

The Problem

After SWAP bit to Swap bit application update, for example RP4.2-TY11 to UUT 0.0.0.7, We saw an inconsistency of seeing the **UsbChangeEvent()** being called.

The Main page generates the **UsbChangeEvent(IntPtr hwnd, int msg, IntPtr wParam, IntPtr lParam, ref bool handled)** when a USB device is attached.

We observed very inconsistent behavior when we had the logs, meanings these prints were not seen as expected. This caused many reconnection issues.

This effected the connection state of the device.

The Expected USB event behavior

The UsbChangeEvent() should be called once when the USB device detaches, and UsbChangeEvent() should be called twice when attached.

Which should print the message as shown below

We Connected the USB device here

The thread 0x9894 has exited with code 0 (0x0).

Main - Device Changed | 1511000 | 537 | 7 | 0

[2022-07-19T22:28:02] DeviceManager: UsbChangeEvent: hwnd=1511000, msg:537, wParam=7, lParam=0, handle=False Connect event

Main - Device Changed | 1511000 | 537 | 7 | 0

[2022-07-19T22:28:02] DeviceManager: UsbChangeEvent: hwnd=1511000, msg:537, wParam=7, lParam=0, handle=False Connect event

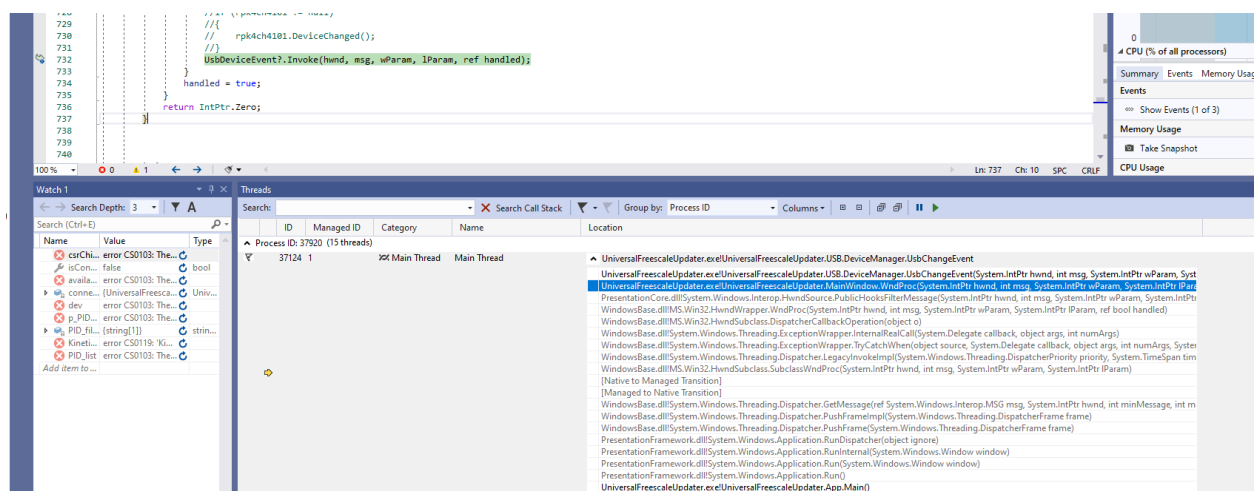
We disconnected the USB device here

Main - Device Changed | 1511000 | 537 | 7 | 0

[2022-07-19T22:28:05] DeviceManager: UsbChangeEvent: hwnd=1511000, msg:537, wParam=7, lParam=0, handle=False Disconnect event

The Main page generates the **UsbChangeEvent(IntPtr hwnd, int msg, IntPtr wParam, IntPtr lParam, ref bool handled)** and prints "Main - Device Changed | 331564 | 537 | 7 | 0".

This method is executed in the Main Thread as you can see Thread view, call stack.



```
[2022-07-26T00:13:02] KinetisUpdater 0: Setting flashing in progress to true  
[2022-07-26T00:13:02] KinetisUpdater 0: Starting update step  
[FLASH_SWAP_BIT_APPLICATION] using file  
[C:\Projects\PC_Software\UWFU_GitLab\ufwu_application\UniversalFreescaleUpdat  
er\bin\Debug_Dev\UpdateFiles\RP5-GM31\0.0.0.7\A-109_TESTER_UUT_V7.pufx]  
[2022-07-26T00:13:02] KinetisUpdater 0: Attempting to erase the chip...  
[2022-07-26T00:13:02] Kinetis Device: tx-F000  
[2022-07-26T00:13:02] Kinetis Device: rx-  
F1010000000000000000000000000000000000000000000000000000000000000000  
0000000000000000000000000000000000000000000000000000000000000000  
[2022-07-26T00:13:02] KinetisUpdater 0: Erasing Chip - PASS  
[2022-07-26T00:13:02] KinetisUpdater 0: Attempting to flash the chip...  
The thread 0x6658 has exited with code 0 (0x0).  
The thread 0x3b20 has exited with code 0 (0x0).
```

```

The thread 0xb7c has exited with code 0 (0x0).
[2022-07-26T00:13:16] KineticUpdater 0: Flashing Chip - PASS
[2022-07-26T00:13:16] KineticUpdater 0: Flash complete, switching device mode
[2022-07-26T00:13:16] Kinetic Device: tx-F400
[2022-07-26T00:13:16] KineticUpdater 0: Next update step [NONE]
[2022-07-26T00:13:16] KineticUpdater 0: 14121ms to flash the device
[2022-07-26T00:13:16] HidDevice: Killing rx thread. Too many errors
[2022-07-26T00:13:16] HidDevice: Stopping receive thread
[2022-07-26T00:13:16] Kinetic Device: Requesting MCU ID records from database
[9191000125D6001C0018800166324E45]
Checking for mico 9191000125D6001C0018800166324E45
Main - Device Changed | 4132712 | 537 | 7 | 0
[2022-07-26T00:13:16] Kinetic Device: UsbEvent: Starting Event [537]count: 1
Main - Device Changed | 4132712 | 537 | 7 | 0
[2022-07-26T00:13:17] Kinetic Device: UsbEvent: Connection status did not
change [True]
[2022-07-26T00:13:17] Kinetic Device: UsbEvent: Completed USB eventcount: 1
[2022-07-26T00:13:17] Kinetic Device: UsbEvent: Starting Event [537]count: 2
[2022-07-26T00:13:17] Kinetic Device: UsbEvent: Connection status did not
change [True]
[2022-07-26T00:13:17] Kinetic Device: UsbEvent: Completed USB eventcount: 2
SQL - deviceCheckProgramming - Took 1946ms

```

If we call `UpdateCompleteEvent()` after update complete and make the `UpdatedCompletedUI()` to `threadsleep(` bout 2-3 seconds). The "Main - Device Changed | 331564 | 537 | 7 | 0" call backs will never be called in the log.

```
[2022-07-26T12:14:13] KinetisUpdater 0: Setting flashing in progress to true  
[2022-07-26T12:14:13] KinetisUpdater 0: Starting update step  
[FLASH_SWAP_BIT_APPLICATION] using file  
[C:\Projects\PC_Software\UWFU_GitLab\ufwu_application\UniversalFreescaleUpdat  
er\bin\Debug_Dev\UpdateFiles\RP4.2-TY11\4.1.4.47\RP4.2-TY11_V47.pufx]  
[2022-07-26T12:14:13] KinetisUpdater 0: Attempting to erase the chip...  
[2022-07-26T12:14:13] Kinetis Device: tx-F000  
Exception thrown: 'System.IO.IOException' in mscorlib.dll  
[2022-07-26T12:14:14] Kinetis Device: rx-  
F1010000000000000000000000000000000000000000000000000000000000000000  
000000000000000000000000000000000000000000000000000000000000000000  
[2022-07-26T12:14:14] KinetisUpdater 0: Erasing Chip - PASS  
[2022-07-26T12:14:14] KinetisUpdater 0: Attempting to flash the chip...  
The thread 0x66f0 has exited with code 0 (0x0).  
The thread 0x2ed4 has exited with code 0 (0x0).
```

The thread 0x82e4 has exited with code 0 (0x0).
The thread 0x3d48 has exited with code 0 (0x0).
[2022-07-26T12:14:26] KinetisUpdater 0: Flashing Chip - PASS
[2022-07-26T12:14:26] KinetisUpdater 0: Flash complete, switching device mode
[2022-07-26T12:14:26] Kinetis Device: tx-F400
[2022-07-26T12:14:26] KinetisUpdater 0: Next update step [NONE]
[2022-07-26T12:14:26] KinetisUpdater 0: 12632ms to flash the device
[2022-07-26T12:14:26] HidDevice: Killing rx thread. Too many errors
[2022-07-26T12:14:26] HidDevice: Stopping receive thread
[2022-07-26T12:14:26] Kinetis Device: Requesting MCU ID records from database
[9191000125D6001C0018800166324E45]
Checking for mico 9191000125D6001C0018800166324E45
SQL - deviceCheckProgramming - Took 2215ms

Why calling the ReconnectDevice() does not help us.

Now WE called KinetisDevice.ReconnectDevice() from UpdatedCompletedUI() or from the KinetisUpdater Thread. But due to the complexities and timing issues between UsbEvent() and the ReconnectDevice() , the reconnect behavior is very unpredictable.

Final conclusion

we can see that "Main - Device Changed | 331564 | 537 | 7 | 0" is called only twice for Swap bit to Swap bit update.

But from bootloader to bootloader, Bootloader to swapbit the Main - Device Changed | 331564 | 537 | 7 | 0 is called 3 times, once for disconnect and two for re-connect.

But we see only two Main - Device Changed | 331564 | 537 | 7 | 0 at most being called(if we don't thread sleep on UpdatedCompletedUI(status), non if we thread sleep). This is because the of the KinetisUpdater.UpdateTask() calls UpdateCompleteEvent() which in turn calls

Dispatcher.BeginInvoke(UpdatedCompletedUI(status);). When we call a function using

Dispatcher.BeginInvoke that function runs on the UI thread.

The main page USB event which prints "Main - Device Changed | 331564 | 537 | 7 | 0" also runs on the UI Thread(Main thread), So this event gets blocked from being called. If we thread sleep in the UpdatedCompletedUI(status) all three USB events will be blocked.

The at least first Main - Device Changed | 331564 | 537 | 7 | 0 which is corresponding to the USB disconnect event is crucial for the UsbEvent() to determine that the device has disconnected. So that it will attempt to connect again by calling **CheckForNewDeviceConnection()**. This connection creation from **CheckForNewDeviceConnection()** may happen in the first UsbEvent() it self if the device has rebooted and reconnected or it may happen in the subsequent 2 UsbEvent() call that will follow after the device has rebooted and reconnected.

For more details about the Dispatcher.BeginInvoke

See my writeup about the Dispaacther in the C# notes(Kasun's Notebook). I was able to recreate this effect in a stand alone WPF application.