, Version 1.3*
[USB2.0]	*Universal Serial Bus Revision 2.0 Specification including ECNs and errata*
[USB3.2]	*Universal Serial Bus Revision 3.2 including ECNs and errata.*
[USB4]	*Universal Serial Bus 4 (USB4™) Specification*
[USB4DROM]	*Universal Serial Bus 4 (USB4) Device ROM Specification*
[USBPeripheralChecklist]	*USB Compliance Checklist, Peripheral (Excluding Hubs)*
[USBPeripheralSilicon]	*USB Compliance Checklist, Peripheral Silicon (Excluding Hub Silicon)*
[USBSystemsChecklist]	*USB Compliance Checklist, Systems*
[USBType-C2.1]	*USB Type-C™ Cable and Connector Specification Revision 2.1*
[XML1.0]	*Extensible Markup Language (XML) 1.0 (Fifth Edition)*
[XMLSchema1.0]	*W3C XML Schema Definition Language (XSD) 1.0*

2 ACRONYMS AND TERMS

This chapter lists and defines terms and abbreviations used throughout this specification. Other terms and abbreviations are provided in ***[PowerDelivery2.0]***, ***[PowerDelivery3.0]*** and ***[USBType-C2.0]***.

Term	Description
Attached	USB Power Delivery ports which are mechanically joined with USB cable.
BIST	Built In Self Test – Power Delivery testing mechanism for the Phy Layer.
Cold Socket	A downstream port receptacle that does not apply vSafe5V on VBUS until a plug insertion is detected.
Complete PD Specification Number	The following fields considered as 4-digit binary coded decimal, listed from most significant to least significant: • *PD_Spec_Revision_Major* • *PD_Spec_Revision_Minor* • *PD_Spec_Version_Major* • *PD_Spec_Version_Minor* If any of the fields that make up the Complete PD Specification Number are not set, then it is *invalid* and shall compare false to any valid Complete PD Specification Number. *Example: for PD Specification Revision 3.0, Version 2.0:* • *PD_Spec_Revision_Major* = 3 • *PD_Spec_Revision_Minor* = 0 • *PD_Spec_Version_Major* = 2 • *PD_Spec_Version_Minor* = 0 *The Complete PD Specification Number is 3020h.*
Component	A part of a Qualifying Product which can be considered independently from the product as a whole. An example of a Component is a single USB Port.
Connected	USB Power Delivery ports which are actively communicating using the USB Power Delivery protocol.
Consumer	A PD Port that can sink power from the power conductor (e.g., VBUS). This will usually the Upstream Facing Port of a Qualifying Product.
Consumer/Provider	A Consumer that can additionally act as a Provider.
Contract	An agreement on both power level and direction reached between a Port Pair. A contract may be explicitly negotiated between the Port Pair or may 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 agreement may only be altered in the case of a negotiation, Hard Reset or failure of the Source.
Dead Battery	A device has a Dead Battery when the battery in a device is unable to power its functions.
Device Policy Manager	Module running in a Provider or Consumer that applies Local Policy to each port in the Qualifying Product via the Policy Engine.

Term	Description
Downstream Port/Downstream Facing Port (DFP)	Either a port in the Host or the ports defined in ***[USB2.0]***, ***[USB3.2]***, ***[USB4]*** or USB Type-C as defined in ***[USBType-C2.0]***. The default Host and Source.
Dual-Role Device	A Qualifying Product that contains one or more Dual-Role Ports that are capable of operating as either a Source or a Sink.
Dual-Role Port	A Consumer/Provider or Provider/Consumer capable port that is a port capable of operating as either a Source or Sink.
Hard Reset	This is initiated by HardReset signaling from either Port Partner. It restores VBUS to the default condition and resets the PD communications engine to its default state.
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 wire in the cable plus the contact resistance in the connectors times the current flowing over the path.
Local Policy	Every Qualifying Product 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 may 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 may be changed by a System Policy Manager.
Message	The packet payload consisting of a header for control messages and a header and data for data messages as defined in Sections 6.2, 6.3, and 6.4 of ***[PowerDelivery2.0]*** and ***[PowerDelivery3.0]***.
Messaging	Communication in the form of messages as defined in Sections 6.2, 6.3, and 6.4 of ***[PowerDelivery2.0]*** and ***[PowerDelivery3.0]***.
Negotiation	This is the PD process whereby: The Source advertises its capabilities. The Sink requests one of the advertised capabilities. The Source acknowledges the request and alters its output to satisfy the request. The result of the negotiation is a contract for power delivery/consumption between the Port Pair.
Packet	One entire unit of PD communication including a preamble, SOP*, payload, CRC and EOP as defined in Sections 6.2 of ***[PowerDelivery2.0]*** and ***[PowerDelivery3.0]***.
PD	USB Power Delivery
PD Capable	A port that supports USB Power Delivery.
PDUSB	USB Port as defined in ***[USB2.0]*** or ***[USB3.2]***, that is PD capable.
PD Connection	A Port Pair with an established contract.

Term	Description
Policy	Policy defines the behavior of PD capable parts of the system and defines the capabilities it advertises, requests made to (re)negotiate power and the responses made to requests received.
Policy Engine	The Policy Engine interprets the Device Policy Manager's input in order to implement Policy for a given port and directs the Protocol Layer to send appropriate messages.
Port	An interface typically exposed through a receptacle, or via a plug on the end of a hard-wired captive cable. USB Power Delivery defines the interaction between a Port Pair.
Port Pair	Two attached PD Ports.
Port Partner	The USB Power Delivery contract is negotiated between a Port Pair connected by a USB cable. These ports are known as Port Partners.
Power Conductor	The wire delivering power from the Source to Sink. For example, USB's VBUS.
Power Consumer	See Consumer
Power Provider	See Provider
Qualifying Product	The physical object that is described by a particular Vendor Info File. A Qualifying Product consists of one or more Components.
Protocol Error	An unexpected or unknown message that cannot be handled by a given implementation.
Protocol Layer	The entity that forms the messages used to communicate information between Port Partners.
Provider	A PD Port that can source power over the power conductor (e.g., VBUS). This will usually be a Type-A port or a Type-C Port with RP asserted on its CC Wire.
Provider/Consumer	A Provider that can additionally act as a Consumer. This corresponds to a Dual-Role Type-A Port or a Dual-Role Type-C Port with RP asserted on its CC Wire.
Reserve	Power which is kept back by a Provider in order to ensure that it can meet total power requirements of attached Consumers on at least one port.
Safe Operation	Sources must have the ability to tolerate 5V applied by both Port Partners.
Signaling	An ordered set of four K-codes used to indicate a particular line symbol e.g., Hard Reset as defined in Section 5.6.4 of ***[PowerDelivery2.0]*** and ***[PowerDelivery3.0]***.
Sink	The port consuming power from VBUS; most commonly the Upstream Facing Port of the Qualifying Product.
Soft Reset	A process that resets the PD communications engine to its default state.
Source	A role a port is currently taking to supply power over VBUS; most commonly a Host or Hub downstream port.

Term	Description
System Policy	Overall system policy generated by the system, broken up into the policies required by each Port Pair to affect the system policy. It is programmatically fed to the individual Devices for consumption by their Policy Engines.
System Policy Manager	Module running on the USB Host. It applies the System Policy through communication with PD capable Consumers and Providers that are also connected to the Host via USB.
Upstream Port/Upstream Facing Port (UFP)	Typically, a Type-B port on a Qualifying Product as defined in ***[USB2.0]*** or ***[USB3.2]***, or a Type-C Port as defined in ***[USBType-C2.0]***.
USB Powered State	Synonymous with the ***[USB2.0]*** and ***[USB3.2]*** definition of the powered state.
USB4 Product	A Qualifying Product which includes one or more Ports that support USB4 as specified in ***[USB4]***. A USB4 Product may include additional ports that do not support USB4.
VIF Consumer	An application that takes Vendor Info Files as input.
VIF Processor	An application that is both a VIF Consumer and a VIF Producer.
VIF Producer	An application that generates Vendor Info Files.
VIF Tester (Tester)	A VIF Consumer that uses the Vendor Info File in order to manage the testing process of a Qualifying Product.

3 SUBMISSION MATERIALS

3.1 Vendor Information File (VIF)

3.1.1 Conformant and Valid VIFs

A Vendor Info File that conforms to the XML schema referenced in Appendix A is *conformant*.

A *valid* VIF is a conformant VIF that adheres to all requirements given in this specification.

3.1.2 Vendor Info File Fields

A Vendor Info File consists of a number of *Fields*, which describe the capabilities of the Qualifying Product. Section 3.2 of this specification provides definitions for all fields that may appear in a Vendor Info File.

There are three kinds of fields:

1. **String fields**, which define a UTF-8 encoded text string. Unless otherwise noted in section 3.2, a string field shall contain one or more non-white space characters. A VIF producer may optionally strip leading and trailing white space when writing to file.
2. **Numeric fields**, which define a non-negative decimal integer.
3. **Boolean fields**, which take one of the values *true* or *false*.

When a VIF Producer saves a VIF, it shall omit fields that have no content, or are otherwise not *conformant*. Conformant fields are defined in section 3.1.4.1 and Appendix D for each field type.

Future versions of this specification may deprecate, remove, rename or otherwise transform certain fields defined in this version of the specification. These fields are listed with a brief explanation in Appendix C. Unless otherwise specified, these fields shall be valid in a conformant VIF. Upon encountering a field listed in Appendix C, a VIF Producer shall perform any transformations specified therein. A VIF Producer shall not generate a VIF that contains fields listed in Appendix C.

Unless otherwise specified, all Required fields in a Valid VIF shall have a value.

3.1.3 Vendor Info File Format

The Vendor Info File is a UTF-8 encoded XML 1.0 document that conforms to the XML 1.0 Schema Definition (XSD) given in Appendix A. In the event of a conflict between the informal description in this section and the XSD, the XSD shall take precedence.

A Vendor Info File characterizes a single Qualifying Product that contains one or more *Components*. A Component may be either a *Port*, a *Cable*, or a *Repeater*. A valid VIF shall contain a single Cable, a single Repeater, or 1 or more Ports.

Unless otherwise specified, all elements in a Conformant VIF are optional

XML comments may be inserted at any point allowed in the XML base specification.

Components

A Conformant VIF contains 0 or more Fields, and 0 or more Components, subject to the restrictions defined in Appendix A.

Components contain shall contain 0 or more fields and 0 or more field group collections.

Fields

A VIF Field consists of a single XML Element where the element name is the name of a VIF field. See Appendix A for a list of all valid field names.

A VIF Field is either *product level*, in which case it applies to the Qualifying Product as a whole, or *component level*, in which case it applies to the component in which it is defined.

The value of a ***String*** field is contained in the contents of the field element. A conformant String field shall contain at least one non-whitespace character.

- An example of a String field is `<Port_Label>UFP</Port_Label>`.

The value of a ***Numeric*** field is a decimal number, contained in the `value` attribute of the field. A Numeric field may optionally include text in its content area.

- Examples of Numeric fields:
    a. `<Num_Fixed_Batteries value=”3”/>`.
    b. `<Manufacturer_Info_VID_Port value=”255”>0x00FF</Manufacturer_Info_VID_Port>`
    c. `<PD_Port_Type value=”0”>Consumer Only</PD_Port_Type>`
    d. `< Src_PDO_Voltage value=”100”>5000 mV</Src_PDO_Voltage>`

Note: it is recommended that VIF Producers use the content area to provide additional context for Numeric field values as appropriate, possibly as shown in examples b-d above.

The `value` attribute of a conformant Numeric field is required. It shall be non-empty, and shall contain decimal numbers only.

The value of a ***Boolean*** field is contained in the `value` attribute of the field. The field may optionally include text in its content area.

- Examples of Boolean fields:
    a. `<USB_PD_Support value=”true”/>`.
    b. `<Captive_Cable value=”false”>NO</ Captive_Cable/>`

The `value` attribute of a conformant Boolean field is required, and shall consist of one of the strings “true” or “false”.

Field Groups

The XML Schema defines *Field Groups*, collections of Fields that may appear multiple times in the Product element, or in a single Component. Field Groups are contained in *Field Group Lists*.

The following Field Group Lists are defined in this specification. If a Field Group represents a data object returned by a Qualifying Product in a response to a request, then unless otherwise specified, Field Groups in a Field Group List shall be listed in the same order as they are returned by the Qualifying Product.

- ***RouterList*** – contains one or more *Usb4Router* elements. See section 3.2.2.1.2 for information on the relevant fields.
- ***PCIeEndpointList*** – contains one or more *PCIeEndpoint* elements. *PCIeEndpointList* shall be a sub-element of a *RouterList*. See section 3.2.2.1.3 for information on the relevant fields.
- ***SrcPdoList*** – contains one or more *SrcPDO* elements. See section 3.2.9.1 for information on the relevant fields.
- ***SnkPdoList*** – contains one or more *SnkPDO* elements. See section 3.2.10.1 for information on the relevant fields.
- ***SopSVIDList*** – contains one or more *SOPSVID* elements. See section 3.2.12.1 for information on the relevant fields. If *SVID_Fixed_SOP* is set to NO, then *SOPSVIDs* may be listed in any order.
- ***SOPSVIDModeList*** – contains one or more *SOPSVIDMode* elements. *SOPSVIDModeList* shall be a sub-element of a *SOPSVID*. See section 3.2.12.2 for information on the relevant fields. If *SVID_Modes_Fixed_SOP* for the parent *SOPSVID* is set to NO, then *SOPSVIDModes* may be listed in any order.
- ***CableSVIDList*** – contains one or more *CableSVID* elements. See section 3.2.15.1 for information on the relevant fields. If *SVID_Fixed* is set to NO, then *CableSVIDs* may be listed in any order.
- ***CableSVIDModeList*** – contains one or more *CableSVIDMode* elements. *CableSVIDModeList* shall be a sub-element of a *CableSVID*. See section 3.2.15.2 for information on the relevant fields. If *SVID_Modes_Fixed* is set to NO for the parent CableSVID, then *CableSVIDModes* may be listed in any order.

Field Uniqueness

A Field in a Component which is not a member of a Field Group shall appear at most once in that Component.

A Field in a Field Group which is not a member of a descendent Field Group shall appear at most once in that Field Group.

Version Numbers

Unless specified otherwise, version numbers are in the form ***X1.X2[..]***, where *X1, X2, etc. are decimal numbers*.

/VIF

The root element that describes the Qualifying Product. It contains introductory material followed by an optional product-level field element, zero or more Components, and zero or more Optional Content elements. This field is required.

/VIF/VIF_Specification

The Vendor Info File specification to which the VIF is compliant. Vendor Info Files that conform to this specification shall set this field to 3.23.

This field is generated automatically by the VIF producer. This field may be displayed to the user, but it shall not be modifiable by the user within the VIF producer.

A VIF Producer shall populate this field with the most recent version of this specification that it supports when it saves the VIF.

The format of this field shall be one of the following:

- Revision <*version*>, Version <*version*>
- Version<*version*>

/VIF/VIF_App

This element immediately follows */VIF/VIF_Specification*. It describes the application that was used to generate the VIF. This field is required.

The contents of this field shall be one of the following. When employing method 1, all three fields referenced therein are required. When employing method 2, */VIF/VIF_App/Description* is required.

The two methods are mutually exclusive.

1. The following three elements, in order
    a. **/VIF/VIF_App/Vendor** – a free-text string describing the vendor of the application.
    b. **/VIF/VIF_App/Name** – a free-text string giving the name of the application.
    c. **/VIF/VIF_App/Version** – the *version* number of the application.
2. **/VIF/VIF_App/Description** – a free-text string that describes the application.

When creating a new Vendor Info File, a VIF producer shall employ method 1.

Method 2 is provided to allow backward compatibility with older VIFs. VIF Processors that allow human intervention should support manual conversion from */VIF/VIF_App/Description* to the fields described in method 1.

/VIF/Vendor_Name

To be provided by the Vendor. This is a string field.

If the Qualifying Product has a Vendor Name entry in USB4 DROM, then this field should be identical to that entry.

/VIF/Model_Part_Number

To be provided by the Vendor. This field should match what appears in the USB-IF Product Registration form. This is a string field.

If the Qualifying Product has a Model Name entry in USB4 DROM, then this field should be identical to that entry.

Note: The USB-IF uses this field and /VIF/Product_Revision *to generate the product name in the USB Integrator's List.*

/VIF/Product_Revision

To be provided by the Vendor. This field should match what appears in the USB-IF Product Registration form. This is a string field.

Note: The USB-IF uses this field and /VIF/Model_Part_Number *to generate the product name in the USB Integrator's List.*

/VIF/TID

Provided by the USB-IF. This is a string field.

/VIF/VIF_Product_Type

The highest-level category into which the Component being tested falls. Valid options are:

0 - Port Product (contains one or more ports)
1 - Cable
2 - Repeater

/VIF/Certification_Type

What is the USB-IF certification category under which the Qualifying Product is to be submitted? This field shall be set to the same value as the one on the USB-IF Product Registration form.

If */VIF/VIF_Product_Type* is set to 0 (Port Product), then valid options are:

0 - End Product
1 - Reference Platform
2 - Silicon

If */VIF/VIF_Product_Type* is set to 1 (Cable), then valid options are:

0 - End Product
2 - Silicon

If */VIF/VIF_Product_Type* is set to 2 (Repeater), then this field shall be set to 2 (Silicon).

If */VIF/VIF_Product_Type* is not present, then this shall not be present.

/VIF/Product

An optional element that contains Fields or Field Group Lists that pertain to the Qualifying Product as a whole.

/VIF/Component

0 or more components that fully describe a component of the Qualifying Product. If */VIF/VIF_Product_Type* is not present, then the number of components shall be 0.

/VIF/OptionalContent

0 or more blocks of implementation-defined arbitrary content. An *optional content* block has a mandatory *identifier* attribute and arbitrary content. The content shall be valid XML, but is otherwise unrestricted.

3.1.4 VIF Producers

- A VIF Producer shall omit inapplicable fields from the VIF upon saving.
- A VIF Producer shall not generate a VIF that is not conformant.

- A VIF Producer shall not generate a VIF that contains any of the Removed Fields listed in Appendix C.

3.1.5 VIF Consumers

- A VIF Consumer shall accept all conformant VIFs.
- A VIF Consumer may reject a non-conformant VIF with no further action.

3.1.6 VIF Processors

- A VIF Processor should pass through unchanged any content it does not recognize.
- A VIF Processor may discard the contents (anything in the content area) of a Numeric or Boolean field, or may generate new content.
- A VIF Processor may discard XML comments from an input VIF file, or may generate new ones.
- When applicable, a VIF Processor shall update Removed Fields that it encounters. See Appendix C for a description of all Removed Fields.

3.1.7 VIF Testers

- Inappropriate parameters for the Qualifying Product in question (for example, cable parameters for a port) shall be ignored by VIF Testers.
- A VIF with inconsistent applicable parameters for the Qualifying Product shall be recorded as a failure by VIF Testers. The VIF may then be redirected to a VIF editor.
- A VIF Tester shall take the VIF as the authority on how the Qualifying Product shall behave. An inconsistency between the VIF and the behavior of the Qualifying Product shall be recorded by the VIF Tester as a failure.
- If a Vendor Info File contains a field that is required to be **ignored by Testers**, a VIF Tester shall immediately discard it without further analysis.

3.2 Vendor File Fields

The following is a listing of all valid Fields that a Vendor Info File may have, with additional characterizations as required.

3.2.1 Introduction

3.2.1.1 Boolean fields

In the following sections, fields marked (Y/N) are Boolean as defined in section 3.1.3.

Note: in the field descriptions in this specification, "YES" is sometimes used as a synonym for "true", and "NO" is sometimes used as a synonym for "false".

3.2.1.2 USB4 Products

The VIF Field requirements in this specification use the following definitions

- ***USB4 Port***: A Component in which *USB4_Supported* is set to YES. (Also referred to as a Component which ***supports USB4***)
- ***USB4 Upstream Facing Port (USB4 UFP)***: A Component in which *USB4_UFP_Supported* is set to YES.
- ***USB4 Downstream Facing Port (USB4 DFP)***: A Component in which *USB4_DFP_Supported* is set to YES.
- ***USB4 Dual Role Data Port (USB4 DRD)***: A Component which is both a ***USB4 Downstream Facing Port*** and a ***USB4 Upstream Facing Port***.
- ***USB4 Peripheral***: A Qualifying Product which contains a ***single USB4 Port*** with the following property:
    - It is a ***USB4 UFP*** and not a ***USB4 DRD***.
- ***USB4 Hub***: A Qualifying Product with two or more ***USB4 Ports*** with the following properties:
    - No USB4 Ports are ***USB4 DRDs***.
    - One USB4 Port is a ***USB4 UFP***.
    - The remaining USB4 Ports are ***USB4 DFPs***.
- ***USB4 Dock***: A ***USB4 Hub*** on which *USB4_Dock* is set to YES. *Note: unless otherwise specified, all requirements that apply to* ***USB4 Hubs*** *shall also apply to* ***USB4 Docks****.*
- ***USB4 Host***: A Qualifying Product with one or more ***USB4 Ports*** with the following properties:
    - All USB4 Ports are ***USB4 DFPs*** that are optionally ***USB4 DRDs***.
- A ***USB4 Port*** is ***associated with a USB4 Router*** (alternately: a ***Router has a USB4 Port***) ***when*** the *USB4_Router_Index* for that ***USB4 Port*** is set equal to the *USB4_Router_ID* of the USB4 Router.

Note: All **USB4 Ports** *must be a* **USB4 UFP**, *a* **USB4 DFP** *or a* **USB4 DRD**.

Note: A Qualifying Product that has a **USB4 Port** *must be a* **USB4 Peripheral**, *a* **USB4 Hub**, *or a* **USB4 Host**.

3.2.2 Product Fields

Unless otherwise specified, fields in this section are Product-level fields that apply to the Qualifying Product as a whole and are not part of a Component.

3.2.2.1 USB4 Product Fields

Unless otherwise specified, fields in this section shall be ignored by Testers unless *USB4_Supported* is set to YES.

USB4_DROM_Vendor_ID

The Vendor ID of the Qualifying Product, as provided in the *Product Descriptor Entry* in USB4 DROM.

If the Qualifying Product is not a ***USB4 Peripheral*** or a ***USB4 Hub***, then this field shall be ignored by Testers.

If *Certification_Type* is set to 2 (Silicon), then this field shall be ignored by Testers.

USB4_Dock (Y/N)

Is the Qualifying Product a Dock as specified in ***[USB4]***?

If the Qualifying Product is not a ***USB4 Hub***, then this field shall be ignored by Testers.

USB4_Num_Internal_Host_Controllers

The number of Internal Host Controllers that the Qualifying Product contains.

Valid values are in the range 0 - 4.

If the Qualifying Product does not contain a ***USB4 Port***, then this field shall be ignored by Testers.

If the Qualifying Product is a ***USB4 Host*** or a ***USB4 Dock***, then this field shall be greater than 0.

USB4_Num_PCIe_DN_Bridges

The number of PCIe downstream bridges in the product that connect to a PCIe Adapter, a Native PCIe device or internal PCIe device.

Valid values are in the range 0 - 63.

This field shall be set to 0 unless the Qualifying Product has at least one ***USB4 Port*** on which *USB4_PCIe_Tunneling_Supported* is set to YES.

If the Qualifying Product does not contain a ***USB4 Port***, then this field shall be ignored by Testers.

USB4_Device_HiFi_Bi_TMU_Mode_Required (Y/N)

Does the Qualifying Product require HiFi Bi-Directional TMU mode in order to be operational?

If the Qualifying Product is not a ***USB4 Peripheral*** or a ***USB4 Dock***, then this field shall be ignored by Testers.

3.2.2.1.1 USB4 Device Class Fallback Support

If the Qualifying Product is not a ***USB4 Peripheral*** or a ***USB4 Dock*** then the fields in this section shall be ignored by Testers.

USB4_Audio_Supported (Y/N)

Does the Product implement the USB Audio Class when operating over USB 3.2 or USB 2?

USB4_HID_Supported (Y/N)

Does the Product implement the USB Human Interface Device (HID) Class when operating over USB 3.2 or USB 2?

USB4_Printer_Supported (Y/N)

Does the Product implement the USB Printer Class when operating over USB 3.2 or USB 2?

USB4_Mass_Storage_Supported (Y/N)

Does the Product implement the USB Mass Storage Class when operating over USB 3.2 or USB 2?

USB4_Video_Supported (Y/N)

Does the Product implement the USB Video (UVC) Class when operating over USB 3.2 or USB 2?

USB4_Comms_Networking_Supported (Y/N)

Does the Product implement the USB Comms/Networking Class when operating over USB 3.2 or USB 2?

USB4_Media_Transfer_Protocol_Supported (Y/N)

Does the Product implement the USB Media Transfer Protocol Class when operating over USB 3.2 or USB 2?

USB4_Smart_Card_Supported (Y/N)

Does the Product implement the USB Smart Card Class when operating over USB 3.2 or USB 2?

USB4_Still_Image_Capture_Supported (Y/N)

Does the Product implement the USB Still Image Capture Class when operating over USB 3.2 or USB 2?

USB4_Monitor_Device_Supported (Y/N)

Does the Product implement the USB Monitor Class when operating over USB 3.2 or USB 2?

3.2.2.1.2 USB4 Router Fields

Unless otherwise specified, the fields in this section shall be ignored by Testers if the Qualifying Product does not contain a ***USB4 Port***,

Index numbers shall start at 0, and shall be incremented by 1 for each router. A Qualifying Product shall have no more than 16 USB4 Routers.

USB4_Router_ID

Index number assigned to uniquely identify Router within the product.

Valid values are in the range 0 - 15 and shall be less than the number of Routers in the Qualifying Product.

USB4_Host_Is_Standalone_AIC (Y/N)

Is the Qualifying Product a USB4 Host Router that is added to the platform as a Standalone Add-In Card (AIC)?

If the Qualifying Product is not a ***USB4 Host***, then this field shall be ignored by Testers.

USB4_Silicon_VID

The Vendor Identification Number (VID) of the Vendor providing the silicon for the Router. This value is assigned by USB-IF to the silicon vendor.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

USB4_Num_Lane_Adapters

The total number of Lane Adapters on the Router.

Valid values are in the range 2 - 62.

This field shall be greater than or equal to the number of ***USB4 Ports associated with this Router*** multiplied by 2.

USB4_Num_USB3_DN_Adapters

The number of Downstream USB3 Adapters on the Router.

Valid values are in the range 1 - 63.

If the Qualifying Product is not a ***USB4 Host*** or a ***USB4 Hub***, then this field shall be ignored by Testers.

USB4_Num_DP_IN_Adapters

The number of DisplayPort IN Adapters on the Router.

Valid values are in the range 0 - 63.

If the Qualifying Product is a ***USB4 Host***, then the sum of this field over all routers shall be greater than 0.

If the Qualifying Product is a ***USB4 Peripheral*** that supports DP Tunneling (*USB4_DP_Tunneling_Supported* is set to YES on its ***USB4 UFP*** and the ***USB4 UFP*** is ***associated with this Router***), then at least one of this field and *USB4_Num_DP_OUT_Adapters* shall be greater than 0.

USB4_Num_DP_OUT_Adapters

The number of DisplayPort OUT Adapters on the Router.

Valid values are in the range 0 - 63.

USB4 Hubs shall not set this field to 0.

If the Qualifying Product is a ***USB4 Peripheral*** that supports DP Tunneling (*USB4_DP_Tunneling_Supported* is set to YES on its ***USB4 UFP***) and the ***USB4 UFP*** is ***associated with this Router***), then at least one of this field and *USB4_Num_DP_IN_Adapters* shall be greater than 0.

USB4_Num_PCIe_DN_Adapters

The number of PCIe Downstream Adapters on the Router.

Valid values are in the range 0 - 63.

If the Qualifying Product is a ***USB4 Host*** or a ***USB4 Hub*** and *USB4_PCIe_Tunneling_Supported* is set to YES on a ***USB4 Port associated with this Router***, then this field shall be greater than 0.

USB4_TBT3_Not_Supported

Indicates whether the product has one or more Thunderbolt 3-compatible Ports on this Router.

Valid options are:

0 - TBT3-Compatible
1 - Not TBT3-Compatible

This field shall be set to 0 (TBT3-Compatible) if *USB4_TBT3_Compatibility_Supported* is set to YES on any ***USB4 Port associated with this Router***.

This field shall be set to 1 (Not TBT3-Compatible) if *USB4_TBT3_Compatibility_Supported* is not set to YES on any ***USB4 Port associated with this Router***.

*Note: the field name and option values are chosen to correspond to the base specification—refer to **[USB4]**, table 8-3.*

USB4_PCIe_Wake_Supported (Y/N)

Does the Qualifying Product support PCIe Wake?

This field shall be set to NO unless this Router ***has a USB4 Port*** in which *USB4_PCIe_Tunneling_Supported* is set to YES.

USB4_USB3_Wake_Supported (Y/N)

Does the Qualifying Product support USB3 Wake?

If the Qualifying Product does not support USB3 tunneling on the Router (*USB4_USB3_Tunneling_Supported* is set to NO on all ***USB4 Ports associated with this Router***), then this field shall be set to NO

USB4_Num_Unused_Adapters

The number of Adapters in the Router that are not wired to a USB-C Connector.

Valid values are in the range 0 - 63.

USB4_TBT3_VID

The Thunderbolt 3 Vendor ID (VID), assigned by Intel.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

If *USB4_TBT3_Not_Supported* is not set to 0 (TBT3-Compatible), then this field shall be ignored by Testers.

USB4_PCIe_Switch_Vendor_ID

Vendor ID of PCIe switch connected to Router. This value is assigned by PCIe SIG.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

This field shall be ignored by Testers unless this Router ***has a USB4 Port*** in which *USB4_PCIe_Tunneling_Supported* is set to YES.

USB4_PCIe_Switch_Device_ID

Device ID of PCIe switch connected to Router. This value is assigned by the vendor.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

This field shall be ignored by Testers unless this Router ***has a USB4 Port*** in which *USB4_PCIe_Tunneling_Supported* is set to YES.

USB4_Num_PCIe_Endpoints

The number of PCIe endpoints connected to Router. This includes endpoints for the internal PCIe device and any other embedded PCIe devices.

Valid values are in the range 0 - 64.

This field shall be ignored by Testers if the Qualifying Product is not a ***USB4 Dock*** or ***USB4 Peripheral***.

This field shall be ignored by Testers unless this Router ***has a USB4 Port*** in which *USB4_PCIe_Tunneling_Supported* is set to YES.

3.2.2.1.3 PCIe Endpoint Fields

In this section, the fields represent the parameters for a single PCIe Endpoint.

Fields in this section shall be ignored by Testers if the Qualifying Product is not a ***USB4 Dock*** or ***USB4 Peripheral***.

Unless otherwise specified, fields in this section shall be ignored by Testers unless this Router ***has a USB4 Port*** in which *USB4_PCIe_Tunneling_Supported* is set to YES.

USB4_PCIe_Endpoint_Vendor_ID

The Vendor ID of the PCIe endpoint. This value is assigned by PCIe SIG.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

USB4_PCIe_Endpoint_Device_ID

The Device ID of the PCIe endpoint. This value is assigned by the vendor.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

USB4_PCIe_Endpoint_Class_Code

The PCIe Class Code of the PCIe endpoint.

This field is a 6-digit hexadecimal number, with valid values in the range 0 - FFFFFFh (0 - 16777215).

3.2.3 Component Fields

The fields in this section are required for all Qualifying Products unless otherwise specified.

Port_Label

To be provided by the Vendor. This field shall correspond with the port label given on the device picture submitted to USB-IF by the Vendor along with the VIF. This is a string field.

If *VIF_Product_Type* is not set to 0 (Port Product) this field shall be ignored by Testers.

This field shall be unique to each Component.

On all Components for which *DFP_VDO_Port_Number* is required, this field shall begin with one or more digits that, when converted to an integer, shall be set equal to it.

Note: this allows DFPs to have descriptive text.

The following values are valid for this field when DFP_VDO_Port_Number is required. The substring used in validation is bolded:

- *"**3**"*
- *"**24**"*
- *"00**12**"*
- *" **6**"*
- *"**5**-DRD"*
- *"**2**USB4"*

The following are not valid when DFP_VDO_Port_Number is required:

- *"DFP"*
- *"DFP-2"*

"Port2-DRD"

Connector_Type

The connector type of a Port. Valid options are:

0 - Type-A (includes mini-A and micro-A)
1 - Type-B (includes mini-B, micro-B, and Components that present a Type-A plug)
2 - USB Type-C (includes captive cable Components that present a USB Type-C plug)
3 - Micro A/B

If *VIF_Product_Type* is not set to 0 (Port Product), then this field shall be ignored by Testers.

If the Component does not have an accessible port and presents a Type-A plug, then set this field to 1 (Type-B) and set *Captive_Cable* to YES.

If the Component does not have an accessible port and presents a USB Type-C plug, then set this field to 2 and set *Captive_Cable* to YES.

USB4_Supported (Y/N)

Indicates whether or not this Component supports USB4.

If *VIF_Product_Type* is not set to 0 (Port Product) or 1 (Cable), then this field shall be ignored by Testers.

If *Connector_Type* is not set to 2 (USB Type-C), then this field shall be ignored by Testers.

Note: if this field is set to YES for any Component, the vendor of the Qualifying Product shall provide a test platform that supports USB4 testing.

USB4_Router_Index

The Router ID of the Router that owns this Component. This field shall be set to the *USB4_Router_ID* of a Router defined in the current VIF.

Valid values are in the range 0 - 15.

If *USB4_Supported* is not set to YES, then this field shall be ignored by Testers.

USB_PD_Support (Y/N)

Does this product support USB Power Delivery?

If *VIF_Product_Type* is set to 0 (Port Product) and *Connector_Type* is not set to 2 (Type-C), then this field shall be set to NO.

If *VIF_Product_Type* is set to 1 (Cable) then this field shall be set to YES.

If *VIF_Product_Type* is set to 2 (Repeater) then this field shall be ignored by Testers.

If *USB4_Supported* is set to YES, then this field shall be set to YES.

PD_Port_Type

The PD capabilities of the Qualifying Product.

Valid options are:

0 - Consumer Only (asserts Rd all the time)
1 - Consumer/Provider (asserts Rd at startup and can be directed to assert Rp)
2 - Provider/Consumer (asserts Rp at startup and can be directed to assert Rd)
3 - Provider Only (asserts Rp)
4 - DRP (toggles between asserting Rp and Rd)
5 - eMarker (connects to its partner through a captive eMarker cable).

If *VIF_Product_Type* is not set to 0 (Port Product), then this field shall be ignored by Testers.

If *USB_PD_Support* is not set to YES), then this field shall be ignored by Testers.

If *Connector_Type* is not set to 2 (Type-C), then this field shall be ignored by Testers.

If *USB4_Supported* is set to YES, then this field shall not be set to 5 (eMarker).

Type_C_State_Machine

Indicates which Type-C connection state machine is implemented on the DUT. If *Connector_Type* is not set to 2 (Type-C) then this field shall be ignored by Testers.

If *USB_PD_Support* is set to YES and *PD_Port_Type* is equal to 0 (Consumer Only) or 5 (eMarker), then valid options are:

1 - SNK

If *USB_PD_Support* is set to YES and *PD_Port_Type* is equal to 1 (Consumer/Provider), then valid options are:

1 - SNK
2 - DRP

If *USB_PD_Support* is set to YES and *PD_Port_Type* is equal to 2 (Provider/Consumer), then valid options are:

0 - SRC
2 - DRP

If *USB_PD_Support* is set to YES and *PD_Port_Type* is equal to 3 (Provider only), then valid options are:

0 - SRC

If *USB_PD_Support* is set to YES and *PD_Port_Type* is equal to 4 (DRP), then valid options are:

2 - DRP

If *USB_PD_Support* is set to NO, then valid options are:

0 - SRC
1 - SNK
2 - DRP

Captive_Cable (Y/N)

Indicates whether this Component has a captive cable. Any Component that presents a Type-A or USB Type-C plug is considered to have a captive cable, even if there is nothing visible that looks like a cable (e.g., a USB thumb-drive).

This field and *Type_C_Sources_VCONN* cannot both be set to YES.

If *Connector_Type* is not set to 1 (Type-B) or 2 (Type-C) then this field shall be ignored by Testers.

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to YES.

Captive_Cable_Is_eMarked (Y/N)

Indicates whether this Component's captive cable is an Electronically Marked Cable.

If *PD_Port_Type* is set to 5 (eMarker), this field shall be ignored by testers.

If *USB_PD_Support* is not set to YES or *Captive_Cable* is not set to YES then this field shall be ignored by testers.

Port_Battery_Powered (Y/N)

Can this Component be powered by one or more batteries?

If *VIF_Product_Type* is not set to 0 (Port Product), then this field shall be ignored by Testers.

BC_1_2_Support

What Battery Charging 1.2 features does the Qualifying Product support?

If *Port_Battery_Powered* is set to YES and *Type_C_State_Machine* is set to 2 (DRP), then valid options are:

0 - None
1 - Portable Device

2 - Charging Port
3 - Both

If *Port_Battery_Powered* is set to YES and *Connector_Type* is set to 1 (Type-B) or 3 (Micro A/B), then valid options are:

0 - None
1 - Portable Device

If *Port_Battery_Powered* is set to YES and *Type_C_State_Machine* is set to 1 (SNK), then valid options are:

0 - None
1 - Portable Device

If *Connector_Type* is set to 0 (Type-A), then valid options are:

0 - None
2 - Charging Port

If *Connector_Type* is set to 2 (Type-C) and *Type_C_State_Machine* is set to 0 (SRC), then valid options are:

0 - None
2 - Charging Port

If *Port_Battery_Powered* is set to NO and *Connector_Type* is set to 2 (Type-C) and *Type_C_State_Machine* is set to 2 (DRP), then valid options are:

0 - None
2 - Charging Port

If *Port_Battery_Powered* is set to NO and *Connector_Type* is set to 1 (Type-B), then valid options are:

0 - None

If *Port_Battery_Powered* is set to NO and *Type_C_State_Machine* is set to 1 (SNK), then valid options are:

0 - None

If *VIF_Product_Type* is not set to 0 (Port Product), then this field shall be ignored by Testers.

3.2.4 General PD Fields

The fields in this section are required for all Qualifying Products that support Power Delivery (that is, where *USB_PD_Support* is set to YES) and shall be ignored by Testers otherwise.

PD_Spec_Revision_Major

The Major Revision number of the highest PD Specification the Qualifying Product supports.

Valid values are in the range 3 – 9.

If *USB4_Supported* is set to YES, then the Complete PD Specification Number shall be greater than or equal to 3020h.

PD_Spec_Revision_Minor

The Minor Revision number of the highest PD Specification the Qualifying Product supports.

Valid values are in the range 0 – 9.

If *USB4_Supported* is set to YES, then the Complete PD Specification Number shall be greater than or equal to 3020h.

PD_Spec_Version_Major

The Major Version number of the highest PD Specification the Qualifying Product supports.

Valid values are in the range 0 – 9.

If *USB4_Supported* is set to YES, then the Complete PD Specification Number shall be greater than or equal to 3020h.

PD_Spec_Version_Minor

The Minor Version number of the highest PD Specification the Qualifying Product supports.

Valid values are in the range 0 – 9.

If *USB4_Supported* is set to YES, then the Complete PD Specification Number shall be greater than or equal to 3020h.

PD_Specification_Revision

Which revision of the PD Specification is the Qualifying Product compliant with?

This field shall be set to 2 (Revision 3)

USB_Comms_Capable (Y/N)

Is the Qualifying Product capable of enumerating as a USB host or device?

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

If *USB4_Supported* is set to YES, then this field shall be set to YES.

Note: This field represents bits in more than one message. It is important that all messages give the same value for these bits.

DR_Swap_To_DFP_Supported (Y/N)

Set to YES if Qualifying Product can respond with an ***Accept*** to a ***DR_Swap*** request to switch from a UFP to a DFP.

If *Type_C_State_Machine* is set to DRP and *Type_C_Can_Act_As_Host* is set to YES and *Type_C_Can_Act_As_Device* is set to NO then this field shall be set to YES.

If *Type_C_State_Machine* is set to SNK and either *Type_C_Can_Act_As_Host* or *Type_C_Is_Alt_Mode_Controller* is set to YES, then this field shall be set to YES.

If *Type_C_State_Machine* is set to SRC and *Type_C_Can_Act_As_Device* is set to YES, then this field shall be set to YES.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

If *USB4_DFP_Supported* is set to YES and *Type_C_Port_On_Hub* is set to NO, then this field shall be set to YES.

Note: This field represents bits in more than one message. It is important that all messages give the same value for these bits.

DR_Swap_To_UFP_Supported (Y/N)

Set to YES if Qualifying Product can respond with an ***Accept*** to a ***DR_Swap*** request to switch from a DFP to a UFP.

If *Type_C_State_Machine* is set to DRP and *Type_C_Can_Act_As_Device* is set to YES and *Type_C_Can_Act_As_Host* is set to NO then this field shall be set to YES.

If *Type_C_State_Machine* is set to SNK and either *Type_C_Can_Act_As_Host* or *Type_C_Is_Alt_Mode_Controller* is set to YES, then this field shall be set to YES.

If *Type_C_State_Machine* is set to SRC and *Type_C_Can_Act_As_Device* is set to YES, then this field shall be set to YES.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Note: This field represents bits in more than one message. It is important that all messages give the same value for these bits.

Unconstrained_Power (Y/N)

Set this field to YES if either the Qualifying Product has an external power source available that is sufficient to adequately power the system while charging external devices or the Qualifying Product's primary function is to charge external devices.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Note: This field represents bits in more than one message. It is important that all messages give the same value for these bits.

VCONN_Swap_To_On_Supported (Y/N)

Set to YES if Qualifying Product can respond with an ***Accept*** to a ***VCONN_Swap*** message requesting it to start sourcing VCONN.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

VCONN_Swap_To_Off_Supported (Y/N)

Set to YES if Qualifying Product can respond with an ***Accept*** to a ***VCONN_Swap*** message requesting it to stop sourcing VCONN.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

If *Type_C_Sources_VCONN* is set to YES, then this field shall be set to YES.

Responds_To_Discov_SOP_UFP (Y/N)

Can this port respond with an ACK to a ***Discover Identity*** command from its port partner using SOP when acting as an Upstream Facing Port?

Note: This does not preclude the port from responding with BUSY before responding with ACK.

If *USB4_UFP_Supported* is set to YES, then this field shall be set to YES.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Responds_To_Discov_SOP_DFP (Y/N)

Can this Port respond with an ACK to a ***Discover Identity*** command from its port partner using SOP when acting as a Downstream Facing Port?

Note: This does not preclude the port from responding with BUSY before responding with ACK.

If this Component is a ***USB4 DFP***, then this field shall be set to YES.

If the Complete PD Specification Number is greater than or equal to 3020h, and the Qualifying Product has more than one port on which *Product_Type_DFP_SOP* is set to any of 1 (PDUSB Hub), 2 (PDUSB Host), or 3 (Power Brick), then this field shall be set to YES.

If *USB4_DFP_Supported* is set to YES, then this field shall be set to YES.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Attempts_Discov_SOP (Y/N)

Can this Port send a ***Discover Identity*** command to its port partner using SOP?

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

If *USB4_DFP_Supported* is set to YES, then this field shall be set to YES.

Power_Interruption_Available

Which Power Interruption Events can generate a Fast Role Swap?

Valid values are:

0 - No Interruption Possible
1 - AC mains/wall power Only
2 - DC Power Only
3 - AC mains/wall power and DC Power

If *VIF_Product_Type* is not set to 0 (Port Product), or if *USB_PD_Support* is not set to YES, then this field shall be ignored by testers.

Chunking_Implemented_SOP (Y/N)

Does this Qualifying Product implement an extended message chunking layer, as defined in Chapter 6 of ***[PowerDelivery3.0]***?

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Unchunked_Extended_Messages_Supported (Y/N)

Does this Qualifying Product set the Unchunked Extended Messages Supported bit, as defined in Chapter 6 of ***[PowerDelivery3.0]***?

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Manufacturer_Info_Supported_Port (Y/N)

Is the ***Get_Manufacturer_Info*** request (with Manufacturer Info Target set to 0), supported by this Component?

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Manufacturer_Info_VID_Port

The Product ID, as assigned by the manufacturer of the Qualifying Product.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

If *Manufacturer_Info_Supported_Port* is not set to YES, then this field shall be ignored by Testers.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Note: this is the Vendor ID returned in a response to a Get_Manufacturer_Info message in which Manufacturer Info Target *is set to* Port/Cable Plug.

Manufacturer_Info_PID_Port

The Product ID, as assigned by the manufacturer of the Qualifying Product.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

If *Manufacturer_Info_Supported_Port* is not set to YES, then this field shall be ignored by Testers.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Note: this is the Product ID returned in a response to a Get_Manufacturer_Info message in which Manufacturer Info Target *is set to* Port/Cable Plug.

Security_Msgs_Supported_SOP (Y/N)

Set to YES if the Qualifying Product responds to a ***Security_Request*** message with a ***Security_Response*** message.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

Num_Fixed_Batteries

The number of non-removable batteries in the device of which the Qualifying Product is a part.

Valid values are in the range 0 - 4.

If *Port_Battery_Powered* is set to YES, then at least one of this field and *Num_Swappable_Battery_Slots* shall be non-zero.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

This field shall be the same for all Components for which it is required.

Num_Swappable_Battery_Slots

The number of slots for removable batteries in the device of which the Qualifying Product is a part.

Valid values are in the range 0 - 4.

If Port_Battery_Powered is set to YES, then at least one of this field and Num_Fixed_Batteries shall be non-zero.

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker) then this field shall be ignored by Testers.

This field shall be the same for all Components for which it is required.

Data_Reset_Supported (Y/N)

Indicates whether or not this Port responds to a ***Data_Reset*** message with an ***Accept*** message.

If the Complete PD Specification Number is less than 3020h, then this field shall be ignored by testers.

If *VIF_Product_Type* is not set to 0 (Port Product), then this field shall be ignored by Testers.

If *USB4_Supported* is set to YES, then this field shall be set to YES.

Enter_USB_Supported (Y/N)

Indicates whether this Component responds to an ***Enter_USB*** message with an ***Accept*** or ***Reject*** message.

If the Complete PD Specification Number is less than 3020h, then this field shall be ignored by testers.

If *VIF_Product_Type* is not set to 0 (Port Product) or 1 (Cable), then this field shall be ignored by Testers.

If *VIF_Product_Type* is set to 1 (Cable) and *Product_Type* is not set, then this field shall be ignored by Testers.

If *USB4_Supported* is set to YES, and *Product_Type* is set to any value other than 3 (Passive Cable), then this field shall be set to YES.

If *VIF_Product_Type* is set to 1 (Cable) and *Product_Type* is not set, then this field shall be ignored by Testers.

If *Product_Type* is set to 3 (Passive Cable), then this field shall be set to NO.

ID_Header_Connector_Type_SOP

Is this connector a plug or a receptacle?

Valid options are:

2 - USB Type-C Receptacle
3 - USB Type-C Plug

If *VIF_Product_Type* is not set to 0 (Port Product), this field shall be ignored by Testers.

3.2.4.1 SOP* Capabilities

For the SOP* capability fields described below, the requirement is to answer YES if the Qualifying Product will return a ***GoodCRC*** for a message in the appropriate SOP* type, under the conditions of the test, when it is appropriate. Typically, *SOP_P_Capable* and *SOP_PP_Capable* will not be responded to by a UFP with a contract. During testing this is the assumed condition. If they respond to SOP' and/or SOP'' as a DFP then the question should be answered YES.

SOP_Capable (Y/N)

Does the Qualifying Product support the SOP protocol?

If *VIF_Product_Type* is set to 1 (Cable) or *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to NO.

If *VIF_Product_Type* is set to 0 (Port Product) and *PD_Port_Type* is not set to 5 (eMarker), then this field shall be set to YES.

SOP_P_Capable (Y/N)

Does the Qualifying Product support the SOP' protocol?

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to YES.

If *USB4_DFP_Supported* is YES then this field shall be set to YES.

If *VIF_Product_Type* is set to 1 (Cable), then this field shall be set to YES.

SOP_PP_Capable (Y/N)

Does the Qualifying Product support the SOP'' protocol?

If *SOP_P_Capable* is not set to YES, then this field shall be ignored by Testers.

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to NO.

If *USB4_DFP_Supported* is YES then this field shall be set to YES.

SOP_P_Debug_Capable (Y/N)

Does the Qualifying Product support the SOP'_Debug protocol?

SOP_PP_Debug_Capable (Y/N)

Does the Qualifying Product support the SOP''_Debug protocol?

3.2.5 USB Type-C Fields

The fields in this section shall be ignored by Testers if *Connector_Type* is not set to 2 (Type-C) or if *VIF_Product_Type* is not set to 0 (Port Product).

Type_C_Implements_Try_SRC (Y/N)

Indicates whether this Component supports the Try.SRC state when transitioning out of AttachWait.SNK.

At most one of *Type_C_Implements_Try_SRC* and *Type_C_Implements_Try_SNK* may be set to YES.

If *Type_C_State_Machine* is not set to 2 (DRP) then this field shall be ignored by Testers.

Type_C_Implements_Try_SNK (Y/N)

Indicates whether this Component supports the Try.SNK state when transitioning out of AttachWait.SRC.

At most one of *Type_C_Implements_Try_SRC* and *Type_C_Implements_Try_SNK* may be set to YES.

If *Type_C_State_Machine* is not set to 2 (DRP) then this field shall be ignored by Testers.

RP_Value

Indicates what Rp value a source port presents upon connect.

Valid options are:

0 - Default
1 - 1.5A
2 - 3A

If *Type_C_State_Machine* is not set to 0 (SRC) or 2 (DRP) then this field shall be ignored by Testers.

Type_C_Supports_VCONN_Powered_Accessory (Y/N)

Indicates whether the non-source port supports communication with a Vconn Powered Accessory.

If *PD_Port_Type* is not set to 0 (Consumer Only), then this field shall be ignored by Testers.

Type_C_Is_VCONN_Powered_Accessory (Y/N)

Indicates whether this Component is a Vconn Powered Accessory.

If *PD_Port_Type* is set to 3 (Provider), then this field shall be ignored by Testers.

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to NO.

If *Captive_Cable* is not set to YES, then this field shall be set to NO.

Type_C_Is_Debug_Target_SRC (Y/N)

Indicates whether this Component supports the UnorientedDebugAccessory.SRC state and optionally the OrientedDebugAccessory.SRC state.

If *Type_C_State_Machine* is not set to 0 (SRC) or 2 (DRP) then this field shall be ignored by Testers.

Type_C_Is_Debug_Target_SNK (Y/N)

Indicates whether this Component supports the DebugAccessory.SNK state.

If *Type_C_State_Machine* is not set to 1 (SNK) or 2 (DRP) then this field shall be ignored by Testers.

Type_C_Can_Act_As_Host (Y/N)

Indicates whether this Component can communicate with USB 2.0 or USB 3.2 as a host or as the Downstream Facing Port of a hub.

If *USB_Comms_Capable* is set to NO, then this field shall be set to NO.

If *USB_Comms_Capable* is set to YES and *Type_C_Can_Act_As_Device* is set to NO, then this field shall be set to YES.

If *USB_PD_Support* is not set to YES and *Type_C_State_Machine* is set to 1 (SNK), then this field shall be set to NO.

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to NO.

If *USB4_DFP_Supported* is set to YES, then this field shall be set to YES.

The Qualifying Product shall have no more than one field in which *USB_Comms_Capable* is set to YES and this field is set to NO.

Type_C_Is_Alt_Mode_Controller (Y/N)

Can this Component act as an Alternate Mode Controller?

If *USB_PD_Support* is not set to YES, then this field shall be ignored by Testers.

If *Attempts_Discov_SOP* is not set to YES, then this field shall be set to NO.

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to NO.

Type_C_Can_Act_As_Device (Y/N)

Indicates whether this Component can communicate with USB 2.0 or USB 3.2 as a device or as the Upstream Facing Port of a hub.

If *USB_Comms_Capable* is set to NO, then this field shall be set to NO.

If *USB_Comms_Capable* is set to YES and *Type_C_Can_Act_As_Host* is set to NO, then this field shall be set to YES.

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to YES.

If *USB_PD_Support* is not set to YES and *Type_C_State_Machine* is set to 0 (SRC), then this field shall be set to NO.

If *USB4_UFP_Supported* is set to YES, then this field shall be set to YES.

Type_C_Is_Alt_Mode_Adapter (Y/N)

Can this Component act as an Alternate Mode Device?

If *USB_PD_Support* is not set to YES, then this field shall be ignored by Testers.

If *Type_C_Can_Act_As_Device* is not set to YES, then this field shall be set to NO.

If *Responds_To_Discov_SOP_UFP* is not set to YES, then this field shall be set to NO.

Type_C_Power_Source

Indicates whether this Component is powered externally, through the Upstream Facing Port, or either ("Both").

Valid options are:

0 - Externally Powered
1 - UFP-powered
2 - Both

Type_C_Port_On_Hub (Y/N)

Is this Component part of a PDUSB Hub?

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to NO.

Type_C_Supports_Audio_Accessory (Y/N)

Does this Component support communication with an Audio Accessory?

Type_C_Sources_VCONN (Y/N)

Indicates whether this Component sources Vconn.

If *VCONN_Swap_To_On_Supported* is set to YES, then this field shall be set to YES.

This field and *Captive_Cable* shall not both be set to YES.

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to NO.

3.2.6 USB4 Port Fields

The fields in this section shall be ignored by Testers unless *USB4_Supported* is set to YES.

USB4_Lane_0_Adapter

The Adapter number of the Lane 0 Adapter associated with this Component.

Valid values are in the range 1 - 62.

USB4_Max_Speed

Indicates the maximum supported USB4 speed.

Valid options are:

0 - Gen 2 (20Gb)
1 - Gen 3 (40Gb)

USB4 Hubs shall set this field to 1 (Gen 3 (40Gb)).

USB4_DFP_Supported (Y/N)

Can this Component act as a Downstream Facing Port as specified in ***[USB4]***?

If *USB4_UFP_Supported* is set to NO, then this field shall be set to YES.

If *Type_C_Can_Act_As_Host* is set to NO, then this field shall be set to NO.

USB4_UFP_Supported (Y/N)

Can this Component act as an Upstream Facing Port as specified in ***[USB4]***?

If *USB4_DFP_Supported* is set to NO, then this field shall be set to YES.

The Qualifying Product shall not have more than one port on which *USB4_DFP_Supported* is set to NO and this field is set to YES.

If *Type_C_Can_Act_As_Device* is set to NO, then this field shall be set to NO.

USB4_USB3_Tunneling_Supported (Y/N)

Does this Component support USB3 Tunneling?

If the Qualifying Product is a ***USB4 Host*** or a ***USB4 Hub***, then this field shall be set to YES.

USB4_DP_Tunneling_Supported (Y/N)

Does this Component support DisplayPort Tunneling?

If the Qualifying Product is a ***USB4 Host*** or a ***USB4 Hub***, then this field shall be set to YES.

USB4_PCIe_Tunneling_Supported (Y/N)

Does this Component support PCIe Tunneling?

If the Qualifying Product is a ***USB4 Hub***, then this field shall be set to YES.

USB4_TBT3_Compatibility_Supported (Y/N)

Does this field support Thunderbolt 3?

If the Qualifying Product is a ***USB4 Hub*** then this field shall be set to YES on all ***USB4 DFPs***.

If the Qualifying Product is a ***USB4 Dock***, then this field shall be set to YES.

USB4_CL1_State_Supported (Y/N)

Does this Component support the CL1 low power state?

USB4_CL2_State_Supported (Y/N)

Does this Component support the CL1 low power state?

USB4_Num_Retimers

The number of On-Board re-timers between Router and connector.

Valid values are in the range 0 - 2.

USB4_DP_Bit_Rate

The Main-Link bit rate as defined in DP 1.4a specification.

Valid options are:

0 - RBR
1 - HBR
2 - HBR2
3 - HBR3

If *USB4_DP_Tunneling_Supported* is not set to YES, then this field shall be ignored by Testers.

USB4_Num_DP_Lanes

The number of Lanes that support Native DP traffic.

Valid options are:

1 - 1 lane
2 - 2 lanes
4 - 4 lanes

If *USB4_DP_Tunneling_Supported* is not set to YES, then this field shall be ignored by Testers.

3.2.7 USB Data – Upstream Facing Port Fields

The fields in this section shall be ignored by Testers unless *Connector_Type* is set to 1 (Type-B) or 3 (Micro A/B), or *Connector_Type* is set to 2 (Type-C) and *Type_C_Can_Act_As_Device* is set to YES.

The fields in this section shall only be set for a single port on a Qualifying Product.

Device_Supports_USB_Data (Y/N)

Indicates whether this Component can act as a USB Data Upstream Facing Port.

If *Connector_Type* is not set to 3 (Micro-A/B), then this field shall be set to YES.

Device_Speed

Indicates the maximum USB speed supported when communicating as a USB2 or USB3.2 device.

Valid options are:

0 - USB 2
1 - USB 3.2 Gen 1x1
2 - USB 3.2 Gen 2x1
3 - USB 3.2 Gen 1x2
4 - USB 3.2 Gen 2x2

If *Connector_Type* is set to 3 (Micro-A/B), then this field shall be set to 0 (USB 2).

If *Device_Supports_USB_Data* is set to NO, then this field shall be ignored by Testers.

Device_Max_USB2_Speed

The highest USB 2 speed the Qualifying Product can operate at when acting as a USB data device.

Valid Options are:

0 - Low Speed
1 - Full Speed
2 - High Speed

If *Device_Supports_USB_Data* is not set to YES, then this field shall be ignored by Testers.

If *Device_Speed* is in the range 2-4 (USB 3.2 Gen 2x1, USB 3.2 Gen 1x2, USB 3.2 Gen 2x2), then this field shall be set to 2 (High Speed).

Device_Contains_Captive_Retimer (Y/N)

Does this Component have an associated re-timer?

If *Device_Supports_USB_Data* is set to NO, then this field shall be ignored by Testers.

Device_Truncates_DP_For_tDHPResponse (Y/N)

When communicating as a device, does this Component truncate Data Packets in order to meet the timing requirements for tDHPResponse?

If *Device_Speed* is not set in the range 1 - 4 (any USB 3.2 Gen XxY), then this field shall be ignored by Testers.

If *Device_Supports_USB_Data* is set to NO, then this field shall be ignored by Testers.

Device_Gen1x1_tLinkTurnaround

tLinkTurnaround is defined as the quantity *tDHPResponse* – *tDPacket*, where *tDHPResponse* and *tDPacket* are as defined in ***[USB3.2]***. When communicating as a device operating at gen1x1, valid values are in the range 400ns - 1500ns.

If *Device_Speed* is set to 0 (USB 2) or *Device_Truncates_DP_For_tDHPResponse* is not set to YES, then this field shall be ignored by Testers.

Device_Gen2x1_tLinkTurnaround

tLinkTurnaround is defined as the quantity *tDHPResponse* – *tDPacket*, where *tDHPResponse* and *tDPacket* are as defined in ***[USB3.2]***. When communicating as a device operating at gen2x1, valid values are in the range 700ns - 1500ns.

If *Device_Speed* is not set to 2 (USB 3.2 Gen 2x1) or 4 (USB 3.2 Gen 2x2) or *Device_Truncates_DP_For_tDHPResponse* is not set to YES, then this field shall be ignored by Testers.

Hub_Billboard_DSPort_Num

Indicates the location of the USB 2.0 Port on a PDUSB Hub where a Billboard Device is attached when the UFP AMA is not entered within tAMETimeout. If the Qualifying Product has PDUSB Hubs on more than one tier, this field contains the full path to Billboard Device.

This field is a hexadecimal number, consisting of between 1 and 4 non-zero hexadecimal digits. Each digit represents the number of a USB 2.0 Port Number on a USB Hub, with the tiers increasing from least significant to most significant nibble.

If *Type_C_Port_On_Hub* is not set to YES, then this field shall be ignored by testers.

If *Type_C_Is_Alt_Mode_Adapter* is not set to YES, then this field shall be ignored by testers.

Example: a single tier hub where the Billboard Device appears on the DS Port with USB 2.0 Port Number 3 – 0x3

Example: a two-tier hub where the Billboard Device appears on the first tier DS Port with USB 2.0 Port Number 2 – 0x2

Example: a two-tier hub where the Billboard Device appears on the second tier DS Port with USB 2.0 Port Number 2, and the second-tier hub is attached to the first-tier DS Port with USB 2.0 Port Number 4 – 0x24

3.2.8 USB Data – Downstream Facing Port Fields

The fields in this section shall be ignored by Testers unless *Connector_Type* is set to 0 (Type-A) or 3 (Micro A/B); or *Connector_Type* is set to 2 (Type-C) and *Type_C_Can_Act_As_Host* is set to YES.

Host_Supports_USB_Data (Y/N)

Indicates whether this Component can act as a USB Data Downstream Facing Port.

If *Connector_Type* is not set to 0 (Type-A), then this field shall be set to YES.

If the Qualifying Product has no Components on which *Type_C_State_Machine* is set to 0 (SRC) or 2 (DRP), then this field shall be set to YES.

Host_Speed

Indicates the maximum USB speed supported when communicating as a USB2 or USB3.2 host or hub.

Valid options are:

0 - USB 2
1 - USB 3.2 Gen 1x1
2 - USB 3.2 Gen 2x1
3 - USB 3.2 Gen 1x2
4 - USB 3.2 Gen 2x2

If *Connector_Type* is set to 3 (Micro-A/B), then this field shall be set to 0 (USB 2).

If *Host_Supports_USB_Data* is not set to YES, then this field shall be ignored by Testers.

Is_DFP_On_Hub (Y/N)

Indicates whether this Component is a Downstream Facing Port of a USB Hub.

If *Connector_Type* is set to 2 (Type-C), then this field shall be set to the value of *Type_C_Port_On_Hub*.

If *Host_Supports_USB_Data* is not set to YES, then this field shall be ignored by Testers.

Hub_Port_Number

The internal USB hub port number of this Component. This is the number that a USB Host uses to access this Component.

If *Host_Speed* is set to 0 (USB 2), then valid values are in the range 1 - 255.

If *Host_Speed* is set to any value in the range 1 - 4 (any USB 3.2 Gen XxY), then valid values are in the range 1 - 15.

If *Is_DFP_On_Hub* is not set to YES, then this field shall be ignored by Testers.

Host_Contains_Captive_Retimer (Y/N)

Does this Component have an associated re-timer?

If *Host_Supports_USB_Data* is not set to YES, then this field shall be ignored by Testers.

Host_Truncates_DP_For_tDHPResponse (Y/N)

When communicating as a host, does this Component truncate Data Packets in order to meet the timing requirements for tDHPResponse?

If *Host_Speed* is not set in the range 1 - 4 (any USB 3.2 Gen XxY) then this field shall be ignored by Testers.

If *Host_Supports_USB_Data* is not set to YES, then this field shall be ignored by Testers.

Host_Gen1x1_tLinkTurnaround

tLinkTurnaround is defined as the quantity *tDHPResponse* – *tDPacket*, where *tDHPResponse* and *tDPacket* are as defined in ***[USB3.2]***. When communicating as a host operating at gen1x1, valid values are in the range 400ns - 1500ns.

If *Host_Truncates_DP_For_tDHPResponse* is not set to YES, then this field shall be ignored by Testers.

Host_Gen2x1_tLinkTurnaround

tLinkTurnaround is defined as the quantity *tDHPResponse* – *tDPacket*, where *tDHPResponse* and *tDPacket* are as defined in ***[USB3.2]***. When communicating as a host operating at gen2x1, valid values are in the range 700ns - 1500ns.

If *Host_Speed* is not set to 2 (USB 3.2 Gen 2x1) or 4 (USB 3.2 Gen 2x2) or *Host_Truncates_DP_For_tDHPResponse* is not set to YES, then this field shall be ignored by Testers.

Host_Is_Embedded (Y/N)

Is this Component part of an Embedded Host? An Embedded Host is a specialized USB Host with minimal functionality designed to work with a specific list of peripherals.

Host_Suspend_Supported (Y/N)

Does the embedded host to which this Component belongs support USB Suspend?

If *Host_Supports_USB_Data* is not set to YES, then this field shall be ignored by Testers.

If *Host_Is_Embedded* is set to NO, then this field shall be set to YES.

3.2.9 PD Source Fields

The fields in this section are required for all Ports on a Qualifying Products with Source capability (that is, *PD_Port_Type* is equal to one of 1 (Consumer/Provider), 2 (Provider/Consumer), 3 (Provider Only), or 4 (DRP)), and shall be ignored by Testers otherwise.

The first ***Source_Capabilities*** message sent by the tester to a Sink will always be 5V at 100mA. The Qualifying Product is required to make a legal request for this (or for less current). At the same time the Capability Mismatch bit may be set. Any Qualifying Product requesting more than the Tester offered Source Capabilities will automatically fail, and no further testing will be performed.

PD_Power_As_Source

An ECR to the V2.0 PD Specification has established a new set of Power Rules, superseding the earlier Profile Rules. The vendor of a Source Capable device shall specify a PD Power level (PDP) in mW. This is used by the Tester in conjunction with the Normative Voltages and Currents Table to determine the capabilities which may be offered by the Source.

Valid values are in the range 500 - 240000, where the value shall be exactly divisible by 500 if it is less than 10000, and shall be exactly divisible by 1000 if it is greater than or equal to 10000.

EPR_Supported_As_Src (Y/N)

Is the current Port Extended Power Range (EPR) capable as a Source?

If the Complete PD Specification Number is less than 3110h, then this field shall be set to NO.

If the Complete PD Specification Number is invalid, then this field shall be ignored by Testers.

USB_Suspend_May_Be_Cleared (Y/N)

In ***Source_Capabilities*** there is a bit called ***USB Suspend Supported***, which is normally set to one, but may be cleared to 0 to signal to the sink that the sink need not obey USB Suspend.

If the Qualifying Product (as a Source) will ever set ***USB Suspend Supported*** to a 0, then the VIF shall set this field to YES. Otherwise, it shall be set to NO.

Sends_Pings (Y/N)

Set to YES if Qualifying Product sends Ping messages when operating as a source. Sending Ping messages is optional (and unnecessary when communicating over a USB Type-C cable).

FR_Swap_Type_C_Current_Capability_As_Initial_Sink

This field is used to determine if the Qualifying Product supports Fast Role Swap in initial Sink role, and if so, what current it supplies as a new Source.

This parameter is not part of any PD message.

Valid options are:

0 - FR_Swap not supported
1 - Default USB Power
2 - 1.5A @ 5V
3 - 3A @ 5V

Master_Port (Y/N)

Set to YES if this Component is a Master Port as defined in ***[USBType-C2.0]***. A Master Port is one which, upon receipt of a BIST Message with a BIST Shared Test Mode Entry BIST Data Object, enters the BIST Shared Capacity Test Mode.

Has_Invariant_PDOs (Y/N)

Does this port always advertise the same PDOs except when limited by the cable?

Num_Src_PDOs

The number of Source Power Data Objects (PDOs) returned by the Port in a ***Source_Capabilities*** message.

Valid values are in the range 1 - 7.

If *EPR_Supported_As_Src* is set to NO, then this field shall be equal to the number of Source PDOs defined for this Port.

If *EPR_Supported_As_Src* is set to YES, then this field shall be strictly less than the number of Source PDOs defined for this Port.

*Note: on a port with EPR Capabilities, this field refers only to the non-empty PDOs in the range SPR PDO 1 - SPR PDO 7) in an **EPR_Source_Capabilities** message. Refer to Figure 6-54 in **[PowerDelivery3.1]**.*

PD_OC_Protection (Y/N)

Does the Qualifying Product support Over-Current Protection (OCP)?

If this Component supports USB Power Delivery, then it is required to support OCP. However, a Qualifying Product may set this field to NO in order to notify Testers that they have not yet implemented OCP and that Testers should not run tests that could harm it.

Note: Testers may record a failure if a test is not run.

PD_OCP_Method

What method does the Qualifying Product use to implement OCP?

Valid options are:

0 – Over-Current Response
1 – Under-Voltage Response
2 – Both

If *PD_OC_Protection* is not set to YES, then this field shall be ignored by Testers.

3.2.9.1 Source PDOs

In this section, the fields represent the parameters for a single non-empty Source PDO. Source PDOs shall appear in the VIF in the same order they are returned in a ***Source_Capabilities*** or ***EPR_Source_Capabilities*** message.

*Note: on a port with EPR Capabilities that has less than 7 SPR PDOs, the zero-filled PDOs are not listed in the Vendor Info File and the first EPR PDO shall be listed after the last SPR PDO. Note that this does not match the definition of the **EPR_Source_Capabilities** message as defined in section 6.5.15.1 in **[PowerDelivery3.1]**.*

Src_PDO_Supply_Type

The type of this Source PDO.

Valid options are:

0 – Fixed
1 – Battery
2 – Variable (non-battery)
3 – Augmented

In the first Source PDO of this ***SrcPdoList***, this field shall be set to 0 (Fixed).

Src_PDO_APDO_Type

Is this APDO a Standard Power Range (SPR) Programmable Power Supply, or an Extended Power Range (EPR) Adjustable Voltage Supply?

Valid options are:

0 – SPR Programmable Power Supply
1 – EPR Adjustable Voltage Supply

If *Src_PDO_Supply_Type* is not set to 3 (Augmented), then this field shall be ignored by Testers.

If *EPR_Supported_As_Src* is not set to YES, then this field shall be set to 0 (SPR).

Src_PDO_Peak_Current

Peak current (that is, over the value specified by *Src_PDO_Voltage*) that the Qualifying Product may provide for short periods.

Valid options are:

0 – 100% IOC
1 – 130% IOC
2 – 150% IOC
3 – 200% IOC

If *Src_PDO_Supply_Type* is not set to 0 (fixed), then this field shall be ignored by Testers.

Src_PDO_Voltage

Output voltage in units of 50 mV.

If *EPR_Supported_As_Src* is not set to YES valid values are in the range 0 - 400 (0 - 20000 mV).

If *EPR_Supported_As_Src* is set to YES valid values are in the range 0 - 960 (0 - 48000 mV).

In the first Source PDO of this ***SrcPdoList***, this field shall be set to 100 (5000 mV).

If *Src_PDO_Supply_Type* is not set to 0 (fixed), then this field shall be ignored by Testers.

Src_PDO_Max_Current

If *Src_PDO_Supply_Type* is set to 0 (fixed), or 2 (Variable), then this field represents the maximum operating current in units of 10mA, with valid values in the range 0 - 500 (0 - 5000 mA).

If *Src_PDO_Supply_Type* is set to 3 (Augmented) and *Src_PDO_APDO_Type* is set to 0 (SPR Programmable Power Supply), then this field represents the maximum operating current in units of 50mA, with valid values in the range 0 - 100 (0 - 5000 mA).

If *Src_PDO_Supply_Type* is not set to 0 (fixed), 2 (Variable), or 3 (Augmented), then this field shall be ignored by Testers.

If *Src_PDO_Supply_Type* is set to 3 (Augmented) and *Src_PDO_APDO_Type* is not set to 0 (SPR Programmable Power Supply), then this field shall be ignored by Testers.

If *Src_PDO_Supply_Type* is not set to 0 (fixed), 2 (Variable), or 3 (PPS), then this field shall be ignored by Testers.

Src_PDO_Min_Voltage

If *Src_PDO_Supply_Type* is set to 1 (Battery) or 2 (Variable), this field represents the minimum output voltage in units of 50 mV with valid values in the range 0 - 420 (0 - 21000 mV).

If *Src_PDO_Supply_Type* is set to 3 (Augmented) and *Src_PDO_APDO_Type* is not set to 1 (EPR Adjustable Voltage Supply), this field represents the minimum output voltage in units of 100 mV, with valid values in the range 0 - 210 (0 - 21000 mV).

If *Src_PDO_Supply_Type* is set to 3 (Augmented) and *Src_PDO_APDO_Type* is set to 1 (EPR Adjustable Voltage Supply), this field represents the maximum output voltage in units of 100 mV, with valid values in the range 0 - 480 (0 - 48000 mV).

In all cases, this field shall be less than *Src_PDO_Max_Voltage*.

If *Src_PDO_Supply_Type* is not set to 1 (Battery), 2 (Variable), or 3 (Augmented), then this field shall be ignored by Testers.

Src_PDO_Max_Voltage

If *Src_PDO_Supply_Type* is set to 1 (Battery) or 2 (Variable), this field represents the maximum output voltage in units of 50 mV, with valid values in the range 0 - 420 (0 - 21000 mV).

If *Src_PDO_Supply_Type* is set to 3 (Augmented) and *Src_PDO_APDO_Type* is not set to 1 (EPR Adjustable Voltage Supply), then this field represents the maximum output voltage in units of 100 mV, with valid values in the range 0 - 210 (0 - 21000 mV).

If *Src_PDO_Supply_Type* is set to 3 (Augmented) and *Src_PDO_APDO_Type* is set to 1 (EPR Adjustable Voltage Supply), this field represents the maximum output voltage in units of 100 mV, with valid values in the range 0 - 480 (0 - 48000 mV).

In all cases, this field shall be greater than *Src_PDO_Min_Voltage*.

If *Src_PDO_Supply_Type* is not set to 1 (battery), 2 (Variable), or 3 (Augmented), then this field shall be ignored by Testers.

Src_PDO_Max_Power

Power supplied in units of 250 mW.

Valid values are in the range 0 - 400 (0 - 100000 mW).

If *Src_PDO_Supply_Type* is not set to 1 (battery), then this field shall be ignored by Testers.

Src_PDO_PDP_Rating

The PDP of this AVS Port in units of 1W.

Valid values are in the range 0 – 240 (0-240 W).

If *Src_PDO_APDO_Type* is not set to 1 (EPR Adjustable Voltage Supply), then this field shall be ignored by Testers.

Src_PD_OCP_OC_Debounce

The Over-Current debounce time in units of 1 mS.

Valid values are in the range 0 – 1000.

If *Src_PDO_Supply_Type* is not set to 0 (fixed), then this field shall be ignored by Testers.

If *PD_OCP_Method* is not set to 0 (Over-Current Response) or 2 (Both), then this field shall be ignored by Testers.

Src_PD_OCP_OC_Threshold

The Over-Current threshold current in units of 10 mA.

Valid values are in the range *Src_PDO_Max_Current* to 1000 (10000 mA).

If *Src_PDO_Supply_Type* is not set to 0 (fixed), then this field shall be ignored by Testers.

If *PD_OCP_Method* is not set to 0 (Over-Current Response) or 2 (Both), then this field shall be ignored by Testers.

Src_PD_OCP_UV_Debounce

The Under-Voltage debounce time in units of 1 mS.

Valid values are in the range 0 - 1000.

If *Src_PDO_Supply_Type* is not set to 0 (fixed), then this field shall be ignored by Testers.

If *PD_OCP_Method* is not set to 1 (Under-Voltage Response) or 2 (Both), then this field shall be ignored by Testers.

Src_PD_OCP_UV_Threshold_Type

What method should be used to determine the Under-Voltage threshold?

Valid options are:

0 – Value
1 – Percentage

If *Src_PDO_Supply_Type* is not set to 0 (fixed), then this field shall be ignored by Testers.

If *PD_OCP_Method* is not set to 1 (Under-Voltage Response) or 2 (Both), then this field shall be ignored by Testers.

Src_PD_OCP_UV_Threshold

If *Src_PD_OCP_UV_Threshold_Type* is set to 0 (Value), then this field represents the Under-Voltage threshold expressed as an absolute voltage in units of 10 mV. Valid values are in the range 80 – V_{95}/10 (800 – V_{95} mV), where V_{95} is 95% of *Src_PDO_Voltage* in mV. Testers shall give 5% tolerance to the value entered.

If *Src_PD_OCP_UV_Threshold_Type* is set to 1 (Percentage), then this field represents Under-Voltage threshold expressed as the percentage of *Src_PDO_Voltage*. Valid values are in the range 0 – 95. Testers shall give 5% tolerance to the value calculated.

If *Src_PDO_Supply_Type* is not set to 0 (fixed), then this field shall be ignored by Testers.

If *PD_OCP_Method* is not set to 1 (Under-Voltage Response) or 2 (Both), then this field shall be ignored by Testers.

3.2.10 PD Sink Fields

The fields in this section are required for all Ports on a Qualifying Products with Sink capability (that is, *PD_Port_Type* is equal to one of 0 (Consumer Only), 1 (Consumer/Provider), 2 (Provider/Consumer), or 4 (DRP)), and shall be ignored by Testers otherwise.

A Sink Qualifying Product will be offered 0mA at all voltages offered at least one point. This is a PD Suspend condition and a request for 0mA at one of the voltages offered is a mandatory requirement. Any Qualifying Product which does not request 0mA under these conditions will fail compliance.

PD_Power_As_Sink

The vendor of a Sink Capable device shall specify a PD Power level (PDP) in mW. This is used by the Tester in conjunction with the Normative Voltages and Currents Table to determine the maximum capabilities which may be required by the Sink.

Valid values are in the range 0 - 240000, where the value shall be exactly divisible by 500 if it is less than 10000 and shall be exactly divisible by 1000 if it is greater than or equal to 10000.

EPR_Supported_As_Snk (Y/N)

Is the current Port Extended Power Range (EPR) capable as a Sink?

If the Complete PD Specification Number is less than 3110h, then this field shall be set to NO.

If the Complete PD Specification Number is invalid, then this field shall be ignored by Testers.

No_USB_Suspend_May_Be_Set (Y/N)

In a Request message there is a bit called ***No USB Suspend***, which the Sink sets to one if it wishes to request that it need not obey USB Suspend, but instead be allowed to continue to draw power according to its PD contract.

If the Qualifying Product (as a Sink) will ever set ***No USB Suspend*** to a 1, then the VIF shall set this field to YES. Otherwise, it should be set to NO.

GiveBack_May_Be_Set (Y/N)

In a Request message there is a bit called ***Giveback***, which the Sink sets to 1 if it is prepared to lower its Operating Current to its Minimum Operating Current, on demand.

If the Qualifying Product will ever set this bit in the test configuration, then it shall set this field to YES. Otherwise, it should be set to NO.

Higher_Capability_Set (Y/N)

In a ***Sink_Capabilities*** message there is a bit called ***HigherCapability***, which the Sink sets to 1 if it needs more than ***vSafe5V*** (e.g., 12V) to provide full functionality.

If the Qualifying Product sets this bit in the configuration described by the VIF, then this field shall be set to YES, otherwise, to NO.

FR_Swap_Reqd_Type_C_Current_As_Initial_Source

This field is used to determine if the Qualifying Product supports Fast Role Swap in initial Source role.

In a ***Sink_Capabilities*** message there is a field called ***Fast Role Swap USB Type-C Current***, in which the initial Source describes whether it supports Fast Role Swap to become a new Sink, and if so, what current it requires as a new Sink.

Valid options are:

0 - FR_Swap not supported
1 - Default USB Power
2 - 1.5A @ 5V
3 - 3A @ 5V

Num_Snk_PDOs

The number of Sink Power Data Objects (PDOs) returned by the Port in a ***Sink_Capabilities*** message.

Valid values are in the range 1 - 7.

If *EPR_Supported_As_Snk* is set to NO, then this field shall be equal to the number of Sink PDOs defined for this Port.

If *EPR_Supported_As_Snk* is set to YES, then this field shall be strictly less than the number of Sink PDOs defined for this Port.

*Note: on a port with EPR Capabilities, this field refers only to the non-empty PDOs in the range SPR PDO 1 - SPR PDO 7) in an **EPR_Sink_Capabilities** message. Refer to Figure 6-54 in **[PowerDelivery3.1]**.*

3.2.10.1 Sink PDOs

In this section, the fields represent the parameters for a single non-empty Sink PDO. Sink PDOs shall appear in the VIF in the same order they are returned in a ***Sink_Capabilities*** or ***EPR_Sink_Capabilities*** message.

*Note: on a port with EPR Capabilities that has less than 7 SPR PDOs, the zero filled PDOs are not listed in the Vendor Info File and the first EPR PDO shall be listed after the last SPR PDO. Note that this does not match the definition of the **EPR_Sink_Capabilities** message as defined in section 6.5.15.1 in **[PowerDelivery3.1]**.*

Snk_PDO_Supply_Type

The type of this Sink PDO.

Valid options are:

0 - Fixed
1 - Battery
2 - Variable (non-battery)
3 – Augmented

In the first Sink PDO of this ***SnkPdoList***, this field shall be set to 0 (Fixed).

Snk_PDO_APDO_Type

Is this APDO a Standard Power Range (SPR) Programmable Power Supply, or an Extended Power Range (EPR) Adjustable Voltage Supply?

Valid options are:

0 – SPR Programmable Power Supply
1 – EPR Adjustable Voltage Supply

If *Snk_PDO_Supply_Type* is not equal to 3 (Augmented), then this field shall be ignored by Testers.

If *EPR_Supported_As_Snk* is not set to YES, then this field shall be set to 0 (SPR).

Snk_PDO_Voltage

The voltage, in units of 50 mV, required for the device to operate at least one of its modes of operation.

If *EPR_Supported_As_Snk* is not set to YES valid values are in the range 0 - 400 (0 - 20000 mV).

If *EPR_Supported_As_Snk* is set to YES valid values are in the range 0 - 960 (0 - 48000 mV).

In the first Sink PDO of this ***SnkPdoList***, this field shall be set to 100 (5000 mV).

If *Snk_PDO_Supply_Type* is not equal to 0 (fixed), then this field shall be ignored by Testers.

Snk_PDO_Op_Current

If *Snk_PDO_Supply_Type* is set to 0 (Fixed) or 2 (Variable), this field represents the operating current, in units of 10 mA, required for the device to operate at least one of its modes of operation, with valid values are in the range 0 - 500 (0 - 5000 mA).

If *Snk_PDO_Supply_Type* is set to 3 (Augmented) and *Snk_PDO_APDO_Type* is set to 0 (SPR Programmable Power Supply), then this field represents the maximum operating current in units of 50mA, with valid values in the range 0 - 100 (0 - 5000 mA).

If *Snk_PDO_Supply_Type* is not set to 0 (fixed), 2 (Variable), or 3 (Augmented), then this field shall be ignored by Testers.

If *Snk_PDO_Supply_Type* is set to 3 (Augmented) and *Snk_PDO_APDO_Type* is not set to 0 (SPR Programmable Power Supply), then this field shall be ignored by Testers.

Snk_PDO_PDP_Rating

The PDP of this AVS Port in units of 1W.

Valid values are in the range 0 – 240 (0-240 W).

If *Snk_PDO_APDO_Type* is not set to 1 (EPR), then this field shall be ignored by Testers.

Snk_PDO_Op_Power

Operating power, in units of 250 mW, required for the device to operate at least one of its modes of operation.

Valid values are in the range 0 - 400 (0 - 100000 mW).

If *Snk_PDO_Supply_Type* is not equal to 1 (battery), then this field shall be ignored by Testers.

Snk_PDO_Min_Voltage

If *Snk_PDO_Supply_Type* is set to 1 (Battery) or 2 (Variable), this field represents the minimum output voltage, in units of 50 mV, with valid values in the range 0 - 420 (0 - 21000 mV).

If *Snk_PDO_Supply_Type* is set to 3 (Augmented) and *Snk_PDO_APDO_Type* is not set to 1 (EPR Adjustable Voltage Supply), this field represents the minimum output voltage, in units of 100 mV, with valid values in the range 0 - 210 (0 - 21000 mV).

If *Snk_PDO_Supply_Type* is set to 3 (Augmented) and *Snk_PDO_APDO_Type* is set to 1 (EPR Adjustable Voltage Supply), this field represents the minimum output voltage, in units of 100 mV, with valid values in the range 0 - 480 (0 - 48000 mV).

In all cases, the absolute voltage, including any voltage variation, shall not fall below this value. This value shall be less than *Snk_PDO_Max_Voltage*.

If *Snk_PDO_Supply_Type* is not set to 1 (Battery), 2 (Variable), or 3 (Augmented), then this field shall be ignored by Testers.

Snk_PDO_Max_Voltage

If *Snk_PDO_Supply_Type* is set to 1 (Battery) or 2 (Variable), this field represents the maximum output voltage in units of 50 mV, with valid values in the range 0 - 420 (0 - 21000 mV).

If *Snk_PDO_Supply_Type* is set to 3 (Augmented) and *Snk_PDO_APDO_Type* is not set to 1 (EPR Adjustable Voltage Supply), this field represents the maximum output voltage in units of 100 mV, with valid values in the range in the range 0 - 210 (0 - 21000 mV).

If *Snk_PDO_Supply_Type* is set to 3 (Augmented) and *Snk_PDO_APDO_Type* is set to 1 (EPR Adjustable Voltage Supply), this field represents the maximum output voltage in units of 100 mV, with valid values in the range 0 - 480 (0 - 48000 mV).

In all cases, the absolute voltage, including any voltage variation, shall not exceed this value.

In all cases, this value shall be greater than *Snk_PDO_Min_Voltage*.

If *Snk_PDO_Supply_Type* is not set to 1 (Battery), 2 (Variable), or 3 (Augmented), then this field shall be ignored by Testers.

3.2.11 PD Dual Role Fields

The fields in this section are required for all Ports on a Qualifying Products with both Source and Sink capability (that is, *PD_Port_Type* is equal to one of 1 (Consumer/Provider), 2 (Provider/Consumer), or 4 (DRP)), and shall be ignored by Testers otherwise.

Accepts_PR_Swap_As_Src (Y/N)

Set to YES if Port ever supports a ***PR_Swap*** request while operating as a Source.

Accepts_PR_Swap_As_Snk (Y/N)

Set to YES if Port ever supports a ***PR_Swap*** request while operating as a Sink.

Requests_PR_Swap_As_Src (Y/N)

Set to YES if the Qualifying Product may send a ***PR_Swap*** request while operating as a Source.

Requests_PR_Swap_As_Snk (Y/N)

Set to YES if the Qualifying Product may send a ***PR_Swap*** request while operating as a Sink.

FR_Swap_Supported_As_Initial_Sink (Y/N)

This field is used to determine if the Qualifying Product supports Fast Role Swap in initial Sink role.

If *FR_Swap_Type_C_Current_Capability_As_Initial_Sink* is not set, then this field shall be ignored by testers.

If *FR_Swap_Type_C_Current_Capability_As_Initial_Sink* is set to 0 (FR_Swap not supported), then this field shall be set to NO.

If *FR_Swap_Type_C_Current_Capability_As_Initial_Sink* is not set to 0 (FR_Swap not supported), then this field shall be set to YES.

3.2.12 SOP Discover ID Fields

The fields in this section shall be ignored by Testers unless at least one of *Responds_To_Discov_SOP_UFP* and *Responds_To_Discov_SOP_DFP* is set to YES.

XID_SOP

A decimal number assigned by USB-IF prior to certification.

Valid values are in the range 0 - 1048575.

Data_Capable_As_USB_Host_SOP (Y/N)

Indicates whether the Qualifying Product is capable of enumerating USB Devices.

This field shall be set to the same value as *Type_C_Can_Act_As_Host*.

Data_Capable_As_USB_Device_SOP (Y/N)

Indicates whether the Qualifying Product is capable of enumerating as a USB Device.

This field shall be set to the same value as *Type_C_Can_Act_As_Device*.

Product_Type_UFP_SOP

What is the product type of the Qualifying Product when acting as an Upstream Facing Port?

If *Type_C_Can_Act_As_Device* is set to YES, then valid options are:

1 - PDUSB Hub
2 - PDUSB Peripheral

If *Type_C_Can_Act_As_Device* is not set to YES, and *Type_C_State_Machine* is set to 0 (SRC), then valid options are:

0 - Undefined

If *Type_C_Can_Act_As_Device* is not set to YES and *Type_C_State_Machine* is not set to 0 (SRC), then valid options are:

0 - Undefined
3 - PSD

Product_Type_DFP_SOP

What is the product type of the Qualifying Product when acting as a Downstream Facing Port?

Valid options are:

0 - Undefined
1 - PDUSB Hub
2 - PDUSB Host
3 - Power Brick

DFP_VDO_Port_Number

The Port Number for this Component as given in the DFP VDO.

This field shall be unique to each Component for which it is required.

This field shall have the same value as the numerical portion of *Port_Label*.

Note: this field is independent of the Port Number field defined in **[USB2.0]** *and* **[USB3.2]** *or in the EHCI or xHCI USB Host Controller specifications.*

If *Responds_To_Discov_SOP_DFP* is not set to YES, then this field shall be ignored by Testers.

If the Complete PD Specification Number is less than 3020h, then this field shall be ignored by Testers.

Modal_Operation_Supported_SOP (Y/N)

Does the product support Modes?

This field shall be set to the value of *Type_C_Is_Alt_Mode_Adapter*.

USB_VID_SOP

A unique 16-bit number, assigned to the Vendor by USB-IF. For USB Devices or Hubs which support USB communications the Vendor ID field shall be identical to the Vendor ID field defined in the product's USB Device Descriptor (see ***[USB2.0]*** and ***[USB3.2]***).

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

PID_SOP

A unique number assigned by the Vendor ID holder identifying the product.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

bcdDevice_SOP

A unique number assigned by the Vendor ID holder containing identity information relevant to the release version of the product.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

Num_SVIDs_Min_SOP

The smallest number of SVIDs which the Qualifying Product will ever announce in response to ***Discover SVIDs***.

Valid values are in the range 1 - 52.

If *SVID_Fixed_SOP* is set to YES, then this field shall equal *Num_SVIDs_Max_SOP*.

If *SVID_Fixed_SOP* is set to NO, then this field shall be less than or equal to *Num_SVIDs_Max_SOP*.

If *Modal_Operation_Supported_SOP* is not set to YES, then this field shall be ignored by Testers.

Num_SVIDs_Max_SOP

The largest number of SVIDs which the Qualifying Product will ever announce in response to ***Discover SVIDs***.

Valid values are in the range 1 - 52.

If *SVID_Fixed_SOP* is set to YES, then this field shall equal *Num_SVIDs_Min_SOP*.

If *SVID_Fixed_SOP* is set to NO, then this field shall be greater than or equal to *Num_SVIDs_Min_SOP*.

This field shall equal the number of SVIDs declared for this Qualifying Product.

If *Modal_Operation_Supported_SOP* is not set to YES, then this field shall be ignored by Testers.

SVID_Fixed_SOP (Y/N)

If this field is set to YES, the expectation is that Testers will check for the presence of precisely those SVIDs that are declared in the VIF, in the order in which they are given.

If this field is set to NO, the expectation is that Testers will check that the SVIDs that are declared are all included in the predefined SVIDs for this Qualifying Product.

If *Modal_Operation_Supported_SOP* is not set to YES, then this field shall be ignored by Testers.

3.2.12.1 SOP SVIDs

In this section, the fields represent the parameters for a single SOP SVID.

If *Modal_Operation_Supported_SOP* is not set to YES, then all fields in this section shall be ignored by Testers.

SVID_SOP

The SVID value, used to retrieve Modes. This field shall be unique for each SOP SVID within a single component.

This field is a non-zero 4-digit hexadecimal number, with valid values in the range 1h - FFFFh (1 - 65535).

SVID_Num_Modes_Min_SOP

The smallest number of Modes which will ever be announced for this SVID.

Valid values are in the range 1 - 6.

If *SVID_Modes_Fixed_SOP* is set to YES, then this field shall equal *SVID_Num_Modes_Max_SOP*.

If *SVID_Modes_Fixed_SOP* is set to NO, then this field shall be less than or equal to *SVID_Num_Modes_Max_SOP*.

SVID_Num_Modes_Max_SOP

The largest number of Modes which will ever be announced for this SVID.

Valid values are in the range 1 - 6.

If *SVID_Modes_Fixed_SOP* is set to YES, then this field shall equal *SVID_Num_Modes_Min_SOP*.

If *SVID_Modes_Fixed_SOP* is set to NO, then this field shall be greater than or equal to *SVID_Num_Modes_Min_SOP*.

This field shall equal the number of Modes declared for this SVID.

SVID_Modes_Fixed_SOP (Y/N)

If this field is set to YES, the expectation is that Testers will check precisely those Modes that are declared in the VIF, in the order in which they are given. *SVID_Num_Modes_Max_SOP* shall equal *SVID_Num_Modes_Min_SOP*.

If this field is set to NO, the expectation is that Testers will check all declared Modes can be Entered and Exited.

The expectation is that Testers will check all Modes in order to determine whether they can be Entered and Exited for all values that this field can take.

3.2.12.2 SOP SVID Modes

In this section, the fields represent the modes of a specified SOP SVID.

If *Modal_Operation_Supported_SOP* is not set to YES, then all fields in this section shall be ignored by Testers.

SVID_Mode_Enter_SOP (Y/N)

Is it possible to Enter and Exit this Mode without any pre-condition?

This field shall be set to YES for at least one Mode.

SVID_Mode_Recog_Mask_SOP

A 32-bit value which, in combination with *SVID_Mode_Recog_Value_SOP*, uniquely identifies a Mode for a given SVID.

This field is a non-zero 8-digit hexadecimal number, with valid values in the range 1h - FFFFFFFFh (1 - 4294967295).

The bitwise AND of this field and *SVID_Mode_Recog_Value_SOP* shall be unique among all Modes of its parent SOP SVID.

If *SVID_Modes_Fixed_SOP* is not set to NO, then this field shall be ignored by Testers.

SVID_Mode_Recog_Value_SOP

A 32-bit value which is used to uniquely identify a Mode for a given SVID.

This field is an 8-digit hexadecimal number, with valid values in the range 0h - FFFFFFFFh (0 - 4294967295).

If *SVID_Modes_Fixed_SOP* is YES, then this field shall be unique among all Modes of a given SOP SVID.

If *SVID_Modes_Fixed_SOP* is NO, then the bitwise AND of this field and *SVID_Mode_Recog_Mask_SOP* shall be unique among all Modes of its parent SOP SVID.

3.2.13 Alternate Mode Adapter (AMA) Fields

Unless otherwise specified, the fields in this section shall be ignored by Testers unless *Type_C_Is_Alt_Mode_Adapter* is set to YES.

Note: these fields are only relevant to PD Revision 2 operation, and have been deprecated in PD Revision 3.

AMA_HW_Vers

The Hardware version as assigned by the Vendor ID owner.

This field is a 1-digit hexadecimal, with valid values in the range 0h - Fh (0 - 15).

AMA_FW_Vers

The Firmware version as assigned by the Vendor ID owner.

This field is a 1-digit hexadecimal number, with valid values in the range 0h - Fh (0 - 15).

AMA_VCONN_Power

When the VCONN required field is set to YES, the VCONN power needed by adapter for full functionality.

Valid options are:

0 - 1W
1 - 1.5W
2 - 2W
3 - 3W
4 - 4W
5 - 5W
6 - 6W

If *AMA_VCONN_Reqd* is not set to YES, then this field shall be ignored by Testers.

AMA_VCONN_Reqd (Y/N)

Is VCONN needed for the AMA to operate?

AMA_VBUS_Reqd (Y/N)

Is VBUS needed for the AMA to operate?

AMA_Superspeed_Support

What type of USB signaling does the AMA support?

Valid options are:

0 - USB 2.0 only
1 - USB 3.2 Gen 1 (includes USB 2.0)
2 - USB 3.2 Gen 2 (includes Gen 1 and USB 2.0)
3 - USB 2.0 Billboard Only

3.2.14 Battery Charging 1.2 Fields

The fields in this section shall be ignored by Testers if *BC_1_2_Support* is not set to 1 (Charging Port), 2 (Portable Device), or 3 (Both).

BC_1_2_Charging_Port_Type

What BC 1.2 charging capabilities does this Component support? Valid options are:

0 - DCP
1 - CDP
2 - Both

This field shall be ignored by Testers if *BC_1_2_Support* is not set to 1 (Charging Port, or 3 (Both).

3.2.15 Cable/eMarker Fields

The fields in this section shall be ignored by testers unless one of the following is true:

- *VIF_Product_Type* is set to 1 (cable).
- *PD_Port_Type* is set to 5 (eMarker).
- *Captive_Cable_Is_eMarked* is set to YES.

XID

A decimal number assigned by USB-IF prior to certification.

Valid values are in the range 0 - 1048575.

Data_Capable_As_USB_Host (Y/N)

Is the Qualifying Product capable of enumerating USB Devices?

This field shall be set to NO.

Data_Capable_As_USB_Device (Y/N)

Is the Qualifying Product capable of enumerating as a USB Device?

If *VIF_Product_Type* is set to 1 (Cable), then this field shall be set to NO.

If *PD_Port_Type* is set to 5 (eMarker), then this field shall be set to YES.

If *Captive_Cable_Is_eMarked* is set to YES, then this field shall be set to NO.

Product_Type

What is the product type of the Qualifying Product?

If *VIF_Product_Type* is set to 1 (Cable) or *Captive_Cable_Is_eMarked* is set to YES, valid options are:

3 - Passive Cable
4 - Active Cable

If *PD_Port_Type* is set to 5 (eMarker), valid options are:

6 - Vconn Powered Device (VPD)

Modal_Operation_Supported (Y/N)

Does the product support Modes?

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be set to NO.

USB_VID

A unique 16-bit number, assigned to the Vendor by USB-IF. For USB Devices or Hubs which support USB communications the Vendor ID field shall be identical to the Vendor ID field defined in the product's USB Device Descriptor (see ***[USB2.0]*** and ***[USB3.2]***).

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

PID

A unique number assigned by the Vendor ID holder identifying the product.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

bcdDevice

A unique number assigned by the Vendor ID holder containing identity information relevant to the release version of the product.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535)

Cable_HW_Vers

The Hardware version as assigned by the Vendor ID owner.

This field is a 1-digit hexadecimal number, with valid values in the range 0h - Fh (0 - 15)

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Cable_FW_Vers

The Hardware version as assigned by the Vendor ID owner.

This field is a 1-digit hexadecimal number, with valid values in the range 0h - Fh (0 - 15).

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Type_C_To_Type_A_B_C

What is the connector type on the opposite end from the USB Type-C connector?

Valid options are:

0 - Type-A
1 - Type-B
2 - Type-C

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Type_C_To_Type_C_Capt_Vdm_V2

What is the connector type at the opposite end from the USB Type-C connector?

Valid options are:

2 - USB Type-C
3 - Captive

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

EPR_Mode_Capable (Y/N)

Does the product support EPR Mode?

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be set to NO.

If the Complete PD Specification Number is less than 3110h, then this field shall be set to NO.

Cable_Latency

A value corresponding to the signal latency—the cable which can be used as an approximation for its length.

If *Product_Type* is equal to 3 (Passive Cable), then valid options are:

1 - < 10ns
2 - 10ns - 20ns
3 - 20ns - 30ns
4 - 30ns - 40ns
5 - 40ns - 50ns
6 - 50ns - 60ns
7 - 60ns - 70ns
8 - > 70ns

If *Product_Type* is equal to 4 (Active Cable), then valid options are:

1 - <10ns
2 - 10ns - 20ns
3 - 20ns - 30ns
4 - 30ns - 40ns
5 - 40ns - 50ns
6 - 50ns - 60ns
7 - 60ns - 70ns
8 - 1000ns
9 - 2000ns
10 - 3000ns

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Cable_Termination_Type

To what extent is VCONN required in order to power the Qualifying Product?

If *Product_Type* is equal to 3 (Passive Cable), then valid options are:

0 - Both ends Passive, VCONN not required
1 - Both ends Passive, VCONN required

Note: if this field is equal to 0 (Both ends Passive, VCONN not required), VCONN may still be required for initialization.

If *Product_Type* is equal to 4 (Active Cable), then valid options are:

2 - One end Active, one end passive, VCONN required
3 - Both ends Active, VCONN required

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Cable_VBUS_Current

What current is the Qualifying Product capable of carrying over VBUS?

Valid options are:

1 - 3A
2 - 5A

If *VBUS_Through_Cable* is not set to YES, then this field shall be ignored by Testers.

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

VBUS_Through_Cable (Y/N)

Does the cable contain an end-to-end VBUS wire?

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Cable_Superspeed_Support

What is the highest USB signaling speed that the Qualifying Product supports when operating in PD Revision 2 mode?

Valid options are:

0 - USB 2.0 only, no SuperSpeed support
1 - USB 3.1 Gen1 (Includes USB 2)
2 - USB 3.1 Gen1 and Gen2 (Includes USB 2)

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Cable_USB_Highest_Speed

What is the highest USB signaling speed that the Qualifying Product supports when operating in PD Revision 3 mode?

Valid options are:

0 - USB 2 only, no Superspeed support
1 - USB 3.2 Gen 1
2 - USB3.2/USB4 Gen2
3 - USB4 Gen3

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Max_VBUS_Voltage_Vdm_V2

What is the maximum voltage that shall be negotiated using a Fixed Supply over the cable as part of an Explicit Contract where the maximum voltage that shall be applied to the cable is ***vSrcNew*** max + ***vSrcValid*** max?

Valid options are:

0 - 20V
1 - 30V (deprecated)
2 - 40V (deprecated)
3 - 50V

If *EPR_Mode_Capable* is set to YES, then this field shall be set to 3 (50V).

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Manufacturer_Info_Supported (Y/N)

Is the ***Get_Manufacturer_Info*** request supported?

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Manufacturer_Info_VID

The Vendor ID, as assigned by USB-IF, of the manufacturer of the Qualifying Product.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

If *Manufacturer_Info_Supported* is not set to YES, then this field shall be ignored by Testers

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Note: this is the Vendor ID returned in a response to a Get_Manufacturer_Info message in which Manufacturer Info Target *is set to* Port/Cable Plug.

Manufacturer_Info_PID

The Product ID, as assigned by the manufacturer of the Qualifying Product.

This field is a 4-digit hexadecimal number, with valid values in the range 0h - FFFFh (0 - 65535).

If *Manufacturer_Info_Supported* is not set to YES, then this field shall be ignored by Testers.

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Note: this is the Product ID returned in a response to a Get_Manufacturer_Info message in which Manufacturer Info Target *is set to* Port/Cable Plug.

Chunking_Implemented (Y/N)

Does this Qualifying Product implement an extended message chunking layer, as defined in Chapter 6 of ***[PowerDelivery3.0]***?

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Security_Msgs_Supported (Y/N)

Set to YES if the Qualifying Product responds to a ***Security_Request*** message with a ***Security_Response*** message.

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

ID_Header_Connector_Type

Is this connector a plug or a receptacle?

Valid options are:

0 - Cable
2 - USB Type-C Receptacle
3 - USB Type-C Plug

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Cable_Num_SVIDs_Min

The smallest number of SVIDs which the Qualifying Product will ever announce in response to ***Discover SVIDs***.

Valid values are in the range 1 - 52.

If *SVID_fixed* is set to YES, then this field shall equal *Cable_Num_SVIDs_Max*.

If *SVID_fixed* is set to NO, then this field shall be less than or equal to *Cable_Num_SVIDs_Max*.

If *Modal_Operation_Supported* is not set to YES, then this field shall be ignored by Testers.

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

Cable_Num_SVIDs_Max

The largest number of SVIDs which the Qualifying Product will ever announce in response to ***Discover SVIDs***.

Valid values are in the range 1 - 52.

If *SVID_Fixed* is set to YES, then this field shall be equal to *Cable_Num_SVIDs_Min*.

If *SVID_Fixed* is set to NO, then this field shall be greater than or equal to *Cable_Num_SVIDs_Min*.

This field shall equal the number of SVIDs declared for this Qualifying Product.

If *Modal_Operation_Supported* is not set to YES, then this field shall be ignored by Testers.

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

SVID_Fixed (Y/N)

If this field is set to YES, the expectation is that Testers will check for the presence of precisely those SVIDs that are declared in the VIF, in the order in which they are given.

If this field is set to NO, the expectation is that Testers will check that the SVIDs that are declared are all included in the predefined SVIDs for this Qualifying Product.

If *Modal_Operation_Supported* is not set to YES, then this field shall be ignored by Testers.

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then this field shall be ignored by Testers.

3.2.15.1 Cable SVIDs

In this section, the fields represent the parameters for a single Cable SVID.

If *Modal_Operation_Supported* is not set to YES, then all fields in this section shall be ignored by Testers.

If *Product_Type* is not set to 3 (Passive Cable) or 4 (Active Cable), then all fields in this section shall be ignored by Testers.

SVID

The SVID value, used to retrieve Modes. This field shall be unique for each cable SVID within a single component.

This field is a non-zero 4-digit hexadecimal number, with valid values in the range 1h - FFFFh (1 - 65535).

SVID_Num_Modes_Min

The smallest number of Modes which will ever be announced for this SVID.

Valid values are in the range 1 - 6.

If *SVID_Modes_Fixed* is set to YES, then this field shall equal *SVID_Num_Modes_Max*.

If *SVID_Modes_Fixed* is set to NO, then this field shall be less than or equal to *SVID_Num_Modes_Max*.

SVID_Num_Modes_Max

The largest number of Modes which will ever be announced for this SVID.

Valid values are in the range 1 - 6.

If *SVID_Modes_Fixed* is set to YES, then this field shall equal *SVID_Num_Modes_Min*.

If *SVID_Modes_Fixed* is set to NO, then this field shall be greater than or equal to *SVID_Num_Modes_Min*.

This field shall equal the number of Modes declared for this SVID.

SVID_Modes_Fixed (Y/N)

If this field is set to YES, the expectation is that Testers will check precisely those Modes that are declared in the VIF, in the order in which they are given.

If this field is set to NO, the expectation is that Testers will check that all declared Modes can be Entered and Exited.

It is expected that Testers will Testers will check all Modes in order to determine whether they can be Entered and Exited for all values that this field can take.

3.2.15.2 Cable SVID Modes

In this section, the fields represent the Modes of a Cable SVID.

If *Modal_Operation_Supported* is not set to YES, then all fields in this section shall be ignored by Testers.

SVID_Mode_Enter (Y/N)

Is it possible to Enter and Exit this Mode without any pre-condition?

This field shall be set to YES for at least one Mode.

SVID_Mode_Recog_Mask

A 32-bit value which, in combination with *SVID_Mode_Recog_Value*, uniquely identifies a Mode for a given SVID.

This field is a non-zero 8-digit hexadecimal number, with valid values in the range 1h - FFFFFFFFh (1 - 4294967295).

The bitwise AND of this field and *SVID_Mode_Recog_Value* shall be unique among all Modes of its parent Cable SVID.

If *SVID_Modes_Fixed* is not set to NO, then this field shall be ignored by Testers.

SVID_Mode_Recog_Value

A 32-bit value which is used to uniquely identify a Mode for a given SVID.

This field is an 8-digit hexadecimal number, with valid values in the range 0h - FFFFFFFFh (0 - 4294967295).

If *SVID_Modes_Fixed* is set to YES, then this field shall be unique among all Modes of its parent Cable SVID.

If *SVID_Modes_Fixed* is set to NO, then the bitwise AND of this field and *SVID_Mode_Recog_Mask* shall be unique among all Modes of its parent Cable SVID.

3.2.16 Active Cable Fields

Unless otherwise specified, if *Product_Type* is not set to 4 (Active Cable) then all fields in this section shall be ignored by Testers.

Cable_SOP_PP_Controller (Y/N)

Is an SOP" Controller Present?

SBU_Supported (Y/N)

Does the Qualifying Product support SBU lines?

SBU_Type

Are the SBUs active or passive?

Valid options are:

0 - SBU is Passive
1 - SBU is Active

If *SBU_Supported* is not set to YES, then this field shall be ignored by Testers.

Active_Cable_Max_Operating_Temp

What is the maximum allowable operating temperature in degrees Celsius inside the plug, in degrees centigrade?

Valid values are in the range 0 - 255. This field shall be less than or equal to *Active_Cable_Shutdown_Temp*.

Active_Cable_Shutdown_Temp

What is the temperature in degrees Celsius inside the plug at which the plug will shut down its active signaling components?

Valid values are in the range 0 - 255. This field shall be greater than or equal to *Active_Cable_Max_Operating_Temp*.

Active_Cable_U3_CLd_Power

How much power does the Qualifying Product consume while in U3 or CLd?

Valid options are:

0 - >10mW
1 - 5-10mW
2 - 1-5mW
3 - 0.5-1mW
4 - 0.2-0.5mW
5 - 50-200µW
6 - <50µW

Active_Cable_U3_U0_Trans_Mode

What is the Qualifying Product's U3 to U0 transition mode?

Valid options are:

0 - U3 to U0 direct
1 - U3 to U0 through U3S

Active_Cable_Physical_Connection

What is the material from which the Qualifying Product is constructed?

Valid options are:

0 - Copper
1 - Optical

Active_Cable_Active_Element

What is the cable's active element?

Valid options are:

0 - Active Re-driver
1 - Active Re-timer

Active_Cable_USB4_Support (Y/N)

Does the Qualifying Product support USB4?

Active_Cable_USB2_Supported (Y/N)

Does the Qualifying Product support USB 2.0 only signaling?

Active_Cable_USB2_Hub_Hops_Consumed

How many USB2 hub hops does the Qualifying Product consume?

Valid options are in the range 0 - 3

If *Active_Cable_USB2_Supported* is set to YES, then this field shall be ignored by Testers.

Active_Cable_USB32_Supported (Y/N)

Does the Qualifying Product support USB 3.2 signaling?

Active_Cable_USB_Lanes

How many USB 3.2 Superspeed lanes does the Qualifying Product support?

Valid options are:

0 - One lane
1 - Two lanes

Active_Cable_Optically_Isolated (Y/N)

Is the Qualifying Product optically isolated as defined in ***[USBType-C2.0]***?

Active_Cable_USB_Gen

Which level of USB signaling Gen does the Qualifying Product support?

Valid options are:

0 - Gen 1
1 - Gen 2 or higher

3.2.17 VCONN Powered Device (VPD) Fields

The fields in this section shall be ignored by Testers unless *VIF_Product_Type* is set to 0 (Port Product), *PD_Port_Type* is set to 5 (eMarker), and *Product_Type* is set to 6 (Vconn Powered Device).

VPD_HW_Vers

The Hardware version as assigned by the Vendor ID owner.

This field is a 1-digit hexadecimal number, with valid values in the range 0h - Fh (0 - 15).

VPD_FW_Vers

The Firmware version as assigned by the Vendor ID owner.

This field is a 1-digit hexadecimal number, with valid values in the range 0h - Fh (0 - 15).

VPD_Max_VBUS_Voltage

What is the maximum voltage that a Sink Shall negotiate through the VPD Charge-Through port as part of an Explicit Contract?

Valid options are:

0 - 20V
1 - 30V (deprecated)
2 - 40V (deprecated)
3 - 50V (deprecated)

VPD_Charge_Through_Support (Y/N)

Does the Qualifying Product support Charge-Through?

VPD_Charge_Through_Current

What is the highest Charge-Through current that the Qualifying Product is capable?

Valid options are:

0 - 3A Capable
1 - 5A Capable

If *VPD_Charge_Through_Support* is not set to 1 (VPD Supports Charge-Through), then this field shall be ignored by Testers.

VPD_VBUS_Impedance

The VBUS Impedance, in mΩ units.

Valid values are in the range 10 - 63.

If *VPD_Charge_Through_Support* is not set to 1 (VPD Supports Charge-Through), then this field shall be ignored by Testers.

VPD_Ground_Impedance

The Ground Impedance, in mΩ units.

Valid values are in the range 10 - 63.

If *VPD_Charge_Through_Support* is set to 0, then this field shall be ignored by Testers.

3.2.18 Repeater Fields

The fields in this section shall be ignored by Testers unless either *VIF_Product_Type* is set to 2 (Repeater), or *VIF_Product_Type* is set to 1 (Cable) and *Product_Type* is set to 4 (Active Cable).

Repeater_One_Type

The basic architecture of the Repeater under consideration. If *VIF_Product_Type* is set to 2 (Repeater), then this is the Qualifying Product itself. If *Product_Type* is set to 4 (Active Cable), then this is the first Repeater in the Qualifying Product.

Valid options are:

0 - SRIS (Separate Reference clock Independent SSC) Re-timer
1 - Bit-Level Re-timer
2 - Linear Re-driver

Repeater_Two_Type

The basic architecture of the second Repeater in an Active Cable with both ends active.

Valid options are:

0 - SRIS (Separate Reference clock Independent SSC) Re-timer
1 - Bit-Level Re-timer
2 - Linear Re-driver

If *Cable_Termination_Type* is not set to 3 (Both ends Active, VCONN required) then this field shall be ignored by Testers.

3.2.19 Product Power Fields

The fields in this section shall be ignored by Testers unless *Connector_Type* is set to 0 (Type-A) or 3 (Micro A/B), or *Connector_Type* is set to 2 (Type-C) and *Type_C_State_Machine* is set to 0 (SRC) or 2 (DRP).

Product_Total_Source_Power_mW

The total power in milliwatts, rounded up to the nearest milliwatt, that the Qualifying Product can deliver across all its ports.

Valid values are in the range 0 - 2400000 (0 - 2400000 mW).

This field shall have the same value for all components wherein this field is required.

Port_Source_Power_Type

Is the Qualifying Product guaranteed to advertise all PDOs it is capable of supporting (power is assured), or is it part of a power gang with other ports, and may reduce its output accordingly (power is shared)? Valid options are:

0 - Assured
1 - Shared

Port_Source_Power_Gang

The name of the power gang of which the Qualifying Product belongs.

This field shall be ignored by Testers if *Port_Source_Power_Type* is not set to 1 (Shared).

Port_Source_Power_Gang_Max_Power

The maximum power in milliwatts, rounded up to the nearest milliwatt, that can be drawn from the power gang in total across all shared ports.

Valid values are in the range 0 - 1000000 (0 - 1000000 mW), but shall be less than or equal to the value of *Product_Total_Source_Power_mW*.

This field shall be ignored by Testers if *Port_Source_Power_Type* is not set to 1 (Shared).

In all ports belonging to the same power gang (that is, where *Port_Source_Power_Gang* is equal), this field shall have the same value.

3.3 Optional Content

An Vendor Info File may contain arbitrary content in *Optional Content Blocks*.

3.3.1 Optional Content Blocks

An Optional Content Block is a valid XML Element which takes the following form:

`<OptionalContent` *`Block-Identifier Block-Namespace`*`>`*`Block-Content`*`</OptionalContent>`

- *Block-Namespace* is the XML namespace *"http://usb.org/VendorInfoFileOptionalContent.xsd"*.
- *Block-identifier* is the XML attribute *identifier*. *identifier* shall not be empty, and shall include at least some non-whitespace content.
- *Block-Content* may be any combination of plain-text and XML content.

In addition to the above restrictions, Optional Content Blocks shall not cause an otherwise valid Vendor Information File to become invalid.

Note: in most circumstances, if Block-Content *is locally valid, then both the containing Optional Content Block and the main Vendor Info File will also be valid. However, this is not globally true. Refer to* ***[XML1.0]****.*

3.3.2 Requirements for Applications

A VIF Consumer shall consume any Optional Content Blocks it encounters.

A VIF Producer may generate 0 or more Optional Content Blocks.

A VIF Processor may transform Optional Content Blocks in an implementation defined manner.

A VIF Processor shall output unchanged all Optional Content Blocks that it doesn't recognize.

Appendix A: XML Schema Definition

The XML Schema that describes a conformant Vendor Info File may be downloaded from https://compliance.usb.org/cv/VendorInfoFile/Schemas/Current/. The XML Schema is defined in two files, *VendorInfoFile.xsd* and *VendorInfoFileOptionalContent.xsd*.

In the event of a conflict between the XML Schema and the contents of this specification, the schema takes precedence.

Appendix B: Settings for USB4 Product Types

	USB4 Host w/ USB4 DRD	**USB4 Host no USB4 DRD**	**USB4 Hub (not a dock) UFP**	**USB4 Hub (not a dock) DFP**	**USB4 Dock UFP**	**USB4 Dock DFP**	**USB4 Peripheral**
USB4_DFP_Supported	YES	YES	NO	YES	NO	YES	NO
USB4_UFP_Supported	YES	NO	YES	NO	YES	NO	YES
Type_C_Port_On_Hub	NO	NO	YES	YES	YES	YES	NO
USB4_Dock	NO	NO	NO	NO	YES	YES	NO

Appendix C: Removed Fields

Fields that are no longer a part of this specification. Unless otherwise specified, fields in this section will not be removed from the XML Schema, and a VIF that contains any of them will remain conformant.

Type_C_To_Plug_Receptacle - Removed in version 3.10
Retimer_Type - Removed in version 3.10
Active_Cable_USB2_Hub_Hops_Supported - Renamed to *Active_Cable_USB2_Hub_Hops_Consumed* in version 3.12
Active_Cable_Optically_Isololated - A typo introduced in version 3.10. Renamed to *Active_Cable_Optically_Isolated* in version 3.12
Product_VID – Renamed to *USB4_DROM_Vendor_ID* and restricted to USB4 Qualifying Products in version 3.13
Active_Cable_Operating_Temp_Support – Removed in version 3.18
Active_Cable_Shutdown_Temp_Support – Removed in version 3.18

Appendix D: Text Format (Informational)

Note: The Vendor Info File text format described here was removed from version 3.20 of this specification.
This appendix is provided to allow VIF Producers and Consumers to provide backward compatibility.

D.1 Text Format Definition

A *text-format* Vendor Info File consists of a number of *Parameter Definitions*, defined as follows:

- A semicolon ';' and anything which follows on that line is a comment and shall be ignored.
    - A semicolon within a string Value Token shall not initiate a comment.
- Empty lines or lines that consist entirely of whitespace are permitted and shall be ignored.
- Each Parameter Definition shall be defined on a single line of text.
- Each Parameter Definition consists of a *Parameter Name*, followed by a colon ':', followed by a single *Value Token* that represents either a 32-bit value or a text string.
- Parameter Definitions may appear in any order within the Vendor Info File.
- Parameter Names shall consist of the following:
    - For string values only, an initial '$' character.
    - One or more upper case letters in the range [A-Z], lower case letters in the range [a-z], digits, or underscores. The first character shall not be a digit.
        - *Note: in revisions of this specification prior to revision 2.00, single quotes were also permitted in Parameter Names. VIF Consumers that support older VIFs should take this into account.*
    - Parameter Names shall be unique across the Vendor Info File.
    - Parameter Names are case-insensitive.
- The Value Token of a String field consists of an opening double-quote '"', arbitrary UTF-8 text (the *content* of the field), and a closing double-quote. Unless otherwise noted in section 3.2, the content of a conformant string field shall contain at least one non-whitespace character. Unless otherwise noted in section 3.2, a VIF Producer may remove leading and trailing whitespace when saving the VIF.
    - If there are more than two double-quotes in the Value Token area, then the final double-quote on the line that is not part of a comment shall close the string Value Token. Thus, `$StringVar: "This is "quoted" text"` is valid, with the Value Token equal to `This is "quoted" text`.
- The Value Token of a Numeric field, shall be a decimal or a hexadecimal number.
    - Hexadecimal values shall be prefixed with the strings “0x” or “0X”.
- The Value Token of a Boolean field shall be one of the strings "YES" (or “1”) or "NO" (or “0”), meaning *true* or *false* respectively.

- “YES” and “NO” are case-insensitive.

- Blank space is permitted and shall be ignored in the following places:
  - Prior to the Parameter Name.
  - Prior to and following the colon that separates the Parameter Name from the Value Token.
  - Following the Value Token.
- A single Parameter Definition shall be parsed as if the following steps are taken in order:
  - Comments are removed.
  - Leading and trailing whitespace is removed.
  - The Parameter Definition is validated.
  - The Parameter Name and Value Token are extracted.

A VIF Consumer shall ignore shall ignore Parameters that are not conformant as described in this section.

A VIF Producer shall not include non-conformant fields when it saves the VIF. Requirements for conformant fields are defined in sections 3.1.3 and 3.1.4.1.

D.2 Text Format-Specific Fields:

The following fields are specific to Text Format VIFs. Unless otherwise specified, they shall be fully synchronized with their XML Format equivalents, and shall additionally meet all the requirements of their XML Format equivalents.

Note: this section is current as of version 3.19 of this specification. It will not be updated in this or future versions.

D.2.1 Text Format Only Fields

The items in this section are defined as Parameters in Text Format VIFs, but they do not correspond to Fields in XML Format. The Text Format Parameter names are followed by their corresponding XML Element.

$VIF_Specification (*/VIF/VIF_Specification*)
$VIF_Producer (*/VIF/VIF_App/Description*)
$Vendor_Name (*/VIF/Vendor_Name*)
$Model_Part_Number (*/VIF/Model_Part_Number*)
$Product_Revision (*/VIF/Product_Revision*)
$TID (/VIF/TID)
VIF_Product_Type (*/VIF/VIF_Product_Type*)
Certification_Type (*/VIF/Certification_Type*)

D.2.2 Renamed Fields

The fields in this section have different names in Text Format VIFs. The Text Format names are followed by their corresponding XML Format Names.

$Port_Label (*Port_Label*)
$Port_Source_Power_Gang (*Port_Source_Power_Gang*)
Cable_SOP''_Controller (*Cable_SOP_PP_Controller*)

D.2.2.1 Indexed Fields

Some fields may appear more than once within a Vendor Info File. The field names are handled differently in Text Format and XML Format.

In XML-format VIFs, these fields are contained in Field Group Collections. The structure given in the XML Schema allows them to be specified unambiguously.

In text-format VIFs, this is not possible. In this case, these fields are distinguished by interpolating one or more index numbers into the field name. Thus, the text-format parameter name *SVID2_mode1_recog_mask* references the first listed SVID mode of the second listed SVID of the Qualifying Product. In this section, text format numbers are denoted as <X>. Thus, the *SVID_Mode_Recog_Mask* field will be listed here as *SVID<X>_Mode<Y>_Recog_Mask*, where *SVID2_Mode1_Recog_Mask* denotes the *SVID_Mode_Recog_Mask* belonging to first SVID Mode of the second SVID.

Fields in this section are grouped by Field Group Collection. Unless otherwise specified, index numbers start at 1, and are incremented by 1 for each item.

RouterList (*zero-based index*)

USB4_Router_ID<X> (*USB4_Router_ID*)
USB4_Silicon_VID<X> (*USB4_Silicon_VID*)
USB4_Num_Lane_Adapters<X> (*USB4_Num_Lane_Adapters*)
USB4_Num_USB3_DN_Adapters<X> (*USB4_Num_USB3_DN_Adapters*)
USB4_Num_DP_IN_Adapters<X> (*USB4_Num_DP_IN_Adapters*)
USB4_Num_DP_OUT_Adapters<X> (*USB4_Num_DP_OUT_Adapters*)
USB4_Num_PCIe_DN_Adapters<X> (*USB4_Num_PCIe_DN_Adapters*)
USB4_TBT3_Not_Supported<X> (*USB4_TBT3_Not_Supported*)
USB4_PCIe_Wake_Supported<X> (*USB4_PCIe_Wake_Supported*)
USB4_USB3_Wake_Supported<X> (*USB4_USB3_Wake_Supported*)
USB4_Num_Unused_Adapters<X> (*USB4_Num_Unused_Adapters*)
USB4_TBT3_VID<X> (*USB4_TBT3_VID*)
USB4_PCIe_Switch_Vendor_ID<X> (*USB4_PCIe_Switch_Vendor_ID*)
USB4_PCIe_Switch_Device_ID<X> (*USB4_PCIe_Switch_Device_ID*)
USB4_Num_PCIe_Endpoints<X> (*USB4_Num_PCIe_Endpoints*)

PCIeEndpointList

USB4_PCIe_Endpoint<X>_Vendor_ID<Y> (*USB4_PCIe_Endpoint_Vendor_ID*)
USB4_PCIe_Endpoint<X>_Device_ID<Y> (*USB4_PCIe_Endpoint_Device_ID*)
USB4_PCIe_Endpoint<X>_Class_Code<Y> (*USB4_PCIe_Endpoint_Class_Code*)

SrcPdoList

Src_PDO_Supply_Type<X> (*Src_PDO_Supply_Type*)
Src_PDO_Peak_Current<X> (*Src_PDO_Peak_Current*)
Src_PDO_Voltage<X> (*Src_PDO_Voltage*)
Src_PDO_Max_Current<X> (*Src_PDO_Max_Current*)
Src_PDO_Min_Voltage<X> (*Src_PDO_Min_Voltage*)
Src_PDO_Max_Voltage<X> (*Src_PDO_Max_Voltage*)
Src_PDO_Max_Power<X> (*Src_PDO_Max_Power*)
Src_PD_OCP_OC_Debounce<X> (*Src_PD_OCP_OC_Debounce*)
Src_PD_OCP_OC_Threshold<X> (*Src_PD_OCP_OC_Threshold*)
Src_PD_OCP_UV_Debounce<X> (*Src_PD_OCP_UV_Debounce*)
Src_PD_OCP_UV_Threshold_Type<X> (*Src_PD_OCP_UV_Threshold_Type*)
Src_PD_OCP_UV_Threshold<X> (*Src_PD_OCP_UV_Threshold*)

SnkPdoList

Snk_PDO_Supply_Type<X> (*Snk_PDO_Supply_Type*)
Snk_PDO_Voltage<X> (*Snk_PDO_Voltage*)
Snk_PDO_Op_Current<X> (*Snk_PDO_Op_Current*)
Snk_PDO_Op_Power<X> (*Snk_PDO_Op_Power*)
Snk_PDO_Min_Voltage<X> (*Snk_PDO_Min_Voltage*)
Snk_PDO_Max_Voltage<X> (*Snk_PDO_Max_Voltage*)

SopSVIDList

SVID<X>_SOP (*SVID_SOP*)
SVID<X>_Num_Modes_Min_SOP (*SVID_Num_Modes_Min_SOP*)
SVID<X>_Num_Modes_Max_SOP (*SVID_Num_Modes_Max_SOP*)
SVID<X>_Modes_Fixed_SOP (*SVID_Modes_Fixed_SOP*)

SOPSVIDModeList

SVID<X>_Mode<Y>_Enter_SOP (*SVID_Mode_Enter_SOP*)
SVID<X>_Mode<Y>_Recog_Mask_SOP (*SVID_Mode_Recog_Mask_SOP*)
SVID<X>_Mode<Y>_Recog_Value_SOP (*SVID_Mode_Recog_Value_SOP*)

CableSVIDList

SVID<X> (*SVID*)
SVID<X>_Modes_Fixed (*SVID_Modes_Fixed*)
SVID<X>_Num_Modes_Min (*SVID_Num_Modes_Min*)
SVID<X>_Num_Modes_Max (*SVID_Num_Modes_Max*)

CableSVIDModeList

SVID<X>_Mode<Y>_Enter (*SVID_Mode_Enter*)
SVID<X>_Mode<Y>_Recog_Mask (*SVID_Mode_Recog_Mask*)
SVID<X>_Mode<Y>_Recog_Value (*SVID_Mode_Recog_Value*)

D.3 Optional Content

Optional Content (section 3.3) is not supported in text format.

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