



SMSC, a subsidiary company of Microchip

Nov 18, 2012
Jean Lee



Definition of bcdUSB

✓ Explanation for term of bcdUSB and definition in USB Spec.

Defined bcdUSB in USB2 and USB3 with 0x200h and 0x300h respectively.

However USB2 bcdUSB in USB3 spec is updated with 0x210h

(bcdUSB : Binary Code USB, This term of bcdUSB is defined in USB Spec.)

9.2.6.6 Speed Dependent Descriptors

A device capable of operation at high-speed can operate in either full- or high-speed. The device always knows its operational speed due to having to manage its transceivers correctly as part of reset processing (See Chapter 7 for more details on reset). A device also operates at a single speed after completing the reset sequence. In particular, there is no speed switch during normal operation. However, a high-speed capable device may have configurations that are speed dependent. That is, it may have some configurations that are only possible when operating at high-speed or some that are only possible when operating at full-speed. High-speed capable devices must support reporting their speed dependent configurations.

A high-speed capable device responds with descriptor information that is valid for the current operating speed. For example, when a device is asked for configuration descriptors, it only returns those for the current operating speed (e.g., full speed). However, there must be a way to determine the capabilities for both high- and full-speed operation.

Two descriptors allow a high-speed capable device to report configuration information about the other operating speed. The two descriptors are: the (other_speed) device_qualifier descriptor and the other_speed_configuration descriptor. These two descriptors are retrieved by the host by using the GetDescriptor request with the corresponding descriptor type values.

Note: These descriptors are not retrieved unless the host explicitly issues the corresponding GetDescriptor requests. If these two requests are not issued, the device would simply appear to be a single speed device.

Devices that are high-speed capable must set the version number in the *bcdUSB* field of their descriptors to 0200H. This indicates that such devices support the other_speed requests defined by USB 2.0. A device with descriptor version numbers less than 0200H should cause a Request Error response (see next section) if it receives these other_speed requests. A USB 1.x device (i.e., one with a device descriptor version less than 0200H) should not be issued the other_speed requests.

11.3 USB 3.0 Device Support for USB 2.0

In most cases, backward compatible operation at USB 2.0 signaling is supported by USB 3.0 devices in order that higher capability devices are still useful with lesser capable hosts and hubs. For product installations where support for USB 3.0 operation can be independently assured between the device and the host, such as internal devices that are not user accessible, device support for USB 2.0 may not be necessary. USB 3.0 device certification requirements require support for USB 2.0 for all user attached devices.

For any given USB 3.0 peripheral device within a single physical package, only one USB connection mode, either SuperSpeed or a USB 2.0 speed but not both, shall be established for operation with the host.

Peripheral devices may implement in the device framework a common standardized ContainerID to enable software to identify all of the functional components of a specific device and independent of which speed bus it appears on. All devices within a compound device that support ContainerID shall return the same ContainerID.

The USB 2.0 capabilities of a USB 3.0 device shall be designed to the USB 2.0 specification and shall meet the USB 2.0 compliance requirements. Note that a SuperSpeed device operating in one of the USB 2.0 modes must return 0210H in the bcdVersion field of the device descriptor.



Definition of bcdUSB (Contd)

9.6 Standard USB Descriptor Definitions

The standard descriptors defined in this specification may only be modified or extended by revision of this specification.

9.6.1 Device

A device descriptor describes general information about a device. It includes information that applies globally to the device and all of the device's configurations. A device has only one device descriptor.

The device descriptor of a SuperSpeed capable device operating in SuperSpeed mode has a version number of 3.0 (0300H). The device descriptor of a SuperSpeed capable device operating in one of the USB 2.0 modes has a version number of 2.1 (0210H).

The *bcdUSB* field contains a BCD version number. The value of the *bcdUSB* field is 0xJJMN for version JJ.M.N (JJ – major version number, M – minor version number, N – sub-minor version number), e.g., version 2.1.3 is represented with value 0x0213 and version 3.0 is represented with a value of 0x0300.



Why bcdUSB is updated with 0x210h?



LPM

- ✓ USB2 : LPM is not mandatory and it was added to USB2 spec later as addendum.
- ✓ USB3 : LPM is mandatory and it should be passed to get USB3 certification in that LPM is one of item in USB3 compliant test.

Below is more detailed explanation why LPM in USB2 should be 0x210h

First, the xHCI host controller must support LPM. To date the Fresco xHCI host controller has supported LPM. More recent Intel host controllers also support LPM, while only the latest Renesas xHCI PDK (available from the usb.org) controller supports LPM. Second, the USB hub must support LPM. A hub returns in the device descriptor what level of USB specification is supported. LPM support is reported to the host by returning a value of 0x210 in the bcdUSB field in the device descriptor. If the value is 0x200, it is for the standard USB 2.0 specification that does not support LPM. In this case the test is aborted.



Where the problem is coming

Mouse can't support WINDOW vista when mouse is hooked up to PC via USB3 HUB
Because VISTA can't recognize mouse (L/S device) that bcdUSB is defined with 210h,
Since the support for VISTA in MSFT was done in 2009.

While XP doesn't care about bcdUSB and bcdUSB is already updated through SP1 in
WINDOW7.



Thanks !