

**Universal Serial Bus  
Mass Storage Class  
Specification Overview**

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**Document Status**

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# 1 Introduction

## 1.1 Overview

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. In addition to this Overview specification, several other USB Mass Storage Class specifications are supported 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 (BBB) Transport*

*USB Mass Storage Class UFI (UFI) Command Specification*

*USB Mass Storage Class Bootability Specification*

*USB Mass Storage Class Compliance Test Specification*

*USB Lockable Storage Devices Feature Specification (LSD FS)*

*USB Mass Storage Class USB Attached SCSI Protocol (UASP)*

The USB Mass Storage Class Control/Bulk/Interrupt (CBI) Transport specification is approved for use only with full-speed floppy disk drives. CBI shall not be used in high-speed capable devices, or in devices other than floppy disk drives. CBI shall not be used in devices that implement LSDFS. Usage of CBI for any new design is discouraged.

NOTE 1 — The Compliance Test specifications are still under development, and are not yet publicly available.

## 1.2 Specification Relationships

This is a normative document for USB Mass Storage Class devices. If there is a code assignment conflict between this document and another USB document, then the assignments in this document override the other document.

The CBI and Bulk-Only transport protocol 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.

Bootting an operating system from a USB Mass 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.

## 1.3 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.

## 1.4 Terms and Abbreviations

**May:** A keyword that indicates an option.

**Shall:** A keyword that indicates a requirement.

## 1.5 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:

- a) Universal Serial Bus Specification revision 2.0 (core USB), available at <http://www.usb.org>
- b) Reduced Block Commands (RBC), INCITS 330:2000, available at <http://www.t10.org>
- c) Multi-Media Command Set 5 (MMC-5), T10/1675-D available at <http://www.t10.org>
- d) Standard Protocol for Authentication in Host Attachments of Transient Storage Devices (IEEE 1667) available at [www.ieee1667.com](http://www.ieee1667.com)
- e) USB Attached SCSI (UAS) T10/2095-D Available at <http://www.t10.org>

## 2 Subclass Codes

The Interface Descriptor of a USB Mass Storage Class device includes a *bInterfaceSubClass* field. This field denotes the industry-standard command set 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 table 1.

The Subclass code values used in the *bInterfaceSubClass* field specify the industry-standard specification that defines transport command sets 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 1 — SubClass Codes Mapped to Command Block Specifications**

Subclass	Command Block Specification	Comment
00h	SCSI command set not reported	De facto use
01h	RBC	Allocated by USB-IF for RBC. RBC is defined outside of USB.
02h	MMC-5 (ATAPI)	Allocated by USB-IF for MMC-5. MMC-5 is defined outside of USB.
03h	Obsolete	Was QIC-157
04h	UFI	Specifies how to interface Floppy Disk Drives to USB
05h	Obsolete	Was SFF-8070i
06h	SCSI transparent command set	Allocated by USB-IF for SCSI. SCSI standards are defined outside of USB.
07h	LSD FS	LSDFS specifies how host has to negotiate access before trying SCSI
08h	IEEE 1667	Allocated by USB-IF for IEEE 1667. IEEE 1667 is defined outside of USB.
09h - FEh	Reserved	Reserved
FFh	Specific to device vendor	De facto use

### 3 Protocol Codes

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 2 — Mass Storage Transport Protocol**

<i>bInterfaceProtocol</i>	Protocol Implementation	Comment
00h	CBI (with command completion interrupt)	USB Mass Storage Class Control/Bulk/Interrupt (CBI) Transport
<u>01h</u>	<u>CBI (with no command completion interrupt)</u>	<u>USB Mass Storage Class Control/Bulk/Interrupt (CBI) Transport</u>
02h	Obsolete	
03h-4Fh	Reserved	Reserved
<u>50h</u>	<u>BBB</u>	USB Mass Storage Class Bulk-Only (BBB) Transport
51h - 61h	Reserved	Reserved
62h	UAS	Allocated by USB-IF for UAS. UAS is defined outside of USB.
63h-FEh	Reserved	Reserved
FFh	Specific to device vendor	De facto use

The USB Mass Storage Class Control/Bulk/Interrupt (CBI) Transport specification (Protocol codes 0x00 and 0x01) is approved for use only with full-speed floppy disk drives. CBI shall not be used in high-speed capable devices, or in devices other than floppy disk drives. Usage of CBI for *any* new design is discouraged.

## 4 Request Codes

Core USB specifies that a USB control Request addressed to *wIndex* = *bInterfaceNumber* of a USB Mass Storage Class device interface includes a *bRequest* field.

The meaning of the *bRequest* code is specific to the device vendor when the *bmRequestType*.Type is Vendor, but the meaning of the *bRequest* code is specific to the interface class when the *bmRequestType*.Type is Class.

**Table 3 — Mass Storage Request Codes**

<i>bRequest</i>	Name	Comment
00h	Accept Device-Specific Command (ADSC)	Assigned in context by USB Mass Storage Class Control/Bulk/Interrupt (CBI) Transport, also aliases core USB request 00h Get Status.
01h - 0Dh	Reserved	Aliases of core USB bRequest codes
0Eh - FBh	Reserved	Reserved
FCh	Get Requests	Assigned by Lockable Storage Devices Feature Specification
FDh	Put Requests	Assigned by Lockable Storage Devices Feature Specification
FEh	Get Max LUN (GML)	Assigned by USB Mass Storage Class Bulk-Only (BBB) Transport
FFh	Bulk-Only Mass Storage Reset (BOMSR)	Assigned by USB Mass Storage Class Bulk-Only (BBB) Transport

## 5 Class Specific Descriptor Codes

Some Mass Storage subclass and protocol specifications require class specific descriptors. Table 4 lists the class specific descriptors used by the Mass Storage Class.

**Table 4 — Mass Storage Class Specific Descriptors**

Descriptor Code	Name	Comment
00h - 23h		Not defined by Mass Storage
24h	Pipe Usage Class Specific Descriptor	Allocated by USB-IF for UAS. UAS is defined outside of USB.
25h - FFh		Not defined by Mass Storage