

Technical Note on System DPI Scaling for Plug-ins in Studio One

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Studio One 4.1 and later provides a new "System DPI Scaling" option for VST plug-ins on Windows so that they appear at the normal size expected by the user when the host is following a higher system scaling factor like 200% on 4K or 5K screens. It requires Windows 10 version 1803 (April 2018 Update) or later.

What we do behind the scenes is switching the DPI awareness context of the main thread from "per-monitor" to "unaware" when calling the plug-in. Additionally, we set the DPI hosting behavior to "mixed" so that our "per-monitor" aware parent window can host an "unaware" child window. This way Windows 10 will bitmap-scale the plug-in GUI accordingly.

Here is some background information from Microsoft and the relevant APIs:

- <https://docs.microsoft.com/en-us/windows/desktop/hidpi/high-dpi-improvements-for-desktop-applications>
- SetThreadDpiAwarenessContext() - <https://docs.microsoft.com/en-us/windows/desktop/api/Winuser/nf-winuser-setthreaddpiawarenesscontext>
- SetThreadDpiHostingBehavior() - <https://docs.microsoft.com/en-us/windows/desktop/api/Winuser/nf-winuser-setthreaddpihostingbehavior>

Changing the DPI awareness context of a thread changes the behavior of DPI-virtualized functions like GetWindowRect() and SetWindowPos(). In "unaware" mode they return logical coordinates based on 96 DPI, whereas in "per-monitor" mode the coordinates correspond to physical pixels. A mismatch between the current mode and the DPI behavior expected by the plug-in can cause graphical glitches like resize flicker, incorrect invalidation, incomplete redraw, etc. These issues can only be fixed by adjusting the plug-in code accordingly.

In case you plan to support high-DPI directly you might want to look into the VST2 and VST3 API extensions we've published with Studio One 3 in 2015. Steinberg meanwhile added an ABI-compatible interface to the VST3 SDK with our permission. The VST2 part is available from the PreSonus Software website: https://www.presonussoftware.com/en_US/developer