1) To take advantage of the reversible interface of Type-C with minimal hardware changes.

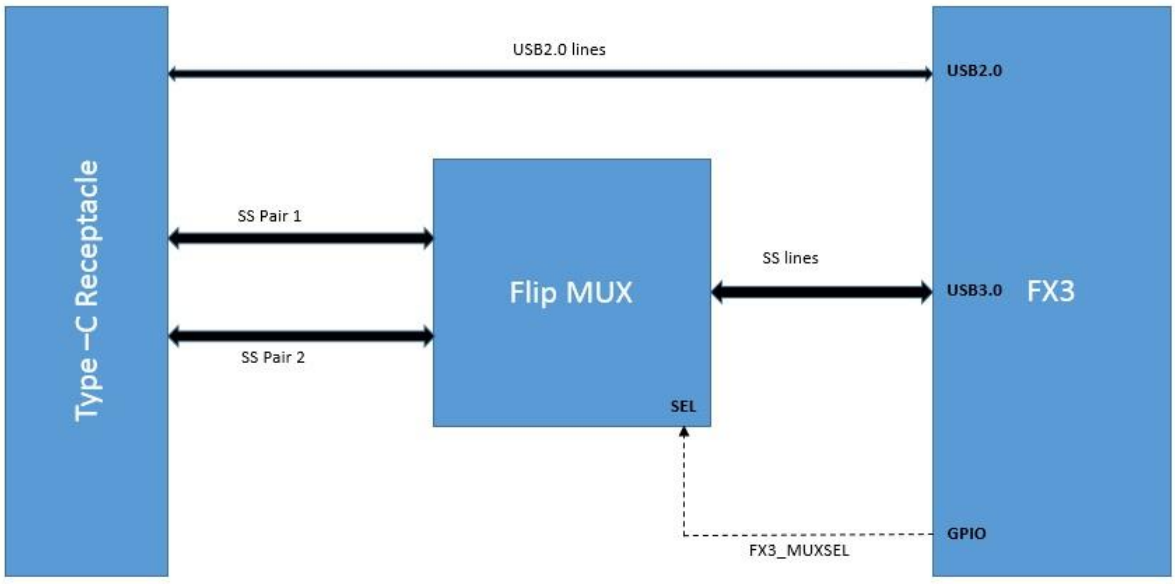
2) To tap into the 15W power (5V, 3A) that is available through an implicit contract, without the use of a PD-Controller.

SOLUTION DETAILS

Flip Feature:

A Type-C receptacle gives out two pairs of USB3 data paths and two pairs of USB2 data paths. The USB2 data paths can be shorted on the receptacle side, so there will effectively be only one pair which can be directly connected to the FX3. However the same cannot be done for the USB3 pairs. So in order to select between either pairs, we need to have a MUX in the path. The MUX SEL pin can be controlled by a GPIO through FX3. This solution is advantageous to customers because it only requires the addition of a single MUX without the need for any additional detection circuitry. The block diagram of the solution is given below,

BLOCK DIAGRAM



Power Sink:

Since FX3 is always a device which will sink power, from a Type-C perspective this will be a pure UFP. The CC lines on the Type-C receptacle need to be pulled down to 5.1Kohm (Rd). This will ensure that a Type-C host will always see the FX3 side as a sinking UFP and will source power to it. The host can source up to 15W (5V, 3A) if it presents a pull resistor (Rp) of 10Kohm on the CC lines.

Attached along with this memo is a reference schematic and an example FX3 firmware for controlling the MUX through a GPIO. The GPIO MUXSEL feature has been added to BulkLoopAuto FX3 example firmware. The customer can make use of this example code and implement it in their project.

FX3 Firmware Flow:

1) Once the Type-C connect happens, FX3 is powered and the firmware starts running.
2) The USB2 PHY is disabled initially and a GPIO is configured and forced high initially.
3) The firmware then attempts a USB3 connection.
4) If USB3 terminations are detected, USB2 PHY is activated and normal enumeration begins.
5) If USB3 terminations are not detected, the GPIO is driven low and USB3 connection is attempted again.
6) USB2 PHY is activated. If USB3 terminations are detected now, it enumerates as USB3.
7) If still no USB3 terminations are detected it enumerates as a 2.0 device.