Introduction

STM32CubeMonitor-UCPD (STM32CubeMonUCPD) is a software tool to configure and monitor the USB Type-C® Power Delivery (UCPD) ports on equipped STM32 boards. The configuring part allows the modification of the USB Type-C® Power Delivery port default configuration. Checks of Power Delivery contract establishment and activity are possible with the monitoring tool.
The main features of the STM32CubeMonitor-UCPD software tool are the following:

- Configures and monitors USB Type-C® Power Delivery (UCPD) ports of STMicroelectronics Type-C Power Delivery boards.
- Sends device policy manager (DPM) messages to the distant USB Type-C® Power Delivery port.

This software applies to STM32 Arm®-based microcontrollers.

*Note:* Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.
2 Getting started

2.1 Computer requirements

Supported operating systems and architectures

- Windows® 7, 8 and 10: 64-bit (x64)
- Linux® (tested on Red Hat®, Fedora®, and Ubuntu®, 64-bit)
- macOS® (minimum version OS X® Yosemite)

Note: Red Hat® is a registered trademark of Red Hat, Inc.
Fedora® is a trademark of Red Hat, Inc.
macOS® is a trademark of Apple Inc. registered in the U.S. and other countries.
Ubuntu® is a registered trademark of Canonical Ltd.

Software requirements

For Linux®, Java™ runtime is required by the installer.

Note: Oracle and Java are registered trademarks of Oracle and/or its affiliates.

2.2 Hardware requirements

- One free USB2 or USB3 host port
- Mini-B or Micro-B cable depending on the target board to access the STM32 ST-LINK
- STMicroelectronics target board with USB Type-C® and a firmware (embedding the tracer or the
cubemon_ucpd_emb module) latest version as described in STM32 STM application (UM2063), downloaded
from STMicroelectronics website www.st.com selecting X-CUBE-USB-PD, or built through STM32CubeMX.

2.3 Installing

2.3.1 Installing STM32CubeMonitor-UCPD

The user must have the administrator rights on the computer to perform the installation.

The steps needed to install the STM32CubeMonitor-UCPD software tool are detailed below (all files can be
downloaded from the STMicroelectronics website www.st.com):
1. Download SetupSTM32CubeMonitor-UCPD.zip and unzip it in a temporary location.
2. Perform setup process associated with the environment (x.y.z represents STM32CubeMonitor-UCPD
software version):
   - Windows: launch SetupSTM32CubeMonitor-UCPD-x.y.z.exe and follow the instructions provided.
   - Linux: launch SetupSTM32CubeMonitor-UCPD-x.y.z.jar and follow the instructions provided.
   - macOS: launch SetupSTM32CubeMonitor-UCPD-x.y.z.dmg and, into the installer window, drag and
     drop the STM32CubeMonitor-UCPD icon on the Applications icon.

If another version of STM32CubeMonitor-UCPD is already installed, the existing version must be uninstalled
before installing the new version (see Section 2.4 for more details).
2.3.2 Installing the USB driver for ST-LINK

**Note:** This section is only applicable to Windows operating systems.

Follow the steps detailed below to install the USB driver for ST-LINK (all files can be downloaded from the STMicroelectronics website [www.st.com](http://www.st.com)):

1. Download the USB driver for ST-LINK (STSW-LINK009).
2. Go in the directory `C:\Program Files (x86)\STMicroelectronics\Software\Virtual comport driver` and launch the files listed below (depending on the operating system):
   - Windows 7 64-bit: launch `Win7/dpinst_amd64.exe`.
   - Windows 8.x and Windows 10 64-bit: launch `Win8/dpinst_amd64.exe`.
3. Plug the board with the USB cable. Windows detects it as "STMicroelectronics ST-LINK Virtual COM port", named COMxx.
   Example: COM10.

2.4 Uninstalling STM32CubeMonitor-UCPD

The steps needed to uninstall STM32CubeMonitor-UCPD are detailed below for the various operating systems:

- **Windows**
  Two possible options:
  1. Open the Windows Control panel. Select Programs and Features to display the list of programs installed on the computer. Right-click on `STM32CubeMonitor-UCPD` from the STMicroelectronics publisher and select the uninstall function.
  2. Go in the installation location (for example `C:\Program Files\STMicroelectronics\STM32CubeUCPD`), go in the Uninstaller folder and launch `uninstaller.jar`.
- **Linux**
  Go in the STM32CubeMonitor-UCPD installation location (example `$HOME/STMicroelectronics/STM32CubeMonitor-UCPD`), go in the Uninstaller folder and launch `uninstaller.jar`.
- **macOS**
  Drag and drop the `STM32CubeMonitor-UCPD application` icon onto the Trash icon.

2.5 Uninstalling the USB driver for ST-LINK

**Note:** This section is only needed for Windows operating systems.

Perform the following steps to uninstall the STMicroelectronics USB driver for ST-LINK:

1. Open the Windows Control panel.
2. Select Programs and Features to display the list of programs installed on the computer.
3. Right-click on Windows Driver Package - STMicroelectronics (WinUSB) STLinkWinUSB from the STMicroelectronics publisher and select the uninstall function.
The main areas are the following (also shown in the figure above):

- **Area 1**: Application Title panel
- **Area 2**: Social panel, linked to STMicroelectronics social networks shown in the figure below
- **Area 3**: Ribbon panel, where the four main states are listed and accessible step after step:
  1. Board selection
  2. Port Selection
  3. Port Configuration
  4. Port Communication

  Chevron-right and chevron-left buttons in the Button panel allow navigation to the previous or next step.
- **Area 4**: Main panel content is state-dependent (see Section 4 How to use STM32CubeMonitor-UCPD).
- **Area 5**: Port Status panel gives a sum up of each board port (see Section 4.4 Port Status information).
- **Area 6**: Button panelists the actions.
- **Area 7**: Status bar panel displays the board version and the port selected when relevant.
- **Area 8**: Traces panel (see Section 5 Traces information)
This area contains five shortcuts to social networks and web pages:

- The Facebook™ icon leads to the official STMicroelectronics Facebook page.
- The YouTube™ icon leads to the official STMicroelectronics YouTube page.
- The Twitter™ icon leads to the official STMicroelectronics Twitter page.
- The Share icon leads to the ST Community web site.
- The ST icon leads to the official STMicroelectronics web site.
4 How to use STM32CubeMonitor-UCPD

4.1 Board detection and selection

The detection of a board is automatically launched when the application starts. If there is no board connected via USB to the computer, the application displays an invitation to connect the board as shown in the figure below.

Figure 3. Invitation to connect the board

To see a new connected board, click on the button Refresh list of connected boards. The application sends a message to all devices, waiting for an appropriate response to distinguish ST-UCPD GUI capable boards from the other boards.

An ST-UCPD GUI capable board is a device that contains a firmware source code to communicate between STM32CubeMonitor-UCPD application and the device.

Note: If the GUI responder is not activated in the embedded firmware, but the debug trace is available (UART through VCP of the STLINK and the compilation switch _TRACE activated) the user may still see the trace in UCPD monitor by clicking on the Trace button in the bottom right corner.
All devices identified as ST-UCPD GUI capable are displayed in the Board Selection panel as shown in the figure below.

**Figure 4. Board Selection window**

Parameters for each board are the following:

- Communication port assigned to the device (ComPort)
- Hardware board version
- Power delivery type
- Firmware version
- Stack version
- Number of USB Type-C® ports on the board (NbPort)

If a board is disconnected, it is removed from the Board Selection panel.

To select a board, move the mouse pointer on the corresponding line. The line is greyed out when selected. Then, double click on the line or click on chevron-right. The board is selected and the application window moves to the Port Selection window.
4.2  Port Selection

When a board is selected, the Port Selection window is opened as shown in the figure below.

**Figure 5. Port Selection window**

The following details are provided on this window:

1. *Port Status* information panel. Refer to Section 4.4.2 Port Status information - Selected port).
2. The board selected in the previous steps is reported here (*PowerDeliveryType* and *ComPort* boards parameters are described in Section 4.1 Board detection and selection).
3. List of USB Type-C® PD available on the selected board (two in this example), with the port number written on the board (*PortNumber*) and the PD specification revision supported by the port (*PDSpecRevision*).
4. Click on it to select the static parameters to display. Refer to the USB PD standards for further definition of these parameters on the USB web site.

Port selection can be performed in zone 1, or 3.

4.3  Port Selection action

The figure below shows the port parameters. On the *Port Status* panel, the port selected is highlighted in light blue (see next section for more details). In the *Status* bar, the selected port number is added, close to the selected board identification.

**Figure 6. Port selected: Port Status panel, Button and Status bars**
4.4 Port Status information

The Port Status panel is displayed as soon as a board is selected. This panel is available in the Port Selection, Port Communication and Port Configuration windows. Refer to the figure below.

![Port Selection ribbon](image)

This Port Status panel lists all the USB Type-C® with Power Delivery ports available on the board. Refer to the figure below.

![Port Status panel](image)

For each port, the following characteristics are displayed:

- **Contract**: If this field is not NO, it means the port established a contract with a distant port and relevant characteristics of this contract are displayed in the next columns.
- **Power Role**:
  - If this field is SNK, the **Selected SRC PDO** is the PDO selected of the distant port.
  - If this field is SRC, the **Selected SRC PDO** is the PDO selected of the current port.
- **Spec Revision and CC, Data Role, VconnON**: characteristics defined in the norm (http://www.usb.org/developers/powerdelivery)
- **VBus and IBus**: filled as soon as measurements are done (see Section 4.5.2)
- **Selected SRC PDO**: selected PDO
  - If the current port is connected as Source, the **Selected SRC PDO** is its own PDO selected which is displayed.
  - If the current port is connected as Sink, the **selected SRC PDO** is the selected SRC PDO of the distant port on which the port is connected.

When the user double clicks on a port in the Port Status panel, the selected port changes, and information in Port communication or port configuration is updated.
4.4.1 Port Status information update

When one of the parameters is updated, its value blinks for several seconds to draw attention. Updates can come from hard-cable disconnection or message sent which involved the contract cancellation or modification (see figure below).

![Figure 9. Parameter blink when the update is done](image)

4.4.2 Port Status information - Selected port

As soon as the Port Communication or Port Configuration window is selected, the Port Status panel highlights the selected port in blue, as shown in the figure below.

![Figure 10. Selected port highlighted](image)

4.5 Port Communication

Click on the tab item Port Communication to see specific content, which can be useful only if the selected port is plugged to another device port.
The two following tabs are displayed:

- The **General** tab, including three panels shown in the figure below:
  - **DISTANT CAPABILITIES**: capabilities of the distant device port
  - **MEASUREMENT**: start/stop measures for this connection
  - **MESSAGE SELECTOR**: messages sent to the distant device port

**Figure 11. General tab overview**

- The **Measurement** tab, which displays a full-screen view of the measurement graph (see figure below).

**Figure 12. Measurement tab overview**
4.5.1 Distant Capabilities panel

The Distant Capabilities panel contains information coming from the distant port regarding its capabilities (Settings, PDO and VDM), depending on the selected Power Role, in a read-only mode. The PDO used for the current contract is mentioned as the selected PDO.

If the port is connected as Sink, the panel displays the Source capabilities of the distant port as shown in the figure below.

Figure 13. SRC capabilities of the distant port

![Distant Capabilities Panel](image)

If the port is connected as Source, the panel displays the Sink capabilities of the distant port, and if an electronic cable is in use, the information related to it is displayed (see figure below).

Figure 14. SINK capabilities of the distant port

![Distant Capabilities Panel](image)
Each capability is summarized but the detailed view is available by clicking on the chevron-right as shown in the figure below.

**Figure 15. Distant PDO details**

4.5.2 **Measurement panel**

This panel shows a graphical view of the measures, containing the two following controls:

- **Start/Stop** button to activate or deactivate the measures
- **Period** to set the period in ms (between 40 and 5000 ms with 40 ms step)

When the measurement period is set to 0, it means the measurement is not yet launched or is stopped. The measures are only available when the port is connected. When measures are started but the port is not connected, there is no measurement done.

As shown in the figure below, two different measures are done: the voltage (Vbus) in mV and the current (Ibus) in mA. Current values for Ibus and Vbus are also visible in the Port Status panel. Refer to Section 4.4 Port Status information.

**Figure 16. Measurement panel**
The steps to follow are detailed below:

1. Select a given period (for example 480 ms).
2. Activate the measurement by clicking on the Start button.

3. Deactivate the measurement by clicking on the Stop button.
4.5.3 **Message Selector panel**

When a distant port is connected, it is possible to send messages to this distant port. The list of messages is available in the *Message Selector* panel as shown in the figure below.

**Figure 18. Message Selector panel**

<table>
<thead>
<tr>
<th>Filtering messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ GOTO MIN</td>
</tr>
<tr>
<td>▶ Ping</td>
</tr>
<tr>
<td>▶ Get Source Capabilities</td>
</tr>
<tr>
<td>▶ Get Sink Capabilities</td>
</tr>
<tr>
<td>▶ Data Role Swap</td>
</tr>
<tr>
<td>▶ Power role Swap</td>
</tr>
<tr>
<td>▶ VCDINN Swap</td>
</tr>
<tr>
<td>▶ Soft Reset</td>
</tr>
<tr>
<td>▶ Get Extended Source Capabilities</td>
</tr>
<tr>
<td>▶ Get Status</td>
</tr>
<tr>
<td>▶ Fast Role Swap</td>
</tr>
<tr>
<td>▶ Get PPS Status</td>
</tr>
<tr>
<td>▶ Get Country Code</td>
</tr>
<tr>
<td>▶ Source Capabilities</td>
</tr>
<tr>
<td>▶ Request Power Profile</td>
</tr>
<tr>
<td>▶ Send Alert</td>
</tr>
<tr>
<td>▶ Get Country Info</td>
</tr>
<tr>
<td>▶ Request VDM Discovery</td>
</tr>
<tr>
<td>▶ Request VDM SVID Discovery</td>
</tr>
<tr>
<td>▶ Request VDM Mode Discovery</td>
</tr>
<tr>
<td>▶ Enter VDM Mode</td>
</tr>
</tbody>
</table>

To reduce the number of messages visible, this list can be filtered with the *Filtering messages* field (see the example in the figure below).

**Figure 19. Messages filtering**

<table>
<thead>
<tr>
<th>Filtering messages display</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Display Port Status</td>
</tr>
<tr>
<td>▶ Display Port Config</td>
</tr>
<tr>
<td>▶ Display Port Attention</td>
</tr>
</tbody>
</table>
Select the message to send by clicking on it. When a message is selected, additional parameters to fill are displayed if any (see figure below).

**Figure 20. Message parameters setting**

Send the selected message by clicking on the button **Send message to connected Port** or double-click on the message itself. If the message is correctly sent, the **Send message to connected Port** button becomes green for a few seconds.

**Figure 21. Send message button**

**Note:** A message is considered as correctly sent when the firmware takes into account the message, but the attached action can fail. The analysis must be done with available monitoring panels (such as Measurement, Distant Port Capabilities, Port Status, and Traces).
If the message is not correctly sent, a specific pop-up with warning or error message appears as shown in the figure below.

**Figure 22. Message-warning information**

4.5.4 **Typical use case with the General tab**

This typical use case shows actions performed with the *Message Selector* panel and the analysis done with monitoring panels *Measurement, Distant Port Capabilities, Port Status*, and *Traces*.

This use case is the selection of a new capability for the current contract.
The initial status is port connected with the selected PDO SRC1, visible in the Distant Port Capabilities panel. The voltage measured in the Measurement panel is around 5000 mV.

Figure 23. Overview communication panel
In the Message Selector panel, select Request Power profile, and fill the additional parameters RDOPosition and RequestedVoltage as shown in the figure below.

Figure 24. Message selection
As soon as the message is sent, the modifications listed below are visible (Refer to Figure 25):

- Selected PDO in the Distant Port Capabilities panel is now SRC2.
- Voltage measured is around 9000 mV in the Measurement panel.

Figure 25. New power contract
4.6 Port Configuration

4.6.1 Overall presentation

The Port Configuration window, shown in the figure below, is used to configure the selected port.

![Port Configuration window](image)

The PD Settings and VDM SOP tabs display the configuration parameters of the selected port. The SRC capabilities panel displays the source PDO configured on this port. The SINK capabilities panel displays the sink PDO configured on this port.

4.6.2 Button bar details

The Button bar (see figure below) provides the following actions:

- The EXPORT button is used to save the current configuration in a text file.
- The IMPORT button is used to upload a saved configuration.
- The SEND TO TARGET button saves the parameter modified from the user interface on the board. In this case, the saving is done only in RAM memory. It means that, after reset or board disconnection, the updates are lost.
- The SAVE ALL IN TARGET button saves the parameter modified from the user interface on the board as the SEND TO TARGET button, but this action saves also these updates in the Flash memory. It means that, after reset or board disconnection, the updates are kept.
- The RESTORE VALUES button restores the values displayed in the user interface as they are on the board.

![Button bar](image)
Because the Port Configuration window contains four tabs on which parameter update can be performed, the actions SAVE IN TARGET, SEND TO TARGET or RESTORE VALUES can be applied to the four tabs in the same time (ALL TABS), or only for the tab displayed in the user interface (CURRENT TAB).

4.6.3 Modify the configuration - Update parameter presentation

The default view is shown in the figure below.

**Figure 28. Default parameter view**

![DRP_Support](image1)

Each parameter has its own self-content help, click on the chevron-right as shown in the figure below.

**Figure 29. Extended parameter view**

![DRP_Support](image2)

In addition to the signification of the parameter, this area also displays the currently registered value on the board. If the value is changed in the GUI interface, an attention mark is displayed close to the new value, and the onboard value is still visible (see figure below).

**Figure 30. Parameter modified**

![DRP_Support](image3)

To save the parameter in the board, use one of the buttons Send to target or Save all in target (Refer to the figure below).

**Figure 31. Parameter saved**

![DRP_Support](image4)

When a value is required, then the range allowed is mentioned in the help (Refer to the figure below).

**Figure 32. Range**

![bodDevice](image5)
The user interface controls the value set with the range. If the value is out of range then it is highlighted in red.

**Figure 33. Value out of range**

![bcdDevice](image)

Current Value in Board: 0xAAAA / Range: 0x0000-0xFFFF
A unique number assigned by the Vendor ID holder containing identity information relevant to the release version of the product.

### 4.6.4 SRC/SNK capabilities tabs - PDO management

Source PDO and Sink PDO have some generic read-only parameters, which are visible on the top of the panel. On each panel, a sum-up of each PDO is displayed as shown in the figure below.

**Figure 34. Parameters of the PDOs**

- PDO1: Type = Fixed; Voltage (mV) = 5000; Max Current (mA) = 3000; Peak Current = 100 % IOC;
- PDO2: Type = Fixed; Voltage (mV) = 9000; Max Current (mA) = 3000; Peak Current = 100 % IOC;
- PDO3: Type = Fixed; Voltage (mV) = 15000; Max Current (mA) = 3000; Peak Current = 100 % IOC;

Click on the chevron-right of the PDO to see all its parameters (see the figure below).

**Figure 35. Detailed parameters of a PDO**

**PDO1**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage (mV)</th>
<th>Max Current (mA)</th>
<th>Peak Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>5000</td>
<td>3000</td>
<td>100 % IOC</td>
</tr>
</tbody>
</table>

**PDO2**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage (mV)</th>
<th>Max Current (mA)</th>
<th>Peak Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>9000</td>
<td>3000</td>
<td>100 % IOC</td>
</tr>
</tbody>
</table>

**PDO3**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage (mV)</th>
<th>Max Current (mA)</th>
<th>Peak Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>15000</td>
<td>3000</td>
<td>100 % IOC</td>
</tr>
</tbody>
</table>

Click on chevron-right of the PDO parameter to get the help, range, and the value in the board (Refer to the figure below).

**Figure 36. PDO parameter: help, range, and value in the board**

**PDO1**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage (mV)</th>
<th>Max Current (mA)</th>
<th>Current Value in Board: 0xAAAA / Range: 0x0000-0xFFFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>5000</td>
<td>3000</td>
<td></td>
</tr>
</tbody>
</table>

**PDO2**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage (mV)</th>
<th>Max Current (mA)</th>
<th>Current Value in Board: 0xAAAA / Range: 0x0000-0xFFFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>9000</td>
<td>3000</td>
<td></td>
</tr>
</tbody>
</table>

**PDO3**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage (mV)</th>
<th>Max Current (mA)</th>
<th>Current Value in Board: 0xAAAA / Range: 0x0000-0xFFFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>15000</td>
<td>3000</td>
<td></td>
</tr>
</tbody>
</table>
4.6.5 Add a PDO

The first step to add a PDO is to define its type, with one of the two following ways:

- From a picklist as shown in the below figure.

**Figure 37. Add a new fixed PDO**

- With a value to choose from a predefined range.

When the new PDO is created, it appears as *new PDO* up to the sending to the target (see figure below).

**Figure 38. New PDO created (not saved yet)**

```
PDO1: Type = Fixed; Voltage (mV) = 5000; Max Current (mA) = 3000; Peak Current = 100 % IOC;
PDO2: Type = Fixed; Voltage (mV) = 9000; Max Current (mA) = 3000; Peak Current = 100 % IOC;
PDO3: Type = Fixed; Voltage (mV) = 15000; Max Current (mA) = 3000; Peak Current = 100 % IOC;
```

After saving, the new PDO is integrated into the numbered list as shown in the figure below.

**Figure 39. New PDO saved**

```
PDO1: Type = Fixed; Voltage (mV) = 5000; Max Current (mA) = 3000; Peak Current = 100 % IOC;
PDO2: Type = Fixed; Voltage (mV) = 9000; Max Current (mA) = 3000; Peak Current = 100 % IOC;
PDO3: Type = Fixed; Voltage (mV) = 1000; Max Current (mA) = 1000; Peak Current = 100 % IOC;
PDO4: Type = Fixed; Voltage (mV) = 15000; Max Current (mA) = 3000; Peak Current = 100 % IOC;
```
4.6.6 Delete a PDO

View details of the PDO to delete and click on the Delete button as shown in the figure below.

Figure 40. Select the PDO to delete

The deleted PDO appears in red up to the sending to the target (see the figure below).

Figure 41. PDO to delete selected

4.6.7 Configuration saving

The tool proposes to save the selected port configuration for further needs. TheEXPORT button allows this saving in a text file with a predefined name and location (which can be updated) (see the figure below).

Figure 42. Export the configuration of a port

The IMPORT button allows the saved configuration to be loaded only in the user interface.
The differences between the current configuration and the configuration loaded are highlighted in the user interface as shown in the figure below.

**Figure 43. Modified parameter after importing a configuration file**

To set effectively the configuration imported in the board, use **SEND TO TARGET** or **SAVE ALL IN TARGET** button.
5 Traces information

Debug information is displayed by the tool on a dedicated Debug panel. There are five types of debug information listed below:

- Type-C Event (EVENT)
- Power Delivery Notification traces (NOTIF)
- Traces of messages sent to the distant device (OUT)
- Traces of messages received from the distant device (IN)
- Debug traces (DEBUG)

5.1 Message contents

Message type contents are described in the user manual STM32 TCPM Application (UM2063).

5.2 Traces panel

The Traces panel, shown in the figure below, includes the following four columns:

1. Type of the message (EVENT, NOTIF, OUT, IN or DEBUG)
2. Timestamp of the message. The timestamp is current hardware value in milliseconds since the boot of the hardware platform.
3. USB Type-C® port number of the message
4. Content of the message

Figure 44. Traces panel

<table>
<thead>
<tr>
<th>Type</th>
<th>TimeSt...</th>
<th>Port</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTIF</td>
<td>8942827</td>
<td>2</td>
<td>SRC_CAP_EXT_RECEIVED</td>
</tr>
<tr>
<td>PE</td>
<td>8942827</td>
<td>2</td>
<td>PE_STATE_EXTENDED_WAITRESPONSE</td>
</tr>
<tr>
<td>NOTIF</td>
<td>8942827</td>
<td>1</td>
<td>GET_PPS_STATUS_RECEIVED</td>
</tr>
<tr>
<td>PE</td>
<td>8942827</td>
<td>1</td>
<td>PE_SEND_EXTENDED_CAPA</td>
</tr>
<tr>
<td>OUT</td>
<td>8942829</td>
<td>1</td>
<td>SOP_PD3 0x0891 EXT_SOURCE_CAPABILITIES</td>
</tr>
<tr>
<td>IN</td>
<td>8942830</td>
<td>2</td>
<td>SOP_PD3 0x0891 EXT_SOURCE_CAPABILITIES</td>
</tr>
<tr>
<td>OUT</td>
<td>8942830</td>
<td>2</td>
<td>GOOD_CRC</td>
</tr>
<tr>
<td>IN</td>
<td>8942830</td>
<td>1</td>
<td>GOOD_CRC</td>
</tr>
<tr>
<td>NOTIF</td>
<td>8942831</td>
<td>2</td>
<td>GET_PPS_STATUS_SENT</td>
</tr>
<tr>
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5.3 *Traces panel functionality*

This panel offers functionalities to select, copy, and clear traces. It can also be done using the mouse and keyboard controls (Ctrl-V), or buttons *Copy Traces, Load Traces, or Clear Traces*. Selections can be copied (Ctrl-V) in usual text editors.

The panel can be also hidden if needed by clicking on *Hide Traces*.

5.4 *Read saved traces file*

By default, the *Traces* are saved:

- **In the Windows® directory** `c:\Users\your_login\AppData\Local\Temp\STM32CubeMonitor-UCPD\Acquisition`,
- **In the Linux® directory** "java temp directory"/STM32CubeMonitor-UCPD/Acquisition,
- **Or in the macOS® directory** "user home directory"/Library/Caches/STM32CubeMonitor-UCPD,

with the `.cpd` extension.

When the tool is not connected to any board, the *Traces* panel proposes a *Load Traces* button in order to read a saved `.cpd` file saved in the application folder.

*Figure 45. Load Traces button*
6 Troubleshooting

6.1 Board not detected

If the board is not detected after clicking on the "Refresh list of connected boards", unplug the board, plug it again and have a new click on the "Refresh" button.

Note: If the GUI responder is not activated in the embedded firmware, but the debug trace is available (UART through VCP of the STLINK and the compilation switch _TRACE activated) the user may still see the trace in UCPD monitor by clicking on the Trace button in the bottom right corner.
7  Support material

7.1  Hardware


7.2  Software

X-CUBE-USB-PD is STM32 USB Power Delivery firmware with the tracer and the cubemon_ucpd_emb modules on their latest version (as described in STM32 TPM application (UM2063), available from www.st.com, or built through STM32CubeMX) or any new Power Delivery firmware from STM32G0, G4, L5 MCU Package.

For more information, refer to the USB Power Delivery overview wiki page https://wiki.st.com/stm32mcu/wiki/USB_Power_Delivery_overview.
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<td>1-Sep-2020</td>
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