USB Type-C ENGINEERING CHANGE NOTICE

Title: Fix TBT3 Discovery and Entry Flow for Gen4 or Better Passive cables
Applied to: USB Type-C Specification Release 2.2, October 2022

Brief description of the functional changes proposed:
Minor edit to the Thunderbolt 3 Compatibility Discovery and Entry flow to consider the Gen 4 USB Speed passive cables as capable of TBT3 Gen 3 performance.

Benefits as a result of the proposed changes:
When new USB 80Gbps cables are used, USB4 hosts with Thunderbolt 3 compatibility support will correctly choose TBT3 Gen 3 (40Gbps) performance with an appropriate Thunderbolt 3 40Gbps device.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
Current spec prescribes a strict equal-to or not-equal-to comparison of USB Speed of USB4 Gen 3 to determine if TBT3 Gen 3 performance is appropriate. Systems built with this may require a software or firmware update to make sure they don't mistakenly restrict to 20Gbps when a value of 100b is seen.

An analysis of the hardware implications:
None.

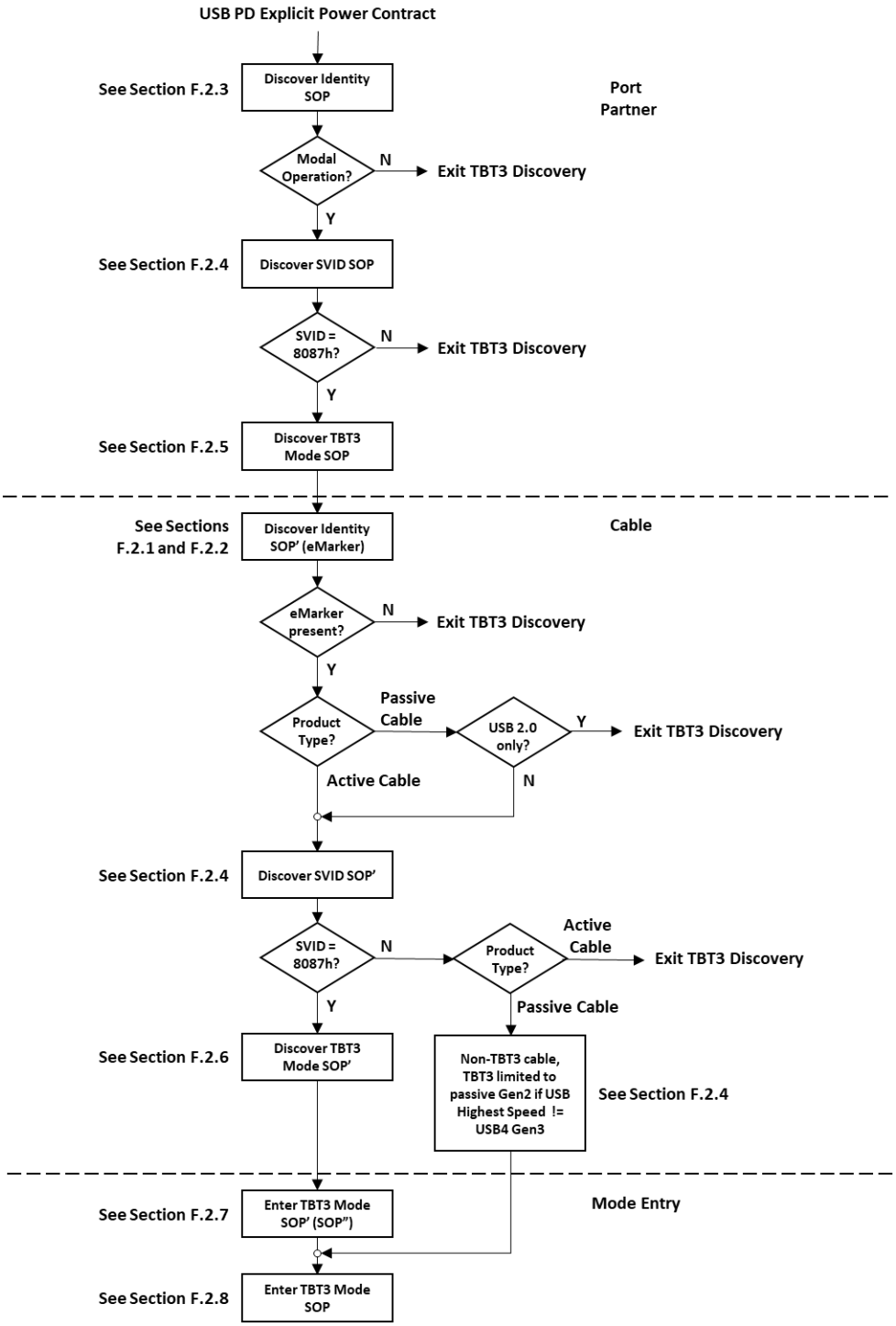
An analysis of the software implications:
Possible firmware or software update needed on existing systems.

An analysis of the compliance testing implications:
None

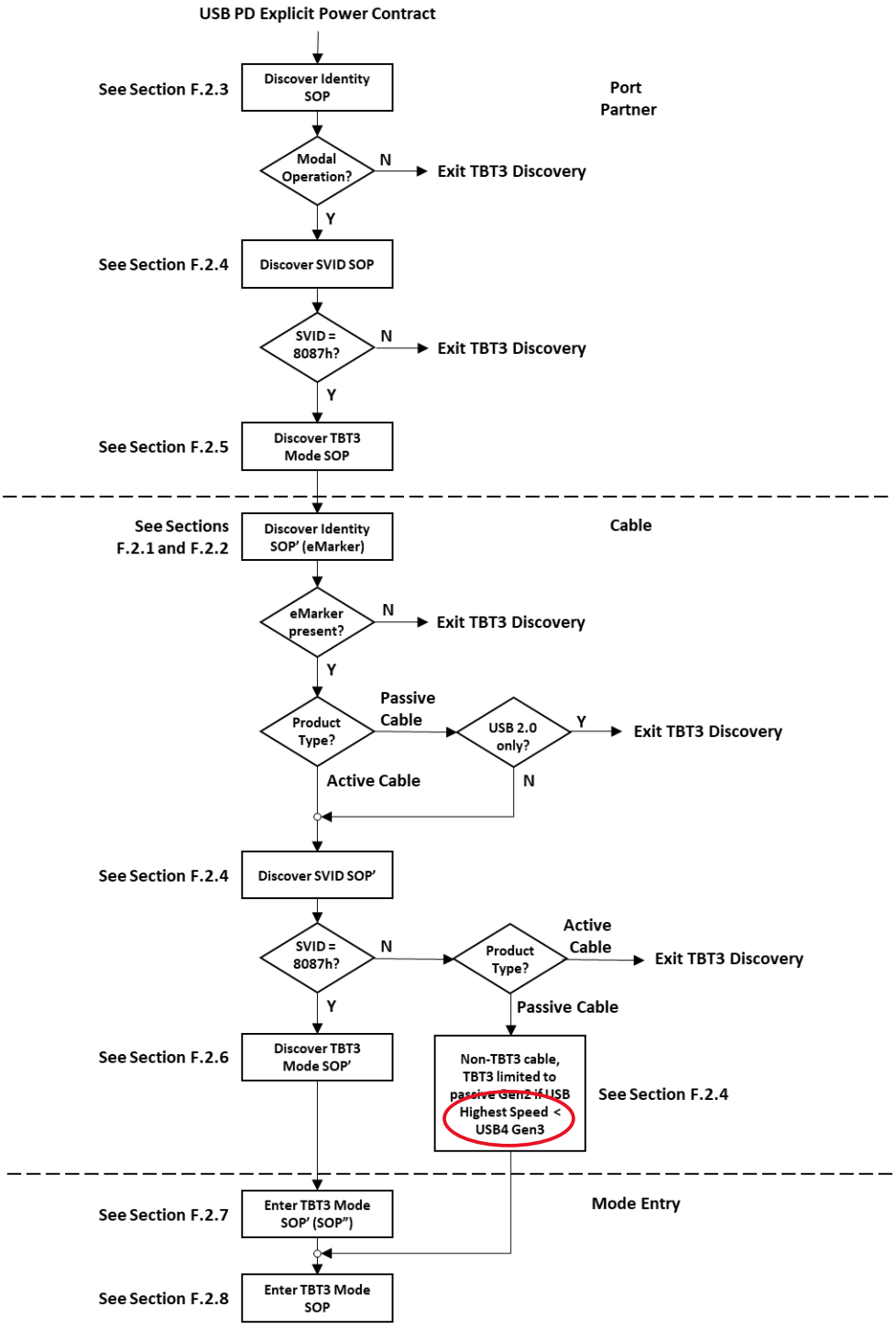
Actual Change Requested

(a). Figure F-1

From:



To:


USB PD Explicit Power Contract
See Section F.2.3
Discover Identity SOP
Port Partner
Modal Operation?
N
Exit TBT3 Discovery
Y
See Section F.2.4
Discover SVID SOP
SVID = 8087h?
N
Exit TBT3 Discovery
Y
See Section F.2.5
Discover TBT3 Mode SOP
See Sections F.2.1 and F.2.2
Discover Identity SOP' (eMarker)
Cable
eMarker present?
N
Exit TBT3 Discovery
Y
Product Type?
Passive Cable
USB 2.0 only?
Y
Exit TBT3 Discovery
Active Cable
N
See Section F.2.4
Discover SVID SOP'
SVID = 8087h?
N
Product Type?
Active Cable
Exit TBT3 Discovery
Y
Passive Cable
See Section F.2.6
Discover TBT3 Mode SOP'
Non-TBT3 cable, TBT3 limited to passive Gen2 if USB Highest Speed < USB4 Gen3
See Section F.2.4
See Section F.2.7
Enter TBT3 Mode SOP' (SOP'')
Mode Entry
See Section F.2.8
Enter TBT3 Mode SOP

(b). Section 5.2.4 TBT3 Discover SVID Responses

From Text:

If the Intel/TBT3 SVID of 0x8087 is not returned in response to the Discover SVID command, a cable is a Non-TBT3 cable.

If a Non-TBT3 cable's Product Type is Active Cable, it shall be regarded as not compatible with TBT3, and TBT3 Discovery shall exit.

If a Non-TBT3 cable's Product Type is Passive Cable, the USB Highest Speed field in the cable's Passive Cable VDO shall determine TBT3 functionality and speed. If USB Highest speed is "USB4 Gen3", the cable shall be regarded as a TBT3 capable cable at Gen3 performance. If USB Highest speed is "USB 3.2 Gen1" or "USB 3.2/USB4 Gen2", it shall be regarded as a TBT3 capable cable limited to passive Gen2 performance. If USB Highest Speed indicates "USB 2.0-only, No SuperSpeed", TBT3 Discovery shall exit.

Note: Legacy TBT3 platforms may not recognize USB4 Gen3 passive cables that don't also include the TBT3 Passive Cable Discover Identity VDOs. When this happens, the USB4 Gen3 passive cable will still function but will only be used at Gen2 speeds.

To Text:

If the Intel/TBT3 SVID of 0x8087 is not returned in response to the Discover SVID command, a cable is a Non-TBT3 cable.

If a Non-TBT3 cable's Product Type is Active Cable, it shall be regarded as not compatible with TBT3, and TBT3 Discovery shall exit.

If a Non-TBT3 cable's Product Type is Passive Cable, the USB Highest Speed field in the cable's Passive Cable VDO shall determine TBT3 functionality and speed. If USB Highest speed is "USB4 Gen3" or higher, the cable shall be regarded as a TBT3 capable cable at Gen3 performance. If USB Highest speed is "USB 3.2 Gen1" or "USB 3.2/USB4 Gen2", it shall be regarded as a TBT3 capable cable limited to passive Gen2 performance. If USB Highest Speed indicates "USB 2.0-only, No SuperSpeed", TBT3 Discovery shall exit.

Note: Legacy TBT3 platforms may not recognize USB4 Gen3 or higher passive cables that don't also include the TBT3 Passive Cable Discover Identity VDOs. When this happens, the USB4 Gen3 or higher passive cable will still function but will only be used at Gen2 speeds.