USB ENGINEERING CHANGE NOTICE

Title: Suspend Current Limit Changes
Applies to: Universal Serial Bus Specification, Revision 2.0

Summary of ECN:
This ECN raises the maximum suspend current to 2.5 mA for all devices except InterChip USB (ICUSB) devices. ICUSBdevice suspend current limit remains at 150 µA.

For the purposes of establishing suspend current limits, there is no difference between a high-power device and a low-power device, nor is there a difference between devices with DEVICE_REMOTE_WAKEUP feature enabled and those without DEVICE_REMOTE_WAKEUP feature enabled. All devices (except ICUSB) have a maximum suspend current limit of 2.5 mA.

NOTE: This ECN affects the core USB 2.0 specification. Previous ECNs and specifications (except ICUSB) that make reference to the former 500 µA limit should be read according to this ECN to permit the new 2.5 mA suspend current limit.

Reasons for ECN:
Simplification of hardware designs, reduced development effort and cost and time wasted waiting for automatic suspend current waivers. Furthermore, the USB Battery Charging Specification presumes that 2.5 mA suspend current is available to all devices.

Impact on existing peripherals and systems:
No impact on currently certified devices. Hosts with very tight suspend current budgets may be affected by new bus-powered hubs drawing higher suspend current prior to configuration, or by new low-power devices using the new limit.

Hardware Implications:
Devices that formerly required waivers for (2.5 mA > ICCSL > 500 µA) no longer require waivers. Bus-powered hubs may require up to 12.5 mA prior to configuration, 2.5 mA for the hub electronics and 2.5 mA for each port with an attached device.

Software Implications:
Host power-management software will need to be aware of the higher potential suspend current when budgeting low-power states and when configuring bus-powered hubs.

Compliance Testing Implications:
All tests that verify 500 µA suspend current are replaced by 2.5 mA suspend current tests. A new test for configured bus-powered hubs permits 12.5 mA suspend current.

Time-averaging schemes for determining suspend current compliance (Section 7.2.3) are unchanged by this ECN.

Changes to USB-IF Full and Low Speed Compliance Test Procedure Section D.6, Step 2

- Pass
  1) Measured current is 2.5 mA or less

  OR
  2) Device is a configured bus-powered hub AND measured current is 12.5 mA or less
- Fail
  1) Measured current exceeds 12.5 mA AND device is a configured bus-powered hub

  OR
  2) Measured current exceeds 2.5 mA

Specification Changes:

All changes (except repagination and indexing) occur in Chapter 7.

Chapter 7 changes:

Replace Section 7.2.3 Paragraph 1 with the following:

All USB Devices (except bus-powered hubs) may draw up to 2.5 mA during suspend. Configured bus-powered hubs and configured bus-powered compound devices may consume a maximum suspend current of 12.5 mA. This limit includes the 2.5 mA suspend current that must be available for each externally-available downstream port on the hub. Unconfigured bus-powered hubs and compound devices operate as a low-power devices and must limit suspend current to 2.5 mA. When computing suspend current, the current from VBUS through the bus pull-up and pull-down resistors must be included.

Replace Section 7.2.3 Paragraph 2 Sentence 4 with the following:

The average current cannot exceed the average suspend current limit (I_{CCS} or I_{CCSHUB}, see Table 7-7) during any 1.0-second interval ($T_{SUSAVG1}$).

Change reference to "ICCS(H/L)" from I_{CCS} in Figure 7-48 to "ICCS"

Change Table 7-7 ICCSH and ICCSL as follows:

Suspended Device (except Configured Bus-Powered Hub)	I_{CCS}	Section 7.2.3		2.5	mA
Suspended Configured Bus-Powered Hub	I_{CCSHUB}	Section 7.2.3		12.5	mA

Remove Table 7-7 Note 15