Universal Serial Bus
Mass Storage Class
Specification Overview

Change History

Revision	Issue Date	Comments
1.0	October 22, 1998	Initial release
1.1	June 28, 2000	Update

USB Device Class Definition for Mass Storage Devices
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1 Introduction

This document gives an overview of the USB Mass Storage Class specifications. How mass storage devices behave on the USB bus is the subject of this and other USB Mass Storage Class specifications. At this time, four other USB Mass Storage Class specifications are under development by the USB Mass Storage Class Working Group (CWG). The titles of these specifications are:

USB Mass Storage Class Control/Bulk/Interrupt (CBI) Transport
USB Mass Storage Class Bulk-Only Transport
USB Mass Storage Class ATA Command Block
USB Mass Storage Class UFI Command Specification

Note: At this time, the ATA Command Block specification is at revision level 0.7 and therefore not posted on the Web.

1.1   Specification Relationships

The CBI and Bulk-Only specifications are each intended to be stand-alone documents for the USB Mass Storage class, enabling development of a USB Mass Storage compliant device. A device manufacturer *may* choose to implement both CBI and Bulk-Only, but shall follow each specification as applicable.

Booting and operating system from a USB Bass Storage Class device requires no special considerations with regard to Mass Storage Class support. Either CBI or Bulk-Only devices may be bootable. Bootability may, however, require other considerations such as particular types of media formatting, etc. Such considerations are hardware- or operating system dependent, and are beyond the scope of the Mass Storage Class specifications.

1.2   Purpose

The purpose of this document is to provide an overview of all the specifications that describe how Mass Storage devices behave on the USB bus. Section 1.1 gives the rules for using the different USB Mass Storage class specifications.

Note that these rules can change. As other companies with different USB Mass Storage Class device projects in mind join the USB Mass Storage Class CWG, other specifications may be developed by the CWG and added to the set of specifications that fully describe how a Mass Storage Class device behaves on the USB bus. If and when that happens, the USB Mass Storage CWG will reconsider the rules specified in section 1.1 of this document.

1.3   Terms and Abbreviations

May
   A keyword that indicates an option.

Shall
   A keyword that indicates a requirement.

1.4   Related Documents

USB Mass Storage specifications use the command sets from several existing protocols. The command blocks of these command sets are placed in a USB wrapper which follows USB protocol. The following specifications are referenced by the USB Mass Storage specifications:

- *Advanced Technology Attachment Packet Interface (ATAPI) for Floppies.* SFF-8070i, available from Global Engineering, (800)-854-7179.

- *Advanced Technology Attachment Packet Interface (ATAPI) for CD-ROMs.* SFF-8020i, available from Global Engineering, (800)-854-7179.

- *Advanced Technology Attachment Packet Interface (ATAPI) for Tape*. QIC-157. Available at http://www.qic.org/html/standards

- *Reduced Block Commands (RBC), T10/1240-D*, available at http://www.t10.org/drafts.htm

- *Multi-Media Command Set 2 (MMC-2),* available at http://www.t10.org/drafts.htm

- *SCSI Primary Commands – 2 (SPC-2), Revision 3 or later*, available from Global Engineering, (800)-854-7179

- *Universal Serial Bus Specification*, 1.0 revision or later (also referred to as the *USB Specification*). In particular, see Chapter 9, "USB Device Framework." Available at http://www.usb.org/developers/devclass.html

2 Subclass Code

The Interface Descriptor of a USB Mass Storage Class device includes a *bInterfaceSubClass* field. This field denotes the industry-standard protocol transported by a Mass Storage Class interface. The value of the *bInterfaceSubClass* field shall be set to one of the Subclass codes as shown in the following table.

Note that the Subclass code values used in the *bInterfaceSubClass* field specify the industry-standard specification that defines transport protocols and command code systems transported by the interface; these Subclass codes do not specify a type of storage device (such as a CD-ROM or floppy disk drive).

Table 2.1 – SubClass Codes Mapped to Command Block Specifications

SubClass Code	Command Block Specification	Comment
01h	Reduced Block Commands (RBC) T10 Project 1240-D	Typically, a Flash device uses RBC command blocks. However, any Mass Storage device can use RBC command blocks.
02h	SFF-8020i, MMC-2 (ATAPI)	Typically, a C/DVD device uses SFF-8020i or MMC-2 command blocks for its Mass Storage interface.
03h	QIC-157	Typically, a tape device uses QIC-157 command blocks.
04h	UFI	Typically a floppy disk drive (FDD) device
05h	SFF-8070i	Typically, a floppy disk drive (FDD) device uses SFF-8070i command blocks. However, an FDD device can be in another subclass (for example, RBC) and other types of storage devices can belong to the SFF-8070i subclass.
06h	SCSI transparent command set	
07h – FFh	Reserved for future use.	

3 Protocol Code

The Interface Descriptor of a USB Mass Storage Class device includes a *bInterfaceProtocol* field. This field denotes the transport protocol used by this interface.

Table 3.1 – Mass Storage Transport Protocol

bInterfaceProtocol	Protocol Implementation	Comment
00h	Control/Bulk/Interrupt protocol (with command completion interrupt)	USB Mass Storage Class Control/Bulk/Interrupt (CBI) Transport
01h	Control/Bulk/Interrupt protocol (with no command completion interrupt)	USB Mass Storage Class Control/Bulk/Interrupt (CBI) Transport
50h	Bulk-Only Transport	USB Mass Storage Class Bulk-Only Transport
02h – 4Fh	Reserved	
51h – FFh	Reserved	