5.0 Features, Profiles and Parameters

1.1. Introduction

A feature is a set of commands, mode parameters and behaviors that specify the capabilities of a logical unit and its associated medium - one or more features may be supported by a particular logical unit. In general, features associated with device capabilities are static while features associated with medium capabilities are dynamic. While features are optional, the commands and mode parameters specified by a feature are mandatory. If a particular feature is reported, the logical unit or its transport shall implement all of the commands and mode parameters of that feature.

Classification by features allows logical units to report and provide layers of functionality; it also allows applications to use logical units in a precise and consistent manner. For example to illustrate layered aspect, consider two CD-ROM logical units where one particular CD-ROM logical unit may be used as both a read only block device and as a CD-Audio player. These two capabilities are reported as two separate features. Another CD-ROM logical unit may only be capable of being used as a read only block device, and it would not report the feature that specifies CD-Audio support.

Classification by features also allows applications to use devices according to the requirements of the application. For example, a CD-ROM logical unit and a hard disk drive may both be used by the same read only block device feature - the application does not need to use other features supported by the CD-ROM logical unit if the application does not them.

Another important characteristic of classification by features is its dynamic nature; a device that is capable of reading both DVD-ROM and CD-ROM medium reports different features according to whether a DVD-ROM or CD-ROM medium is loaded.

A profile is a set of features that specifies the behavior of a device class over a transport. Classification by profiles provides a means to:

1. assign the implementation of a feature (or part of a feature) between a logical unit and its transport
2. limit command fields and mode parameters based upon the capabilities of a transport
3. extend command fields and mode parameters
4. require additional commands and mode parameters as mandatory

In addition to the transport aspect, a profile enables an application: to load and initialize the appropriate modules that support the logical unit, to provide iconic representation of the logical unit, and to determine the default file system of the logical unit and its medium.

1.2. FEATURES

To determine the Features supported by the Logical Unit, the Initiator shall issue a GET CONFIGURATION command (See SPC-2). In response to this GET CONFIGURATION command the logical unit shall respond with data as defined in Table 1. Response data consists of a header field and zero or more variable length feature descriptors.

Table 1 - GET CONFIGURATION response data format

Bit / Byte	7	6	5	4	3	2	1	0
0 - 7	Feature Header							
8 - n	Feature Descriptor(s)							

The Feature Header field to be returned is shown in **Error! Reference source not found.**.

Table 2 - Feature Header

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Data Length				
2								
3								(LSB)
4	Reserved							
5	Reserved							
6	(MSB)			Current Profile				
7								(LSB)

The Data Length field indicates the amount of data available given a sufficient allocation length following this field. This length shall not be truncated due to an insufficient Allocation Length. If the Data Length is greater than 65,530 bytes, multiple Get Configuration commands with different Starting Feature Numbers will be required for the initiator to read all configuration data. This field is adjusted as appropriate for the given Starting Feature Number.

The Current Profile field shall indicate the logical unit's current profile. The logical unit shall choose the most appropriate current profile from the list of profiles (see **Error! Reference source not found.**) with their CurrentP bit set. If there are no profiles currently active, this field shall contain zero.

Each Feature supported by a logical unit shall be described by a Feature Descriptor. All features descriptors shall be a multiple of four bytes. The Feature Descriptor(s) generic format returned is defined in **Error! Reference source not found.**. Each individual feature description is defined in the appropriate sub-clause.

Table 3 - Feature Descriptor generic format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code				
1								(LSB)
2	Reserved			Version			Persistent	Current
3	Additional Length							
4 - n	Feature Dependent Data							

The Feature Code field shall identify a feature supported by the logical unit.

1.2.1. Version field

The Version field is reserved and shall be set to zero. Future versions of a feature will be backward compatible; incompatible changes will be included in a different feature.

1.2.2. Persistent Bit

The Persistent bit, when set to zero, shall indicate that this feature may change its current status. When set to one, shall indicate that this feature is always active. The logical unit shall not set this bit to one if the Current bit is, or may become, zero.

1.2.3. Current Bit

The Current bit, when set to zero, indicates that this feature is not currently active and that the Feature Dependent Data may not be valid. When set to one, this feature is currently active and the Feature Dependent Data is valid.

1.2.4. Additional Length Field

The Additional Length field indicates the number of Feature specific bytes that follow this header. This field shall be an integral multiple of 4.

1.2.5. Feature Codes

Features are the smallest set of commands, pages, and behavior that may be implemented. Each feature is assigned a unique code or number to identify the feature. Feature codes are shown in Table 4. The maximum number of feature sets is 65,536 and the feature code value of 0 is reserved for the list of Profiles supported by the Logical Unit.

Table 4 - Feature Codes

Feature Number	Feature Name	Description
0000h	Profile List	A list of all profiles supported by the Logical Unit
0001h	Core	Mandatory behavior for all devices
0002h	Morphing	Ability to notify initiator about operational changes and accept initiator requests to prevent operational changes.
0003h	Removable Medium	The medium may be removed from the device
0004h - 000Fh	Reserved	
0010h	Random Readable	Read ability for storage devices with random addressing
0011h - 001Ch	Reserved	
001Dh	MultiRead	The logical unit can read all CD media types; based on OSTA MultiRead
001Eh	CD Read	The ability to read CD specific structures
001Fh	DVD Read	The ability to read DVD specific structures
0020h	Random Writable	Write support for randomly addressed writes
0021h	Incremental Streaming Writable	Write support for sequential recording
0022h	Sector erasable	Write support for erasable media and media that requires an erase pass before overwrite.
0023h	Formattable	Support for formatting of media.
0024h	Defect Management	Ability of the drive/media system to provide an apparently defect-free space.
0025h	Write Once	Write support for write once media that can be written in random order.
0026h	Restricted Overwrite	Write support for media that must be written in multiples of logical blocks.
0027h - 002Ch	Reserved	
002Dh	CD Track at Once	Ability to write CD with Track at Once recording
002Eh	CD Mastering	The ability to write CD with Session at Once or Raw write methods.
002Fh	DVD-R Write	The ability to write DVD specific structures
0030h - 00FFh	Reserved	
0100h	Power Management	Initiator and device directed power management
0101h	S.M.A.R.T.	Self Monitoring Analysis and Reporting Technology (Failure prediction)
0102h	Embedded Changer	Single mechanism multiple disc changer
0103h	CD Audio analog play	Ability to play audio CDs via the drive's own analog output
0104h	Microcode Upgrade	Ability for the device to accept new microcode via the interface
0105h	Time-out	Ability to respond to all commands within a specific time
0106h	DVD-CSS	Ability to perform DVD-CSS authentication and RPC
0107h	Real Time Streaming	Ability to read and write using initiator requested performance parameters
0108h	Logical Unit serial number	Logical unit has a unique identifier
0109h - FEFFh	Reserved	
FF00h - FFFFh	Vendor Unique	

1.3. Feature Definitions

The following sub-clauses define the feature sets and the commands supported by each feature.

1.3.1. Profile List Feature (0000h)

This feature identifies profiles supported by the logical unit. Profiles are defined as collections of features and provide a method to quickly determine the logical unit's type. This feature is always current, even if none of the profiles listed is current.

The Feature Code field shall be set to zero.

The Version field is reserved and shall be set to zero. Future versions of a feature will be backward compatible; incompatible changes will be included in a different feature.

The Persistent bit shall be set to one to indicate that the reporting of the profile list is always supported.

Table 5 - Profile List Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0				
1								(LSB)
2	Reserved		Version				Persistent = 1	Current = 1
3	Additional Length							
4 - n	Profile Decriptor(s)							

The Current bit shall be set to one.

The Additional Length field shall be set to ((number of Profile Descriptors) * 4).

The Profile Descriptors are shown in "Table 98 - Profile Descriptor" on page 190. All profiles supported by the logical unit shall be always reported. Profile descriptors are returned in the order of preferred operation - most desirable to least desirable. E.g. a DVD-ROM that could also read CD-ROM would list the DVD-ROM profile first and the CD-ROM pro-file second.

The Profile Number identifies a profile to which the logical unit conforms. See "Table 99 - Profile List" on page 190.

The Current bit, when set to one, shall indicate that this profile is currently active. If no medium is present, no profile should be active. Multifunction devices shall select the most appropriate profile(s), if any, to set as current. The most appropriate current profile is also reported in the Feature Header - see "Table 94 - Feature Header" on page 186.

Table 6 - Profile Descriptor

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Profile Number				
1								(LSB)
2	Reserved							Current
3	Reserved							

Table 7 - Profile List

Profile Number	Profile Name	Description
0000h	Reserved	
0001h	Non-removable disk	Re-writable disk, capable of changing behavior
0002h	Removable disk	Writeable capable; with removable media
0003h	MO Erasable	Magneto-Optical disk with sector erase capability
0004h	MO Write Once	Magneto-Optical write once
0005h - 0007h	Reserved	
0008h	CD-ROM	Read only Compact Disc capable
0009h	CD-R	Write once Compact Disc capable
000Ah	CD-RW	Re-writable Compact Disc capable
000Bh - 000Fh	Reserved	
0010h	DVD-ROM	Read only DVD
0011h	DVD-R	Write once DVD
0012h	DVD-RAM	Re-writable DVD
0013h - FFFEh	Reserved	
FFFFh	Logical Units Not Conforming to a Standard Profile	The logical unit does not conform to any profile.

the CurrentP bit of the CD-ROM profile would be set to one.

1.3.2. Core Feature (0001h)

This feature identifies a logical unit that supports functionality common to all devices. All logical units that conform to this standard shall implement the Core features set of commands specified in Table 8.

Table 8 - Core Device Commands

Op Code	Command Description	Clause
12h	INQUIRY	SPC-2
46h	GET CONFIGURATION	SPC-2
4Ah	GET EVENT STATUS NOTIFICATION	
55h	MODE SELECT (10)	
5Ah	MODE SENSE (10)	
1Eh	PREVENT/ALLOW	
03h	REQUEST SENSE	
00h	TEST UNIT READY	

The feature descriptor response data to be returned to the initiator is defined in Table 9.

Table 9 - Core Feature Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0001h				
1								(LSB)
2	Reserved			Version			Persistent	Current
3	Additional Length							
4	(MSB)							
5				Physical Interface Standard				
6								
7								(LSB)

The Feature Code field shall be set to 0001h.

The Persistent bit shall be set to one.

The Current bit shall be set to one.

The Additional Length field shall be set to 4. The Physical Interface Standard field shall be set to the current initiator to logical unit communication path as defined in **Error! Reference source not found.**.

Table 10 - Physical Interface Standard

Physical Interface Standard	Description	Application
00000000h	Unspecified	
00000001h	SCSI Family	See SCSI implementation
00000002h	ATAPI	See ATAPI implementation
00000003h	IEEE 1394 - 1995	See 1394 implementation
00000004h - FEh	Reserved	
0000FFFFh	Vendor Unique	
00010000 - 0001FFFFh	Defined by NCITS	
00020000h - 0002FFFFh	Defined by SFF	
00030000h - 0003FFFFh	Defined by IEEE	
00040000h - FFFFFFFFh	Reserved	

1.3.3. Morphing Feature (0002h)

This feature identifies the ability of the Logical Unit to notify an initiator about operational changes and accept initiator requests to prevent operational changes. The feature descriptor response data to be returned to the initiator is defined in Table 11.

Table 11 - Morphing Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 00002h				
1								(LSB)
2	Reserved			Version			Persistent	Current
3	Additional Length = 04h							
4	Reserved							Async
5	Reserved							
6	Reserved							
7	Reserved							

The Feature Code field shall be set to 0002h.

The Persistent bit shall be set to one.

The Current bit shall be set to one.

The Additional Length field shall be set to 4.

The Async bit, when set to zero, indicates that the logical unit supports only the polling implementation of GETEVENT/STATUS NOTIFICATION. When set to one, indicates that the logical unit supports both polling and asynchronous GETEVENT/STATUS NOTIFICATION.

1.3.4. Removable Medium Fearture (0003h)

Implementing this feature, Logical Units shall have a means of communicating to the host that the user wants to eject the medium or has inserted a new medium. A logical unit that implements the Removable Medium Feature shall support the commands as specified in Table 12.

Table 12 - Removable Medium Commands

Op Code	Command Description	Clause
4Ah	GET EVENT STATUS NOTIFICATION	
BDh	MECHANISM STATUS	
1Eh	PREVENT/ALLOW	
25h	READ CAPACITY	
1Bh	START/STOP UNIT and load eject (LOEJ) bit	

Support, for this feature, is enabled using the PREVENT/ALLOW command (Persistent Bit), and the media status is retrieved using the GET EVENT STATUS NOTIFICATION command.

When the Persistent Prevent state is entered, the media shall remain locked in the Logical Unit, until the host issues an eject request, or a power on or hard reset condition occurs. The Persistent Prevent state shall be maintained after the eject request. New media that is inserted into the Logical Unit shall be locked in the Logical Unit after the logical unit reports the NEW MEDIA event. Prior to reporting the NEW MEDIA event, the logical unit may eject media without an explicit eject command from the host. This allows the user to remove incorrectly inserted media without having to wait for host intervention.

While in the Persistent prevent state, the logical unit shall generate Events upon receipt of a User Eject request. The logical unit shall not eject the media on receipt of these requests, if the logical unit has already reported a NEW MEDIA event for this media. When the host receives the Eject Request, and determines that it is safe to eject the medium, an eject command will be issued, at which time the logical unit shall eject the medium.

The logical unit shall only generate MSEN (EJECT REQUEST) events after reporting a MSEN (NEW MEDIA) event, and prior to reporting a MSEN (MEDIA REMOVAL) event for the given media.

To maintain compatibility with existing BIOS implementations and operating systems, the logical unit shall default to Persistent Prevent disabled. When the host enables the support using the PREVENT ALLOW command, the logical unit shall respond as described in this specification. When the host disables this feature, the logical unit must default to normal operating modes. A power on or hard reset shall cause the logical unit to the default Persistent Prevent state.

If the Logical Unit is unable to maintain media status information across a reset or power cycle, the Logical Unit shall generate a NEW MEDIA event.

Commands must be processed exactly the same as they would be if Persistent Prevent was not enabled. For compatibility reasons, UNIT ATTENTION status conditions must still be returned. However, the logical unit shall not return the UNIT ATTENTION status on a GESN command. For example, if the user inserts a new medium and the logical unit is accessed with a command, the CHECK CONDITION with UNIT ATTENTION shall be reported, but the logical unit shall also report the NEW MEDIA Event with the next available GESN (Media Status) command.

If a changer type Logical Unit uses media status operation, it shall use the following variations. If the changer Logical Unit supports individual slot load and unload capability, the slot number(s) exhibiting the media status change shall be reported in the slot fields of the Media Status Event Data. If the changer Logical Unit uses a cartridge load mechanism, the slot fields shall be set to the start and end slot numbers present in the cartridge.

For non-immediate GESN commands, the host shall use exactly one GET EVENT STATUS NOTIFICATION request for the entire changer Logical Unit. The Logical Unit shall respond as indicated in the Asynchronous Operation section above, indicating the slot information in the Request Sense Data as described above.

This feature identifies a logical unit that has a medium that is removable.

Table 13 - Removable MediumLo Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0003h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4 - n	Feature Dependent Data							

The Feature Code field shall be set to 0003h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be set to one.

The Current bit shall be set to one.

The Additional Length field shall be set to 4.

Table 14 - Removable Medium Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0003h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	Loading Mechanism Type			Reserved	Eject	Pvnt Jmprr	Reserved	Lock
5	Reserved							
6	Reserved							
7	Reserved							

The Persistent bit shall be set to one.

The Current bit shall be set to one.

The Additional Length field shall be set to 4.

The Loading Mechanism Type field (**Error! Reference source not found.**)shall be set according to the Eject bit. The Eject bit, when set to zero, indicates that the device cannot eject the medium or cartridge via the normal START/STOP command with the LoEj bit set. When set to one, indicates that the device can eject the medium or cartridge.

The Pvnt Jmpr bit, when set to zero, shall indicate that the Prevent Jumper is present. The logical unit shall power up to the allow state and locking the logical unit with the Prevent/Allow command shall not prevent insertion of the media. When set to one, the Prevent Jumper is not present. The logical unit shall power up to the prevent state (locked) and shall not accept new media or allow the ejection of media already loaded until an allow command is issued. The Pvnt Jmpr bit shall not change state, even if the physical jumper is added or removed during operation. Logical Units that do not have a Prevent Jumper available should set this bit to 0 to indicate that the Logical Unit behaves as described for a jumper being present.

The Lock bit, when set to zero, shall indicate that the medium cannot be locked into the logical unit. When set to one, shall indicate that the Prevent/Allow command is capable of actually locking the media into the logical unit.

Table 15 - Loading Mechanism Type

Bus Type	Description
000b	Caddy/Slot type loading mechanism
001b	Tray type loading mechanism
010b	Pop-up type loading mechanism
011b	Reserved
100b	Embedded changer with individually changeable discs
101b	Embedded changer using a cartridge mechanism
110b - 111b	Reserved

1.3.5. Random Readable Feature (0010h)

This feature identifies a logical unit that can read data from logical blocks specified in a READ command. Logical units that may be used as a random readable block devices shall implement the commands specified in Table 16.

Table 16 - Random Readable Feature

Op Code	Command Description	Clause
28h	READ (10)	
35h	SYNCHRONIZE CACHE	

The feature descriptor response data to be returned to the initiator is defined in Table 17.

Table 17 - Random Readable Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0010h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 08h							
4	(MSB)							
5				Logical Block Size				
6								
7								(LSB)
8	(MSB)			Blocking				
9								(LSB)
10	Reserved							PP
11	Reserved							

There is no requirement that the addresses, in sequences of reads, occur in any particular order.

The Feature Code field shall be set to 10h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3. This bit shall be set to zero if random readable media is not present.

The Additional Length field shall be set to 8.

The Logical Block Size shall be set to the number of bytes per logical block.

The Blocking field shall indicate the number of logical blocks per device readable unit. For most hard disks, this value is 1. And for DVD devices, this number is 10h. The Blocking field is used by the initiator only for performance optimization.

If there is more than one Blocking on the medium possible, the Blocking field shall be set to zero. See the READ TRACK/RZONE INFORMATION Command for more information.

The PP (Page Present) bit, when set to zero, shall indicate that the Read/Write Error Recovery page may not be present. When set to one, shall indicate that the Read/Write Error Recovery page is present.

1.3.6. MultiRead Feature (001Dh)

This feature identifies a logical unit that can read all CD media types. The logical unit shall conform to the OSTA Multi-Read specification 1.00, with the exception of CD Play capability (the CD Audio Feature is not required). Reading of CD Audio data via the READ CD command shall be supported. The feature descriptor response data to be returned to the initiator is defined in Table 18.

Table 18 - Multi-Read Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 00h							

The Feature Code field shall be set to 10h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2..

The Current bit shall be defined as in sub-clause 1.2.3..

The Additional Length field shall be set to 00h.

1.3.7. CD Read Feature (001Eh)

This feature identifies a logical unit that can read CD specific information from the media and can read user data from all types of CD blocks. Logical units that read CD-ROM media shall support the commands specified in Table 19.

Table 19 - CD READ Commands

Op Code	Command Description	Clause
BEh	READ CD	
51h	READ DISC INFOROMATION	
43h	READ TOC/PMA/ATIP	
52h	READ TRACK INFORMATION	

The feature descriptor response data to be returned to the initiator is defined in Table 20.

Table 20 - CD Read Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 1Eh				
1								(LSB)
2	Reserved			Version			Persistent	Current
3	Additional Length = 00h							

The Feature Code field shall be set to 1Eh.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-caluse 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if CD media is not present.

The Additional Length field shall be set to 0.

1.3.8. DVD Read Feature (001Fh)

This feature identifies a logical unit that can read DVD specific information from the media. Logical units that read DVD-ROM media shall support the commands specified in Table 21.

Table 21 - DVD READ Commands

Op Code	Command Description	Clause
51h	READ DISC INFOROMATION	
ADh	READ DVD STRUCTURE	
52h	READ TRACK INFORMATION	

The feature descriptor response data to be returned to the initiator is defined in Table 22.

Table 22 - DVD Read Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 1Fh				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 00h							

The Feature Code field shall be set to 1Fh.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if DVD media is not present.

The Additional Length field shall be set to 0.

1.3.9. Random Writable Feature (0020h)

This feature identifies a logical unit that can write data to logical blocks specified by a Write command. There is no requirement that the addresses in sequences of writes occur in any particular order.Logical units that may be used as a random writable block device shall implement the commands as specified in Table 23.

Table 23 - Random Writable Block Device Commands

Op Code	Command Description	Clause
2Ah	WRITE (10)	
2Eh	WRITE AND VERIFY (10)	

The feature descriptor response data to be returned to the initiator is defined in Table 24

Table 24 - Random Writable Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 20h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	(MSB)							
5				Logical Block Addressing				
6								
7								(LSB)

The Feature Code field shall be set to 20h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if randomly writable media is not present.

The Additional Length field shall be set to 04h.

The Last Logical Block Address is the logical block address of the last addressable block on the medium.

1.3.10. Incremental Streaming Writable (0021h)

This feature identifies a logical unit that can write data to a contiguous region, and can append data to a limited number of locations on the media. On CD media, this is known as packet recording. The feature descriptor response data to be returned to the initiator is defined in Table 24

Table 25 - Incremental Streaming - Writable

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0021h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length							
4	Reserved							
5	Reserved							
6	Reserved							
7	Number of Link Sizes							
8 - n	Link Size							
n - ?	Pad							

The Feature Code field shall be set to 21h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-caluse 1.2.3.. This bit shall be set to zero if sequential write media is not present.

The Additional Length field shall be set to 4 + (Number of Link Sizes) + (Number of Pad bytes).

The Number of Link Sizes shall specify the number of link sizes available for the current media. Note: for CD media, this field should be 1. For DVD-R, this field should be 2.

Each Link Size field shall indicate the number of logical blocks per link. Links occur on sequentially written media between independent write operations. The link size does not include any logical blocks written by the logical unit to satisfy the writable unit specified by the Blocking field in the Random Readable feature. Note: this field is 7 for CD-R media, and may be 0, 1, or 16 for DVD media. Link Size fields are reported by the logical unit in the logical unit's preferred order, most desirable first.

The Pad field shall contain zeros. The number of Pad bytes shall be 4 * IP((Number of Link Sizes + 3)/4) - (Number of Link Sizes), where IP() is the integer part of the number. The Pad field is present to make the length of the Feature Descriptor a multiple of 4 bytes.

1.3.11. Sector Erasable Feature (0022h)

This feature identifies a logical unit that supports erasable media and media that requires an erase pass before overwrite, such as some magneto-optical technologies.

Note: This Feature does not apply to DVD-RAM, which is a direct overwrite technology.

The feature descriptor response data to be returned to the initiator is defined in Table 24

Table 26 - Sector Erasable

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0022h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length							

The Feature Code field shall be set to 22h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2..

The Current bit shall be defined as in sub-caluse 1.2.3..

The Additional Length field shall be set to 00h.

1.3.12. Formattable Feature (0023h)

This feature identifies a logical unit that can format media into logical blocks. Logical units that use medium that may be formatted shall implement the commands specified in Table 27.

Table 27 - FORMAT Feature

Op Code	Command Description	Clause
04h	FORMAT UNIT	
23h	READ FORMATED CAPACITY	
2Fh	VERIFY	

The feature descriptor response data to be returned to the initiator is defined in Table 28

Table 28 - Formattable Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0023h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 00h							

The Feature Code field shall be set to 0023h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if non-formattable media is present.

The Additional Length field shall be set to 0.

1.3.13. Defect Management Feature (0024h)

This feature identifies a logical unit that shall have defect management available to provide a defect-free contiguous address space. The feature descriptor response data to be returned to the initiator is defined in Table 29.

Table 29 - Defect Management Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0024h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 00h							

The Feature Code field shall be set to 24h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if non-managed media is not present. If the media is Defect Managed it may have no defects.

The Additional Length field shall be set to 0.

1.3.14. Write Once Feature (0025h)

This feature identifies a logical unit that shall have the ability to record to any previously unrecorded logical block. The recording of logical blocks may occur in any order. Previously recorded blocks shall not be overwritten. The feature descriptor response data to be returned to the initiator is defined in Table 30.

Table 30 - Write Once Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 00025h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	(MSB)							
5				Last Logical Block				
6								
7								(LSB)

The Feature Code field shall be set to 25h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if write once media is not present.

The Additional Length field shall be set to 4.

The Last Logical Block is the logical block address of the last addressable block on the medium.

1.3.15. Restricted Overwrite Feature (0026h)

This feature identifies a logical unit that shall have the ability to overwrite logical blocks only in fixed sets at a time.

Logical units that write and read CD-R/W media shall support the commands specified in Table 31.

Table 31 - RESTRICTED OVERWRITE Feature

Op Code	Command Description	Clause
2Ah	WRITE(10)	
A1h	BLANK	

ADD PARAMETER PAGES

The feature descriptor response data to be returned to the initiator is defined in Table 32.

Table 32 - Restricted Overwrite

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0026h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	(MSB)							
5				Last Logical Block				
6								
7								(LSB)

The Feature Code field shall be set to 25h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if write once media is not present.

The Additional Length field shall be set to 4.

The Last Logical Block is the logical block address of the last addressable block on the medium.

1.3.16. CD Track at Once Feature (002Dh)

This feature identifies a logical unit that can write data to a CD track.

The feature descriptor response data to be returned to the initiator is defined in Table 33.

Table 33 - CD Track at Once Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 002Dh				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	Reserved					Test Write	CD-RW	R-W Sub-code
5	Reserved							
6	Reserved							
7	Reserved							

The Feature Code field shall be set to 002Dh.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if CD-R or CD-RW media is not present.

The Additional Length field shall be set to 04h.

The following bits indicate feature support. If set to zero, the feature is not supported. If set to one, the feature is supported.

The Test Write bit indicates that the logical unit can perform test writes. **See "10.12.3.8 Write Parameters Mode Page" on page 246.**

The CD-RW bit indicates support for overwriting a Track at Once track with another.

The R-W Sub-code bit indicates that the logical unit can record the R-W sub-channels with user supplied data.

1.3.17. CD Mastering Feature (002Eh)

This feature identifies a logical unit that can write a CD in Session at Once or Raw mode.

The feature descriptor response data to be returned to the initiator is defined in Table 33.

Table 34 - CD Mastering

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 002Eh				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	Reserved		SAO	RAW MS	RAW	TEST WRITE	CD_RW	R-W
5	(MSB)							
6	Maximum Cue Sheet Length							
7								(LSB)

The Feature Code field shall be set to 002Eh.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if CD-R or CD-RW media is not present.

The Additional Length field shall be set to 04h.

The following bits indicate feature support. If set to zero, the feature is not supported. If set to one, the feature is supported.

The SAO bit shall indicate that the logical unit can record using the Session at Once write type.

The Raw MS bit shall indicate that the logical unit can record multi-session in raw mode.

The Raw bit shall indicate that the logical unit can record using the raw write type.

The Test Write bit shall indicate that the logical unit can perform test writes.

The CD-RW bit shall indicate that the logical unit can overwrite previously recorded data.

The R-W bit shall indicate that the logical unit can record the R-W subchannels with user supplied information.

The Maximum Cue Sheet Length field indicates the maximum length of a Cue Sheet that can be accepted by the logical unit for Session at Once recording. If the SAO bit is zero, this field shall be set to zero.

1.3.18. DVD-R Write Feature (002Fh)

This feature identifies a logical unit that can write data to DVD-R in Disc at Once mode.

Logical units that write and read DVD-R media shall support the commands specified in Table 35.

Table 35 - DVD-R Write Commands

Op Code	Command Description	Clause
5Bh	CLOSE TRACK/SESSION	
53h	RESERVE TRACK	

The feature descriptor response data to be returned to the initiator is defined in Table 36.

Table 36 - DVD-R Write

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 002Fh				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	Reserved					Test Write	Reserved	
5	Reserved							
6	Reserved							
7	Reserved							

The Feature Code field shall be set to 002Fh.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2.. This bit shall be set to zero if the medium is removable.

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if DVD-R media is not present.

The Additional Length field shall be set to 04h.

The Test Write bit, when set to zero, shall indicate that the logical unit is not capable of performing test writes. When set to one, the logical unit is capable of performing test writes.

1.3.19. Power Management Feature (0100h)

This feature identifies a logical unit that can perform initiator and logical unit directed power management.

Logical units that support power management shall implement the commands specified in Table 37 and the mode parameters specified in Table 38.

Table 37 - Power Management Commands

Op Code	Command Description	Clause
4Ah	GET EVENT STATUS NOTIFICATION	
1Bh	START/STOP UNIT and the Power Conditions field	

Table 38 - Power Management Mode Parameters

Page Code	Page Description	Clause
1Ah	Power Condition	

The feature descriptor response data to be returned to the initiator is defined in Table 39.

Table 39 – Power Management Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0100h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 00h							

The Feature Code field shall be set to 0100h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be set to one.

The Current bit shall be set to one.

The Additional Length field shall be set to 0.

1.3.20. S.M.A.R.T. Feature (0101h)

This feature identifies a logical unit that can perform Self Monitoring Analysis and Reporting Technology.

S.M.A.R.T. data are not linear predictors of the degrading reliability of a S.M.A.R.T. capable Logical Unit. It is the responsibility of a S.M.A.R.T. Logical Unit to predict an impending failure and report that failure via an Informational Exception Condition.

Logical units that support Self Monitoring Analysis and Reporting shall support the mode pages specified in Table 40.

Table 40 - S.M.A.R.T. Mode Parameters

Page Code	Page Description	Clause
1Dh	Fault/Failure Reporting	

The feature descriptor response data to be returned to the initiator is defined in Table 41.

Table 41 - S.M.A.R.T. Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0101h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	Reserved							PP
5	Reserved							
6	Reserved							
7	Reserved							

The Feature Code field shall be set to 0101h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2..

The Current bit shall be defined as in sub-clause 1.2.3..

The Additional Length field shall be set to 04h.

The PP (Page Present) bit, when set to zero, shall indicate that the S.M.A.R.T. page is not present. S.M.A.R.T. will use defaults defined in the Features section. When set to one, shall indicate that the S.M.A.R.T. page is present.

1.3.21. Embedded Changer Feature (0102h)

This feature identifies a logical unit that can move media from a storage area to a mechanism and back.

Logical units that support an embedded changer shall implement the commands specified in Table 42.

Table 42 - Embedded Changer Command

Op Code	Command Description	Clause
A6h	LOAD/UNLOAD MEDIUM	
BDh	MECHANISM STATUS	

The feature descriptor response data to be returned to the initiator is defined in Table 43.

Table 43 - Embedded Changer Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0102h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
2	Reserved			SCC	Reserved	SDP	Reserved	
3	Reserved							
3	Reserved							
2	Reserved			Highest Slot Number				

The Feature Code field shall be set to 0102h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2..

The Current bit shall be defined as in sub-clause 1.2.3..

The Additional Length field shall be set to 4.

The SCC (Side Change Capable) bit, when set to zero, shall indicate that the logical unit is not capable of selecting both sides of the media. When set to one, shall indicate that the logical unit is capable of selecting both sides of the media.

The SDP (Supports Disc Present) bit, when set to zero, shall indicate that the logical unit cannot report the contents of the slots after a reset or cartridge change. When set to one, shall indicate that the logical unit can report the contents of the slots after a reset or cartridge change and that the response to the Mechanism Status command will contain valid Disc is Present status information for all slots.

Highest Slot Number shall be set to the number of slots minus one.

1.3.22. CD Audio Analog Play (0103h)

This feature identifies a logical unit that can play CD Audio data directly to an analog output.

Logical units that have a CD-Audio analog output shall support the commands specified by Table 44 and the mode pages specified in Table 45.

A logical unit without a CD-Audio output shall respond to a PLAY AUDIO command, which has a transfer length of zero, with CHECK CONDITION status, and set the sense key to ILLEGAL REQUEST. This behavior allows an initiator to determine if a CD-Audio analog output is supported.

Table 44 - CD-Audio Analog Output Commands

OpCode	Command Description	Clause
BDh	MECHANISM STATUS	
4Bh	PAUSE/RESUME	
45h	PLAY AUDIO (10)	
47h	PLAY AUDIO MSF	
42h	READ SUBCHANNEL	
4Eh	STOP PLAY/SCAN	

Table 45 - CD-Audio Analog Output Mode Pages

Page Code	Page Description	Clause
0Eh	CD Audio Control Mode Page	

The feature descriptor response data to be returned to the initiator is defined in Table 46.

Table 46 - CD Audio analog play

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0103h				
1								(LSB)
2	Reserved			Version			Persistent	Current
3	Additional Length = 04h							
2	Reserved						SCM	SV
3	Reserved							
3	(MSB)			Number of Volume Levels				
4 - n								(LSB)

The Feature Code field shall be set to 0103h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2..

The Current bit shall be defined as in sub-clause 1.2.3..

The Additional Length field shall be set to 4.

The SCM (Separate Channel Mute) bit, when set to zero, shall indicate that all audio channels are muted simultaneously.

When set to one, shall indicate that each audio channel can be independently muted.

The SV (Separate Volume) bit, when set to zero, shall indicate that all audio channels will have the same volume level. When set to one, shall indicate that audio channel volume may be set independently.

The Number of Volume Levels shall indicate the number of discrete volume levels supported by the logical unit. If the logical unit supports only turning audio on and off, the Number of Volume Levels field shall be set to 2.

1.3.23. Microcode Upgrade Feature (0104h)

This feature identifies a logical unit that can upgrade its internal microcode via the interface. Logical units that support microcode upgrades shall implement the commands specified in Table 47.

Table 47 - Microcode Upgrade Command

Op Code	Command Description	Clause
3Bh	WRITE BUFFER and Mode 101b (Download microcode and save)	

The feature descriptor response data to be returned to the initiator is defined in Table 48.

Table 48 - Microcode Upgrade Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0104h				
1								(LSB)
2	Reserved			Version			Persistent	Current
3	Additional Length = 00h							

The Feature Code field shall be set to 0104h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be set to one.

The Current bit shall be set to one.

The Additional Length field shall be set to 0.

1.3.24. Time-Out Feature (0105h)

This feature identifies a logical unit that can always respond to commands within a set time period. If a command cannot complete normally within the allotted time, it completes with an error. The feature descriptor response data to be returned to the initiator is defined in Table 49.

Table 49 - Time-out Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0105h				
1								(LSB)
2	Reserved			Version			Persistent	Current
3	Additional Length = 00h							

The Feature Code field shall be set to 0105h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2..

The Current bit shall be defined as in sub-clause 1.2.3..

The Additional Length field shall be set to 0.

1.3.25. DVD-CSS Feature (0106h)

This feature identifies a logical unit that can perform DVD-CSS authentication and key management. Logical units that support DVD-Video CSS (Content Scramble System) shall implement the commands specified by Table 50.

Table 50 - DVD-CSS Feature Commands

Opcode	Command Description	Clause
A2h	REPORT KEY	
A3h	SEND KEY	
A7h	SET READ AHEAD	

The feature descriptor response data to be returned to the initiator is defined in Table 51.

Table 51 - DVD-CSS Feature Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code 0106h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length = 04h							
4	Reserved							
5	Reserved							
6	Reserved							
7	CSS Version							

The Feature Code field shall be set to 0106h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2..

The Current bit shall be defined as in sub-clause 1.2.3.. This bit shall be set to zero if DVD-CSS media is not present.

The Additional Length field shall be set to 4.

The CSS version shall be set to 01h.

1.3.26. Real Time Streaming Feature (0107h)

This feature identifies a logical unit that can perform reading and writing within initiator specified (and drive verified) performance ranges. The feature descriptor response data to be returned to the initiator is defined in Table 52.

Table 52 - Real-Time Streaming Feature Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code = 0107h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length =00h							

The Feature Code field shall be set to 0107h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be defined as in sub-clause 1.2.2..

The Current bit shall be defined as in sub-clause 1.2.3..

The Additional Length field shall be set to 0.

1.3.27. Logical Unit Serial Number Feature (0108h)

This feature identifies a logical unit that has a unique serial number. A device can be uniquely identified by checking its vendor ID, model ID, and serial number. The feature descriptor response data to be returned to the initiator is defined in Table 53.

Table 53 - Serial Number Feature Descriptor Format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			Feature Code =0108h				
1								(LSB)
2	Reserved		Version				Persistent	Current
3	Additional Length							
4 - n	Serial Number							

The Feature Code field shall be set to 0108h.

The Version Field is defined in sub-clause 1.2.1..

The Persistent bit shall be set to one.

The Current bit shall be set to one.

The Additional Length field shall be set to a multiple of 4.

The Serial Number shall be ASCII graphic codes (i.e. codes 20h - 7Eh). Any unused bytes in the Serial Number shall be padded with spaces (20h). There should not be more than three pad bytes.

1.3.28. Event Notification Feature

The Event Notification feature provides a means for an initiator to receive notification of events that are beyond the control of an initiator.

A logical unit that implements Event Notification shall support the commands specified in Table 54.

Table 54 - Event Notification Commands

Op Code	Command Description	Clause
4Ah	GET EVENT STATUS NOTIFICATION (GESN)	

In the Polling Mode of Event Notification, an initiator shall repeatedly issue GESN commands with an immediate bit of 1. The logical unit shall complete these commands upon receipt, supplying the initiator with information on the most recent event occurrences, as described in the GESN command. If an event occurrence of the class(es) requested is not in the logical unit event queue, the Logical Unit shall complete the GESN command, and shall set the NEA bit to 1. This shall not be deemed an error.

If command queuing is supported, the host may issue a GESN command with an immediate bit of 0. The command shall not complete until an event occurrence of the class(es) requested is either in the event queue, or occurs.

The logical unit shall maintain a separate queue for each class of Event Notification(s) supported. Events that are generated shall be placed at the tail of the event queue. The depth of the queue(s) is vendor specific, although it shall be at least one. If an overflow occurs, the logical unit shall maintain the most recent Events in the queue.

Each GESN command shall report only one event. If multiple Event Classes are requested and multiple events are available, the logical unit shall report the Event in the Event Class with the lowest Notification Class ordinal.

1.3.29. CD-Audio Digital Output Feature

Logical units that have a CD-Audio digital output, shall support the commands specified by Table 55 and mode pages specified by Table 56.

Table 55 - CD-Audio Digital Output Commands

OpCode	Command Description	Clause
BDh	MECHANISM STATUS	
4Bh	PAUSE/RESUME	
45h	PLAY AUDIO (10)	
47h	PLAY AUDIO MSF	
4Eh	PLAY CD	
42h	READ SUBCHANNEL	
4Eh	STOP PLAY/SCAN	

Table 56 - CD-Audio Digital Output Mode Pages

Clause	Page Description	Clause
0Eh	CD Audio Control Mode Page	

1.3.30. RANDOM WRITABLE Feature

Logical units that write and read DVD-RAM media shall support the commands specified in “Table 57”.

Table 57 - RANDOM WRITABLE Feature Commands

Op Code	Command Description	Clause

1.4. Profile Definitions

Profiles define a base set of functions for logical units. Logical units that list a profile as current shall support all Fea-tures required by that Profile, but not all Features may be current. Logical units may support Features in addition to those required by the Profile. A single device may implement more than one Profile, and more than one Profile may be active at any given time. All required features may not be current, depending on the medium installed. If a Not Ready response would be given to a TEST UNIT READY command, no Profile shall be current.

For example, a logical unit with unformatted media may not be able to read or write, and the corresponding Features would not be current, but the Profile corresponding to the logical unit/media system may be current. i.e. a DVD-RAM drive with unformatted media loaded may claim compliance to the DVD-RAM profile; A DVD-RAM drive with no media loaded shall claim no Profile as current.

1.4.1. Profile 2: Removable disk

Logical units identifying profile 2 as current shall support the features listed in Table 58.

Table 58 – Mandatory Features for Removable Disks

Feature Number	Feature Name	Description
0000h	Profile List	A list of all profiles supported by the device
0001h	Core	Mandatory behavior for all devices
0002h	Morphing	Ability to notify host about operational changes and accept host requests to prevent operational changes.
0003h	Removable Medium	The medium may be removed from the device
0010h	Random Readable, PP=1	Read ability for storage devices with random addressing.
0020h	Random Writable	Write support for randomly addressed writes
0023h	Formattable	Support for formatting of media
0024h	Defect Management	Ability of the drive/media system to provide an apparently defect-free space
0100h	Power Management	Host and device directed power management
0101h	S.M.A.R.T.	Self Monitoring Analysis and Reporting Technology (Failure prediction)
0105h	Timeout	Ability to respond to all commands within a specific time

1.4.2. Profile 8: CD-ROM

Logical units identifying profile 8 as current shall support the features listed in Table 59.

Table 59 – Mandatory Features for CD-ROM

Feature Number	Feature Name	Description
0000h	Profile List	A list of all profiles supported by the device
0001h	Core	Mandatory behavior for all devices
0002h	Morphing	Ability to notify host about operational changes and accept host requests to prevent operational changes.
0003h	Removable Medium	The medium may be removed from the device
0010h	Random Readable, PP=1	Read ability for storage devices with random addressing.
001Eh	CD Read	The ability to read CD specific structures
0100h	Power Management	Host and device directed power management
0105h	Timeout	Ability to respond to all commands within a specific time

1.4.3. Profile 10h: DVD-ROM

Logical units identifying profile 10h as current shall support the features listed in Table 60.

Table 60 – Mandatory Features for DVD-ROM

Feature Number	Feature Name	Description
0000h	Profile List	A list of all profiles supported by the device
0001h	Core	Mandatory behavior for all devices
0002h	Morphing	Ability to notify host about operational changes and accept host requests to prevent operational changes.
0003h	Removable Medium	The medium may be removed from the device
0010h	Random Readable, PP=1	Read ability for storage devices with random addressing.
001Fh	DVD Read	The ability to read DVD specific structures
0100h	Power Management	Host and device directed power management
0105h	Timeout	Ability to respond to all commands within a specific time
0107h	Real-Time Streaming	Ability to read using host requested performance parameters

1.4.4. Profile 12h: DVD-RAM

Logical units identifying profile 12h as current shall support the features listed in Table 61.

Table 61 – Mandatory Features for DVD-RAM

Feature Number	Feature Name	Description
0000h	Profile List	A list of all profiles supported by the device
0001h	Core	Mandatory behavior for all devices
0002h	Morphing	Ability to notify host about operational changes and accept host requests to prevent operational changes.
0003h	Removable Medium	The medium may be removed from the device
0010h	Random Readable, PP=1	Read ability for storage devices with random addressing.
001Fh	DVD Read	The ability to read DVD specific structures.
0020h	Random Writable	Write support for randomly addressed writes
0023h	Formattable	Support for formatting of media
0024h	Defect Management	Ability of the drive/media system to provide an apparently defect-free space
0100h	Power Management	Host and device directed power management
0101h	S.M.A.R.T.	Self Monitoring Analysis and Reporting Technology (Failure prediction)
0105h	Timeout	Ability to respond to all commands within a specific time
0107h	Real-Time Streaming	Ability to read and write using host requested performance parameters.

1.4.5. Profile FFFFh: Logical Units Not Conforming to a Standard Profile

Logical units identifying profile FFFFh as current shall support the features listed in Table 62.

Table 62 - Mandatory Features for Logical Units Not Conforming to a Standard Profile

Feature Number	Feature Name	Description
0000h	Profile List	A list of all profiles supported by the device
0001h	Core	Mandatory behavior for all devices

1.5. Parameters for all Logical Unit types

This clause defines and lists the specified parameters that a host system or logical unit would require to perform at a desired level.

Parameters uniquely required to implement a specific feature set are defined within the sub-clause defining that feature set. Other parameters that are unique to a specific command are listed in the specific sub-clause defining that command

1.5.1. Mode Pages

Mode Pages are used to provide information to or from the logical unit. MODE SELECT (used to set parameters) and MODE SENSE (used to interrogate capabilities) commands move the pages (Table 63) to/from the logical units. The page definitions are provided in the following sub-clauses.

Each mode page (Table 63) contains a page code, a page length, and a set of mode parameters.

Table 63- Mode Page Codes for C/DVD

Page Code	Description	Section	Status
00h	Vendor-specific (does not require page format)		
01h	C/DVD Read/Write error recovery page	9.1.3.1 on page 114	
02h - 04h	Reserved		
05h	Write Parameter page		
06h	Reserved		
07h	Verify error recovery page		
08h - 0Ah	Reserved		
0Bh	Medium types supported page		
0Ch	Reserved		
0Dh	CD Page		
0Eh	CD audio control page	9.1.3.3 on page 120	Audio Feature set
0Fh - 17h	Reserved		
18h	Feature Set Support & Version page	9.1.3.4 on page 122	
19h	Reserved		
1Ah	Power Condition Page	9.1.3.2 on page 119	
1Bh	Reserved		
1Ch	Fault/Failure Reporting Page	9.1.3.5 on page 123	Smart Feature set
1Dh	C/DVD Inactivity page	9.1.3.6 on page 125	
1Eh - 1Fh	Reserved		
2Ah	C/DVD Capabilities & Mechanical Status Page	9.1.3.F on page 126	
20h - 29H 2Bh - 3Eh	Vendor - specific (page format required)		
3Fh	Return all pages (valid only for the Mode Sense command		

1.5.2. Mode Select/Sense Parameters

This section describes the pages used with MODE SELECT and MODE SENSE commands.

The Mode Parameter List (Table 64) contains a header, followed by zero or more variable length pages (Table 65).

Table 64- Mode Parameter List

Bit Byte	7	6	5	4	3	2	1	0
0 - n	Mode Parameter Header							
0 - n	Page(s)							

Table 65 - Mode Page Format

Bit Byte	7	6	5	4	3	2	1	0
0	PS/ Reserved	Reserved	Page Code					
1	Page Length (n - 1)							
2	Mode Parameter							
n								

When using the MODE SENSE command, a Parameters Savable (PS) bit of one indicates that the mode page can be saved by the C/DVD Logical Unit in a non-volatile, vendor-specific location. A PS bit of zero indicates that the supported parameters cannot be saved. When using the MODE SELECT command, the PS bit is reserved.

The Page Code field identifies the format and parameters defined for that mode page.

When using the MODE SENSE command, if Page Code 00h (vendor-specific page) is implemented, the C/DVD Logical Unit shall return that page last in response to a request to return all pages (page code 3Fh). When using the MODE SELECT command, this page shall be sent last.

The Page Length field specifies the length in bytes of the mode parameters that follow. If the Host Computer does not set this value to the value that is returned for the page by the MODE SENSE command, the C/DVD Logical Unit shall terminate the command with CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST with the additional sense code set to INVALID FIELD IN PARAMETER LIST. The C/DVD Logical Unit is permitted to implement a mode page that is less than the full page length defined in this Specification, provided no field is truncated and the Page Length field correctly specifies the actual length implemented.

The mode parameters for each page are defined here. Mode parameters not implemented by the C/DVD Logical Unit shall be set to zero.

Table 66 - Mode Parameter Header

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)	Mode Data Length						
1	(LSB)							
2	Reserved Obsolete (Medium Type Code)							
3	Reserved							
4	Reserved							
5	Reserved							
6	Block Descriptor Length 0 (8 for legacy SCSI logical units)							
7								

When using the MODE SENSE command, the mode data length field specifies the length in bytes of the following data that is available to be transferred. The mode data length is the total byte count of all data following the mode data length field. When using the MODE SELECT command, this field is reserved.

The block descriptor associated with the Mode Select and Mode Sense commands is used for legacy system support for SCSI systems. If supported, block sizes (see “Block Descriptor Block Sizes for Read” on page 114.) shall include 2048 and may include 512, 2056, 2324, 2332, 2336, 2340, 2352, 2368, and 2448 bytes. The Table of Block Sizes for Read shows the implementation of the various block sizes. These definitions apply for reading with the Read commands. Other block sizes are allowed and the contents of those blocks is not specified by this specification.

In a SCSI Logical Unit, if the block descriptor is not supported and the DBD bit in the Mode Sense command Packet is set to zero, the device shall respond with CHECK CONDITION status, ILLEGAL FIELD IN COMMAND PACKET.

Table 67 - Block Descriptor Block Sizes for Read

Size	Readable block types
512	Mode 1 or Mode 2 Form 1 sectors divided into four blocks each
2048	Mode 1, Mode2 Form1, or DVD
2056	Mode 2 Form 1 with subheader. Equivalent to READ CD, Flag = 50h.
2324	Mode 2 Form 2 with no subheader. Note: There is no mapping to READ CD, as the 4 spare bytes are not returned.
2332	Mode 2, Form1 or 2 data. The drive shall operate as specified for 2048 byte blocks except that both forms send 2332 byte blocks. Form 1 blocks return the third layer ECC with the user data. There is no mapping to READ CD, as the 4 spare bytes are not returned.
2336	Mode 2 data. The drive shall operate as specified for 2048 byte block lengths. This mode will include all data including Yellow Book Mode 2 sectors and Form1 & 3. Equivalent to READ CD, Flag = 58h.
2340	All bytes except the synchronization field. Equivalent to READ CD, Flag = 78h.
2352	Audio or raw blocks. The drive shall operate as specified for 2048 byte block lengths. Reads of data mode sectors shall return descrambled data. Equivalent to READ CD, Flag = F8h
2448 or 2368	Audio or raw blocks with raw sub-channel. The drive shall not perform the data descrambling operation. Equivalent to READ CD, Flag = F8. Sub-channel data selection = 010b (2448) or sub-channel data selection = 001b (2368).

1.5.3. Read/Write Error Recovery Parameters Page

The Read/Write Error Recovery Parameters Page specifies the error recovery parameters the C/DVD Logical Unit shall use during any command that performs a data read operation from the media (e.g. READ, READ TOC/PMA/ATIP, etc.).

Table 68 - Read/Write Error Recovery Parameters Page Format

Bit / Byte	7	6	5	4	3	2	1	0
0	PS (Optional) Default 0	Reserved	Page Code (01h)					
1	Page Length (0Ah)							
2	Error Recovery Parameter, Default 0							
	AWRE	ARRE	TB	RC	Reserved	PER	DTE	DCR
3	Read Retry Count							
4	Reserved (Correction Span in SCSI SBC)							
5	Reserved (Head Offset Count in SCSI SBC)							
6	Reserved (Data Strobe Offset Count in SCSI SBC)							
7	Reserved							
8	Write Retry Count							
9	Reserved							
10	(MSB)		Recovery Time Limit (0)					
11								(LSB)

The Parameters Savable (PS) bit is only used with the MODE SENSE command. This bit is reserved with the MODE SELECT command. A PS bit of one indicates that the C/DVD Logical Unit is capable of saving the page in a non-volatile vendor-specific location. The PS bit is optional.

NOTE The implementation of error recovery procedures for C/DVD Logical Units is markedly different from those used for magnetic medium disk drives. At least one level of error correction is required to transfer the data stream. Therefore, the performance of the Logical Unit may differ substantially from what would be expected by sending the same error recovery parameters to a magnetic medium Logical Unit.

An automatic write reallocation enabled (AWRE) bit of one indicates that the Logical Unit shall enable automatic reallocation to be performed during write operations. An AWRE bit of zero indicates that the Logical Unit shall not perform automatic reallocation of defective data blocks during write operations.

An automatic read reallocation enabled (ARRE) bit of one indicates that the Logical Unit shall enable automatic reallocation of defective data blocks during read operation. An ARRE bit of zero indicates that the Logical Unit shall not perform automatic reallocation of defective data blocks during read operation. When ARRE is enabled other error recovery modes shall not be used. The Disable Correction and Read Continuous shall not be enabled while ARRE is enabled.

A Transfer Block (TB) bit of one indicates that a data block that is not recovered within the recovery limits specified, shall be transferred to the Host Computer before CHECK CONDITION status is returned. A TB bit of zero indicates that such a data block shall not be transferred to the Host Computer. The TB bit does not affect the action taken for recovered data.

A Read Continuous (RC) bit of one indicates that the Logical Unit shall transfer the entire requested length of data without adding delays to perform error recovery procedures. This implies that the Logical Unit may send data that is erroneous or fabricated in order to maintain a continuous flow of data. A RC bit of zero indicates that error recovery operations that cause delays are acceptable during the data transfer.

A Post Error (PER) bit of one indicates that the Logical Unit shall report recovered errors. A PER bit of zero indicates that the Logical Unit shall not report recovered errors. Error recovery procedures shall be performed within the limits established by the error recovery parameters. This capability is very different for DVD media. To be able to recover the data from DVD media, error correction must be used. Thus it is not reasonable to report when ECC is used to recover the data. This bit for DVD media shall only be used to report when auto reallocation of a logical block has been performed.

For CD media this capability is used to report when the Layered Error correction has been used to recover the data. Again as the CIRC is mandatory for recovery of data it shall not cause recovered errors to be reported.

A Disable Transfer on Error (DTE) bit of one indicates that the Logical Unit shall terminate the data transfer to the Host upon detection of a recovered error. A DTE bit of zero indicates that the Logical Unit shall not terminate the data transfer upon detection of a recovered error.

A Disable Correction (DCR) bit of one indicates that error correction codes shall not be used for data error recovery. A DCR bit of zero allows the use of error correction codes for data error recovery.

The interpretation of the bits 5-0 in the Error Recovery Parameter byte for C/DVD Logical Units is given in "Table 66 -C/DVD Error Recovery Descriptions (CD Media)" on page 116. If the error recovery parameter is set to any other value, the command shall be terminated with CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN PARAMETER LIST.

The Read Retry Count field specifies the number of times that the controller shall attempt its read recovery algorithm.

The Write Retry Count field specifies the number of times that the controller shall attempt its write recovery algorithm. This may not have any affect if the Logical Unit does not support read after write operations.

A CIRC Recovered Data Error is defined as a block for which the CIRC based error correction algorithm was unsuccessful for a read attempt, but on a subsequent read operation no error was reported. The number of subsequent read operations is limited to the read retry count. Layered error correction was not used.

A CIRC Un-recovered Data Error is defined as a block for which the CIRC based error correction algorithm was unsuccessful on all read attempts up to the read retry count. Layered error correction was not used.

An L-EC Recovered Data Error is defined as a block for which the CIRC based error correction algorithm was unsuccessful, but the layered error correction was able to correct the block within the read retry count.

An L-EC Un-correctable Data Error is defined as a block which could not be corrected by layered error correction within the read retry count.

The correlation of the error recovery parameter and the bit settings defined for CD devices is given in Table 69. The interpretation of these codes for CD devices is given in Table 70. If the error recovery parameter is set to any other value, the command shall be terminated with CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN PARAMETER LIST.

Table 69 - Error Recovery Parameter Bit Settings

Error Recovery Parameter	Bit Settings 7 6 5 4 3 2 1 0	Error Recovery Parameter	Bit Settings 7 6 5 4 3 2 1 0
00h	R R 0 0 R 0 0 0	20h	R R 1 0 R 0 0 0
01h	R R 0 0 R 0 0 1	21h	R R 1 0 R 0 0 1
04h	R R 0 0 R 1 0 0	24h	R R 1 0 R 1 0 0
05h	R R 0 0 R 1 0 1	25h	R R 1 0 R 1 0 1
06h	R R 0 0 R 1 1 0	26h	R R 1 0 R 1 1 0
07h	R R 0 0 R 1 1 1	27h	R R 1 0 R 1 1 1
10h	R R 0 1 R 0 0 0	30h	R R 1 1 R 0 0 0
11h	R R 0 1 R 0 0 1	31h	R R 1 1 R 0 0 1
14h	R R 0 1 R 1 0 0	34h	R R 1 1 R 1 0 0
15h	R R 0 1 R 1 0 1	35h	R R 1 1 R 1 0 1

R = Reserved and shall be set to zero

Table 70 - CD Devices, error recovery description

error code	description
00h	The maximum error recovery procedures available are used. If an error occurs which is uncorrectable with the error correction codes (ECC) on the media, data transfer is terminated with CHECK CONDITION status. The block with the error is not transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the unrecovered error was detected. Recovered errors are not reported.
01h	Only retries of the read operation and CIRC are used (layered error correction is not used). Only CIRC unrecovered data errors are reported. If an CIRC unrecovered data error occurs, data transfer is terminated with CHECK CONDITION status. The block with the error is not transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the unrecovered error was detected. Recovered errors are not reported.
04h	The maximum error recovery procedures available are used. Recovered data errors are reported. If a recovered data error occurs, data transfer is not terminated. However, when the data transfer has completed CHECK CONDITION status is reported. The sense key is set to RECOVERED ERROR. The information bytes give the address of the last block where a recovered data error was detected. If a data error occurs that is uncorrectable with the ECC information available on the media, data transfer is terminated and CHECK CONDITION status is reported. The block with the error is not transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the uncorrectable error was detected.
05h	Only retries of the read operation and CIRC are used (layered error correction is not used). Recovered data errors are reported. If a recovered data error occurs, data transfer is not terminated. However, when the data transfer has completed CHECK CONDITION status is reported. The sense key is set to RECOVERED ERROR. The information bytes give the address of the last block where a CIRC recovered data error was detected. If an unrecovered data error occurs, data transfer is terminated and CHECK CONDITION status is reported. The block with the error is not transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the unrecovered error was detected.
06h	The maximum error recovery procedures are used. Recovered data errors are reported. If a recovered data error occurs data transfer is terminated and CHECK CONDITION status is reported. The block with the recovered error is not transferred. The sense key is set to RECOVERED ERROR. The information bytes give the address of the block where the recovered data error was detected. If a data error occurs that is uncorrectable with the ECC information on the medium, data transfer is terminated with CHECK CONDITION status. The block with the error is not transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the uncorrectable error was detected.

Table 70 (cont.) - CD Devices, error recovery description

error code	description
07h	Only retries of the read operation are used (layered error correction is not used). CIRC recovered data errors are reported. If a CIRC recovered data error occurs, data transfer is terminated with CHECK CONDITION status. The block with the recovered error is not transferred. The sense key is set to RECOVERED ERROR. The information bytes give the address of the block where the recovered data error was detected. If an CIRC unrecovered data error occurs, data transfer is terminated with CHECK CONDITION status. The block with the error is not transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the uncorrectable error was detected.
10h	If data transfer can be maintained, the maximum error recovery procedures available are used. (RC=1.) If an error occurs which is uncorrectable with the error codes (ECC) on the media, or is uncorrectable in time to maintain data transfer, the data transfer is not terminated. However, when the data transfer has completed, CHECK CONDITION status is reported. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the first unrecovered error was detected. Recovered errors are not reported.
11h	If data transfer can be maintained, retries of the read operation and CIRC are used (layered error correction is not used). (RC=1.) Only CIRC unrecovered data errors are reported. If a CIRC unrecovered data error occurs, data transfer is not terminated. However, when data transfer has completed, CHECK CONDITION status is reported. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the first unrecovered error was detected. Recovered errors are not reported. If a data error occurs that is uncorrectable with the ECC information available on the media, data transfer is terminated and CHECK CONDITION status is reported. The block with the error is not transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the uncorrectable error was detected.
14h	If data transfer can be maintained, the maximum error recovery procedures available are used. (RC=1.) Recovered data errors are reported. If a recovered data error occurs, data transfer is not terminated. However, when the data transfer has completed, CHECK CONDITION status is reported. The sense key is set to RECOVERED ERROR. The information bytes give the address of the block where a recovered data error was detected. If an data error occurs that is uncorrectable with the ECC information available on the media, or is uncorrectable in time to maintain data transfer, the data is not terminated. However, when the data transfer has completed, CHECK CONDITION status is reported. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the first unrecovered error was detected. Reporting unrecovered errors takes precedence over reporting recovered errors.
15h	If data transfer can be maintained, retries of the read operation and CIRC are used (layered error correction is not used). (RC=1.) Recovered data errors are reported. If a recovered data error occurs, data transfer is not terminated. However, when the data transfer has completed CHECK CONDITION status is reported. The sense key is set to RECOVERED ERROR. The information bytes give the address of the block where a CIRC recovered data error was detected. If an unrecovered data error occurs, data transfer is not terminated. However, when the data transfer has completed CHECK CONDITION status is reported. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the unrecovered error was detected. Recovered errors are not reported.

Table 70 (cont.) - CD Devices, error recovery description

error code	description
20h	The maximum error recovery procedures available are used. If an error occurs which is uncorrectable with the error correction codes (ECC) on the media, data transfer is terminated with CHECK CONDITION status. The block with the error is transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the unrecovered error was detected. Recovered errors are not reported.
21h	Only retries of the read operation and CIRC are used (layered error correction is not used). Only CIRC unrecovered data errors are reported. If an CIRC unrecovered data error occurs, data transfer is terminated with CHECK CONDITION status. The block with the error is transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the unrecovered error was detected. Recovered errors are not reported.
24h	The maximum error recovery procedures available are used. Recovered data errors are reported. If a recovered data error occurs, data transfer is not terminated. However, when the data transfer has completed, CHECK CONDITION status is reported. The sense key is set to RECOVERED ERROR. The information bytes give the address of the last block where a recovered data error was detected. If a data error occurs that is uncorrectable with the ECC information available on the media, data transfer is terminated and CHECK CONDITION status is reported. The block with the error is transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the uncorrectable error was detected.
25h	Only retries of the read operation and CIRC are used (layered error correction is not used). Recovered data errors are reported. If a recovered data error occurs, data transfer is not terminated. However, when the data transfer has completed CHECK CONDITION status is reported. The sense key is set to RECOVERED ERROR. The information bytes give the address of the last block where a CIRC recovered data error was detected. If an unrecovered data error occurs, data transfer is terminated and CHECK CONDITION status is reported. The block with the error is transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the unrecovered error was detected.
26h	The maximum error recovery procedures are used. Recovered data errors are reported. If a recovered data error occurs data transfer is terminated and CHECK CONDITION status is reported. The block with the recovered error is transferred. The sense key is set to RECOVERED ERROR. The information bytes give the address of the block where the recovered data error was detected. If a data error occurs that is uncorrectable with the ECC information on the medium, data transfer is terminated with CHECK CONDITION status. The block with the error is transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the uncorrectable error was detected.

Table 70 (cont.) - CD Devices, error recovery description

error code	description
27h	Only retries of the read operation are used (layer error correction is not used). CIRC recovered data errors are reported. If a CIRC recovered data error occurs, data transfer is terminated with CHECK CONDITION status. The block with the recovered error is transferred. The sense key is set to RECOVERED ERROR. The information bytes give the address of the block where the recovered data error was detected. If a CIRC unrecovered data error occurs, data transfer is terminated with CHECK CONDITION status. The block with the error is transferred. The sense key is set to MEDIUM ERROR. The information bytes give the address of the block where the unrecovered error was detected.
30h	Same as code 10h
31h	Same as code 11h
34h	Same as code 14h
35h	Same as code 15h

1.5.4. Write Parameters Mode Page

The Write Parameters Mode Page (see Table 71) contains parameters needed for the correct execution of write commands.

The values in this page do not necessarily reflect the status on a given track. They will be used as applicable when a write operation occurs. If any parameters have values incompatible with the current track, a check condition status shall occur when a write is attempted.

The PS bit (parameters savable) (see Table 71) is only used with the MODE SENSE command. This bit is reserved with the MODE SELECT command. A PS bit of one indicates that the target is capable of saving the page in a non-volatile, vendor-specific location. If the PS bit is set to one in MODE SENSE data, then the page shall be savable by issuing a MODE SELECT command with SP set to one.

Table 71 - Write Parameters Mode Page

Bit / Byte	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code (05h)					
1	Page Length (32h)							
2	Reserved			Test Write	Write Type			
3	Multi-session		FP	Copy	Track Mode			
4	Reserved				Data Block Type			
5	Reserved							
6	Reserved							
7	Reserved		Host Application Code					
8	Session Format							
9	Reserved							
10	(MSB)							
11	Packet Size							
12								
13								(LSB)
14	(MSB)	Audio Pause Length						
15								(LSB)
16	(MSB)							
17	...							
...	Media Catalog Number							
30	...							
31								(LSB)
32	(MSB)							
33	...							
...	International Standard Recording Code							
46	...							
47								(LSB)
48	Sub-header Byte 0							
49	Sub-header Byte 1							
50	Sub-header Byte 2							
51	Sub-header Byte 3							
52	Vendor Specific							
53	Vendor Specific							
54	Vendor Specific							
55	Vendor Specific							

The Test Write bit (see Table 71) is valid only for Write Type 1 or 2 (Track at Once or Session at Once). When the Test Write bit is set to one, it indicates that the device performs the write process, but does not write data to the media. When the bit is set to zero the Write laser power is set such that user data is transferred to the CD media. In addition, all track and disc information collected, during test write mode, shall be cleared. It should be noted that the number of tracks reserved or written may be limited in test write mode.

Write Type Field (Table 72) specifies the CD-R/RW stream type to be used during writing. Write Type values are shown in Table 72.

Table 72 - Write Type Field

Value	Definition
00h	Packet
01h	Track-at-once
02h	Session-at-once
03h	Raw
04h - 0Fh	Reserved

Packet - the device shall perform packet writing when write commands are issued.

Track at Once - the device shall perform track at once recording when write commands are issued.

Session at Once - the device shall perform session at once recording. This mode requires that a cue sheet be sent prior to sending write commands.

Raw - the device shall write data as received from the initiator. In this mode, the initiator sends the lead-in. As the initiator must provide Q sub-channel in this mode, the only valid Data Block Types are 1, 2, and 3. The Next Writable Address starts at the beginning of the lead-in (which shall be a negative LBA on a blank disc).

NOTE: In RAW record mode the drive shall not generate run-in and run-out blocks (main and sub-channel 1 data) but shall generate and record the link block.

The Multi-session field defines how session closure affects the opening of the next session. See Table 73.

Table 73 - Multi-session Field Definition

Multisession Field	Action Upon Session Closure
00b	No B0 pointer. Next Session not allowed
01b	B0 pointer = FF:FF:FF. Next session not allowed
10b	Reserved
11b	Next session allowed. B0 pointer = next possible program area.

The FP bit, when set to one indicates that the packet type is fixed. Otherwise, the packet type is variable. This bit is ignored unless the write type is set to 0 (Packet).

Track Mode is the Control nibble in all mode 1 Q sub-channel in the track.

A Copy bit with value one indicates that this is the first or higher generation copy of a copyright protected track. When set to one, the copyright bit in the control nibble of each mode 1 Q sub-channel shall alternate between 1 and 0 at 9.375 Hz. The duty cycle is 50%, changing every 4 blocks. The initial value on the medium is zero.

Data Block Type defines both the specific data fields in a user data block and its size. The Data Block Type is as defined in Table 74. This size is used for writing instead of the block size set in the mode select header.

Table 74 - Data Block Type Codes

Value	Block Size	Definition	Requirement
0	2352	Raw data 2352 bytes of raw data (not valid for write type = packet)	Optional
1	2368	Raw data with P and Q sub-channel 2352 bytes of raw data, 16 bytes buffer for Q sub-channel: Bytes 0..9 are Q sub-channel data Bytes 10..11 are Q sub-channel EDC Bytes 12..14 are zero Byte 15, most significant bit has state of P sub-channel bit (not valid for write type = packet)	Optional
2	2448	Raw data with P-W sub-channel appended: 2352 bytes of raw data. 96 bytes of pack form R-W sub-channel in the low order 6 bits of each byte. Bit 7 of each byte contains the P sub-channel state and bit 6 of each byte contains the Q sub-channel bit. (not valid for write type = packet)	Optional
3	2448	Raw data with raw P-W sub-channel appended: 2352 bytes of raw data. 96 bytes of raw P-W sub-channel. (not valid for write type = packet)	Optional
4 - 6		Reserved values	
7	NA	Vendor Specific	Optional
8	2048	Mode 1 (ISO/IEC 10149): 2048 bytes of user data	Mandatory
9	2336	Mode 2 (ISO/IEC 10149): 2336 bytes of user data	Optional
10	2048	Mode 2 (CD-ROM XA, form 1): 2048 bytes of user data, sub-header from write parameters	Mandatory
11	2056	Mode 2 (CD-ROM XA, form 1): 8 bytes of sub-header, 2048 bytes of user data	Optional
12	2324	Mode 2 (CD-ROM XA, form 2): 2324 bytes of user data, sub-header from write parameters	Optional
13	2332	Mode 2 (CD-ROM XA, form 1, form 2, or mixed form): 8 bytes of sub-header 2324 bytes of user data	Mandatory
14	-	Reserved values	
15	NA	Vendor Specific	Optional

NOTES:

1. When a track has been designated for packet writing, the device shall ensure that the TDB is written upon receipt of the write command.
2. With the exceptions of data block types 1, 2, and 3, the device shall generate all P sub-channel and all mode 1, mode 2, and mode 3 Q sub-channel.
3. For data block types 8 through 13, the device shall generate all sync fields and all headers.
4. For data blocks of mode 1 or of mode 2, form 1, the device shall generate EDC and L-EC parity.

5. For data block types 0, 1, 2, and 3, the device shall perform no data scrambling per ISO/IEC 10149.
6. For data block types 8 through 13, the device shall perform data scrambling per ISO/IEC 10149.

The Host Application Code is typically zero. When the unrestricted Use Disc bit in Disc Information Block (see **Error! Reference source not found.**) is one, the Host Application Code shall be ignored by the device. If the Unrestricted Use Disc bit is zero, then the Host Application Code shall be set to the appropriate value for the medium in order that writing be allowed. A Host Application Code of zero is used for a Restricted Use - General Purpose Disc.

The Session Format code is to be written in the TOC of the session containing this track. The Session Format code is the PSEC byte of the mode 1, point A0 TOC entry. See Table 75.

Table 75 - Session Format Codes

Disc Type Code	Session Format
00h	CD-DA or CD-ROM Disc
10h	CD-I Disc
20h	CD-ROM XA Disc
All Other Values	Reserved

The Packet Size field specifies the number of User Data Blocks per fixed packet.

Audio Pause Length is the number of blocks from the beginning of the track for which the mode 1 Q sub-channel INDEX shall be zero. If this number is zero, then there is no period where the Mode 1 Q sub-channel INDEX shall be zero. The default value shall be 150. This field is valid only for audio tracks, otherwise it is ignored.

The Media Catalog Number (MCN) is formatted as in **Error! Reference source not found.**. The MCN will be written in a mode 2 Q sub-channel in at least one out of every 100 blocks in the program area.

The International Standard Recording Code (ISRC) is formatted as in **Error! Reference source not found.**.

1.5.5. Verify error recovery page (Page Code 07h)

The verify error recovery parameters page (Table 76) specifies the error recovery parameter the target shall use during verify operations.

Table 76 - Verify error recovery parameters page

Bit Byte	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code (07h)					
1	Parameter Length (06h)							
2	Error Recovery Parameter							
3	Verify Retry Count							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							

The page savable (PS) bit is only used with the MODE SENSE command. This bit is reserved with the MODE SELECT command. A PS bit of one indicates that the target is capable of saving the page in a non-volatile vendor-specific location. The error recovery parameters for verify operations are as defined by the read error recovery parameters (see ***Error! Reference source not found.***).

1.5.5.1. CD device parameters

The CD parameters page (Table 77) specifies parameters that affect all CD-ROM data types.

Table 77 - CD parameters page

Bit / Byte	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code (0Dh)					
1	Parameter Length (06h)							
2	Reserved							
3	Reserved				Inactivity Timer Multiplier			
4	(MSB) Number Of MSF - S Units Per MSF - M Unit							
5								(LSB)
6	(MSB) Number Of MSF - F Units Per MSF - S Unit							
7								(LSB)

The parameters savable (PS) bit is only used with the MODE SENSE command. This bit is reserved with the MODE SELECT command. A PS bit of one indicates that the target is capable of saving the page in a non-volatile vendor-specific location.

The inactivity timer value specifies the length of time that the drive shall remain in the hold track state after completion of a seek or read operation (Table 78).

Table 78 - Inactivity timer multiplier values

Inactivity timer value	minimum time in hold track state	Inactivity timer value	Minimum time in hold track state
0	Vendor-specific	8	16 s
1	125 ms	9	32 s
2	250 ms	Ah	1 min.
3	500 ms	Bh	2 min.
4	1 s	Ch	4 min.
5	2 s	Dh	8 min.
6	4 s	Eh	16 min.
7	8 s	Fh	32 min.

The number of S units per M unit field gives the ratio of these MSF address values. For media conforming to the CD data and CD-DA standard, this value is 60.

The number of F units per S unit field gives the ratio of these MSF address values. For media conforming to the CD data and CD-DA standard, this value is 75.

1.5.6. CD Audio Control Parameters Page (Page Code 0Eh)

The CD Audio Control Parameters Page (Table 79) sets the playback modes and output controls for subsequent PLAY AUDIO commands and any current audio playback operation.

Table 79 - CD Audio Control Mode Page Format

Bit / Byte	7	6	5	4	3	2	1	0
0	PS (Optional)	Reserved	Page Code (0Eh)					
1	Page Length (0Eh)							
2	Reserved					Immed Mandatory Always 1	SOTC Mandatory Default 0	Reserved
3	Reserved							
4	Reserved							
5	Reserved							
6	Obsolete (75)							
7								
8	Reserved				CDDA Output Port 0 Channel Selection			
9	Output Port 0 Volumne (Mandatory) Default FFh							
10	Reserved				CDDA Output Port 1 Channel Selection			
11	Output Port 1 Volumne (Mandatory) Default FFh							
12	Reserved				CDDA Output Port 2 Channel Selection			
13	Output Port 2 Volumne (Mandatory) Default FFh							
14	Reserved				CDDA Output Port 3 Channel Selection			
15	Output Port 3 Volumne (Mandatory) Default FFh							

The Parameters Savable (PS) bit is only used with the MODE SENSE command. The PS bit is optional. This bit is reserved with the MODE SELECT command. A PS bit of one indicates that the C/DVD Logical Unit is capable of saving the page in a non-volatile vendor-specific location.

The Immediate Bit (IMMED) is used for information purposes only; the audio commands will always send completion status as soon as the playback operation has been started. This bit shall always be set to 1.

A Stop On Track Crossing (SOTC) bit of zero indicates the C/DVD Logical Unit shall terminate the audio playback operation when the transfer length is satisfied. Multiple tracks shall be played as necessary. Periods of time encoded as audio pause/silence at the beginning of tracks, (index 0) shall also be played. A SOTC bit of one indicates the C/DVD Logical Unit shall terminate the audio playback operation when the beginning of a following track is encountered. The SOTC bit is mandatory.

The CDDA Output Port Channel Selection field (Table 80)specifies the Red Book audio channels from the disc to which a specific output port shall be connected. More than one output port may be connected to an audio channel. More than one audio channel may be connected to an output port.

Table 80 - CDDA Output Port Channel Selection Codes

Code	Description
0000b	Output port muted
0001	Connect audio channel 0 to this output port
0010b	Connect audio channel 1 to this output port
0011b	Connect audio channel 0 and audio channel 1 to this output port
0100b	Connect audio channel 2 to this output port
1000b	Connect audio channel 3 to this output port

The Output Port Volume Control indicates the relative volume level for this audio output port. The value used is specified as an attenuation of the normal volume level. A value of zero indicates the minimum volume level (Mute), and a value of FFh indicates maximum volume (No attenuation) level. It is recommended that the MUTE and volume functions should be supported on a per channel basis. The attenuation used shall be as specified in "Table 71 - Attenuation Levels for Audio". All values not shown in the table shall be valid, with the attenuation selected by interpolating using the known table values.

It is recommended that the Logical Unit support at least 16 volume levels. The actual attenuation levels for any given Binary attenuation value shall be given by the following equation: 20 Log (Binary Level / 256)

Note: Audio channel volume control regarding channel selection of MUTE vs. Volume Level setting of 0. It is recommend that Logical Units allow the setting of the Channel Selection fields to MUTE and also allow the setting of the Volume Level field to 0. It is up to the Logical Unit to determine how to shut off the volume, either via muting circuitry or via the volume control.

Table 81 - Attenuation Levels for Audio

Binary Level	Attenuation
FFh	0db (0n)
F0h	-0.56
E0h	-1.16
C0h	-2.50
80h	-6.00
40h	-12.0
20h	-18.0
10h	-24.0
0Fh	-24.6
0Eh	-25.2
0Ch	-26.6
08h	-30.0
04h	-36.0
02h	-42.1
01h	-48.0
00h	Mute (Off)

1.5.7. Feature Set Support & Version page (Page Code 18h)

1.5.8. Power Condition Page (Page Code 1Ah)

The power condition page (Table 82) provides the application client the means to control the length of time a logical unit will delay before changing its power requirements. There are notification events to the host that a logical unit has entered into one of the power conditions.

Table 82 - Power Condition Mode Page Format

Bit / Byte	7	6	5	4	3	2	1	0
0	PS (Optional)	Reserved	Page Code (1Ah)					
1	Page Length (0Ah)							
2	Reserved							
3	Reserved						Idle	Standby
4	(MSB)							
5	Idle Timer							
6								
7								(LSB)
8	(MSB)							
9	Standby Timer							
10								
11								(LSB)

On the receipt of a command the Logical Unit shall adjust itself to the power condition which allows the command to execute. The timer which maps to this power condition and any lower power condition timers shall be reset on receipt of the command. On completion of the command the timer associated with this power condition shall be restarted.

An Idle bit of one indicates a logical unit shall use the Idle Timer to determine the length of inactivity time to wait before entering the Idle condition.

If the Idle bit is zero, or a value of zero in the Idle Timer indicates the logical unit shall disable the Idle Timer.

The Idle Timer field indicates the inactivity time in 100 millisecond increments that the logical unit shall wait before entering the Idle condition.

A Standby bit of one indicates a logical unit shall use the Standby Timer to determine the length of inactivity time to wait before entering the Standby condition.

The Standby Timer field indicates the inactivity time in 100 millisecond increments that the logical unit shall wait before entering the Standby condition.

If the Standby bit is zero or a value of zero in the Standby Timer indicates the logical unit shall disable the Standby Timer.

For more information on these timers see section 7.1.2, "Timers", on page 77.

1.5.9. Fault / Failure Reporting Control Page

The Fault / Failure Reporting Control page (Table 83) defines the methods used by the target to control the reporting and the operations of specific informational exception conditions. This page shall only apply to informational exception that report an additional sense code of FAILURE PREDICTION THRESHOLD EXCEEDED to the application client.

Informational exception conditions occur as a result of vendor specific events within a target. An informational exception condition may occur asynchronous to any commands issued by an application client.

Table 83 - Fault/ Failure Reporting Control Page

Bit / Byte	7	6	5	4	3	2	1	0
0	PS (Optional) Default 0	Reserved	Page Code (1Ch)					
1	Page Length (0Ah)							
2	Perf	Reserved			DExcept	Test	Reserved	LogErr (0)
3	Reserved				MRIE			
4	(MSB)							
5	Interval Timer							
6								
7								(LSB)
8	(MSB)							
9	Report Count							
10								
11								(LSB)

The log errors bit (LogErr) of zero indicates that the logging of informational exception conditions within a Logical Unit is vendor specific.

A disable exception control (DExcpt) bit of zero indicates information exception operations shall be enabled. The reporting of informational exception conditions when the DExcpt bit is set to zero is determined from the method of reporting informational exception field. A DExcpt bit of one indicates the Logical Unit shall disable all information exception operations. The method of reporting Fault / Failure Reporting field is ignored when DExcpt is set to one.

A Test bit of one shall create a false Logical Unit failure at the next interval time (as specified by the Interval timer field), if the DExcpt bit is not set. When the Test bit is one, the MRIE and Report count fields shall apply as if the Test bit were zero. The false Logical Unit failure shall be reported with an additional sense code of FAILURE PREDICTION THRESHOLD EXCEEDED (FALSE). If both the Test and the DExcpt bits are one, the Logical Unit shall terminate the MODE SELECT command with CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST with the additional sense code set to INVALID FIELD IN PARAMETER LIST. A Test bit of zero shall instruct the Logical Unit not to generate any false Logical Unit failure notifications.

A Performance bit (Perf) of zero indicates that informational exception operations that are the cause of delays are acceptable. A Perf bit of one indicates the Logical Unit shall not cause delays while doing informational exception operations. A Perf bit set to one may cause the Logical Unit to disable some or all of the informational exception operations, thereby limiting the reporting of informational exception conditions.

The Method of Reporting Fault / Failure Reporting field (MRIE) indicates the methods that shall be used by the Logical Unit to report informational exception conditions *(see Table 74 - on page 124*). The priority of reporting multiple information exceptions is vendor specific.

Table 84 - Method of Reporting Fault/Failure Reporting Field

MRIE	Description
0h	No reporting of informational exception condition: This method instructs the target to not report information exception conditions.
1h - 3h	Reserved
4h	Unconditionally generate recovered error: This method instructs the target to report informational exception conditions, regardless of the value of the Perf bit of the error recovery parameters mode page, by returning a CHECK CONDITION status on any command. The sense key shall be set to RECOVERED ERROR and the additional sense code shall be set to FAILURE PREDICTION THRESHOLD - Predicted Logical Unit Failure or FAILURE PREDICTION THRESHOLD EXCEEDED - Predicted Media Failure. The command that has the CHECK CONDITION shall complete without error before any informational exception condition may be reported.
5h - Bh	Reserved
Ch - Fh	Vendor specific

The Interval Timer field indicates the period in 100 millisecond increments that a informational exception condition has occurred. The Logical Unit shall not report informational exception conditions more frequently than the time specified by the Interval Timer field and as soon as possible after the timer interval has elapsed. After the informational exception condition has been reported the interval timer shall be restarted. A value of zero in the Interval Timer field indicates that the Logical Unit shall only report the informational exception condition one time.

The Report Count field indicates the number of times to report an informational exception condition to the application client. A value of zero in the Report Count field indicates there is no limit on the number of times the Logical Unit shall report an informational exception condition.

The maintaining of the Interval Timer and the Report Count field across power cycles and/or resets by the Logical Unit shall be vendor specific.

1.5.10. C/DVD Time-out & Protect Page

The C/DVD Time-out & Protect page (Table 85) specifies parameters that affect C/DVD operation.

Table 85 - C/DVD Time-out & Protect Page

Bit / Byte	7	6	5	4	3	2	1	0
0	PS (Optional) Default 0	Reserved	Page Code (1Dh)					
1	Page Length (08h)							
2	Reserved							
3	Reserved							
4	Reserved						DISP (Optional) Default 0	SW PP (Optional) Default 0
5	Reserved							
6	(MSB)	Group 1 Minimum Time-out (Seconds)						
7								(LSB)
8	(MSB)	Group 2 Minimum Time-out (Seconds)						
9								(LSB)

The Parameters Savable (PS) bit is only used with the MODE SENSE command. This bit is reserved with the MODE SELECT command. A PS bit of one indicates that the C/DVD Logical Unit is capable of saving the page in a non-volatile vendor-specific location. The PS bit is optional.

The DISP bit when set to 1 shall make the Logical Unit unavailable until power has been removed and then reapplied. The Logical Unit shall report not ready for all media access after this bit has been set to 1.

The SWPP bit provides a Software Write Protect until Power down. When this bit is set to 1 the Logical Unit shall prevent writes to the media. When the bit is set to 1, the Logical Unit shall flush any data in the Cache to the media before preventing any further writes.

See the Time-out model for more information on the Group 1 & 2 Minimum Time-out fields.

1.5.11. C/DVD Capabilities and Mechanical Status Page

The C/DVD Capabilities and Mechanical Status Page (Table 86) is read only and may not be set with Mode Select.

Table 86 - CD Capabilities and Mechanical Status Page

Bit / Byte	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code (2Ah)					
1	Page Length (14h)							
2	Reserved		DVD-RAM Read	DVD-R Read	DVD-ROM Read	Method 2	CD-RW Read	CD-R Read
3	Reserved		DVD-RAM Write	DVD-R Write	Reserved	Test Write	CD-RW Write	CD-R Write
4	Reserved	Multi Session	Mode 2 Form 2	Mode 2 Form 1	Digital Port (2)	Digital Port (1)	Composite	Audio Play
5	Read Bar Code	UPC	ISRC	C2 Pointers supported	R-W De-interleaved & corrected	R-W Supported	CD-DA Stream is Accurate	CD-DA Commands Supported
6	Loading Mechanism Type			Reserved	Eject (Individual or Cartridge)	Prevent Jumper	Lock State	Lock
7	Reserved		P through W in Lead-In	Side Change Capable	S/W Slot Selection (SSS)	Changer Supports Disc Present reporting	Separate Channel Mute Supported	Separate volume levels per channel
8	(MSB) Obsolete - Reserved							
9	(LSB)							
10	(MSB) Number of Volume Levels Supported							
11	(LSB)							
12	(MSB) Buffer Size supported by Logical Unit (in kBytes)							
13	(LSB)							
14	(MSB) Obsolete - Reserved							
15	(LSB)							
16	Reserved							
17	Reserved		Length		LSBF	RCK	BCK	Reserved
18	Optional Reserved							
19	Optional Reserved							
20	(MSB) Copy Management Revision Supported							
21	(LSB)							
22	Reserved							
23	Reserved							

The Page Length field shall be set to 14h

If DVD-RAM Read bit (read only field) is set to one, the Logical Unit shall support the read function of DVD-RAM disc.

If DVD-R Read bit (read only field) is set to one, the Logical Unit shall support the read function of DVD-R disc.

If DVD-ROM Read bit (read only field) is set to one, the Logical Unit shall support the read function of DVD-ROM disc.

If Method 2 is set to one, the Logical Unit shall support the read function of CD-R media written using fixed packet tracks using Addressing Method 2.

If CD-R/RW Read Field is set to one, the Logical Unit shall support the read function of CD-R/RW disc (Orange Book Part III).

If CD-R Read Field is set to one, the Logical Unit shall support the read function of CD-R disc (Orange Book Part II).

If DVD-RAM Write bit (read only field) is set to one, the Logical Unit shall support the write function of DVD-RAM disc.

If DVD-R Write bit (read only field) is set to one, the Logical Unit shall support the write function of DVD-R disc.

If the Test Write bit is set to one, the Logical Unit shall only accept data from the host and not write to the media.

If CD-R/RW Write Field is set to one, the Logical Unit shall support the write function of CD-R/RW disc (Orange Book Part III).

If CD-R Write Field is set to one, the Logical Unit shall support the write function of CD-R disc (Orange Book Part II).

The individual capabilities of the Logical Unit are specified by bytes 4 through 7. Each of the bits indicate if that specific capability is supported. A value of zero indicates that the capability is NOT supported; a value of one indicates the capability IS supported.

Bit 0 - Audio Play - The Logical Unit is capable of Audio Play operation. This also indicates that the Logical Unit is capable of overlapping Play and other commands such as reading of the Sub-channel information.

Bit 1 - Composite - The Logical Unit is capable of delivering a composite Audio and Video data stream.

Bit 2 - Digital Port(1) - The Logical Unit supports digital output (IEC958) on port 1

Bit 3 - Digital Port(2) - The Logical Unit supports digital output(IEC958) on port 2

Bit 4 - Mode 2 Form 1 - The Logical Unit is capable of reading sectors in Mode 2 Form 1 (XA) format.

Bit 5 - Mode 2 Form 2 - The Logical Unit is capable of reading sectors in Mode 2 Form 2 format. Bit 6 Multi Session The Logical Unit is capable of reading multiple session or Photo CD discs.

Bit 8 - CD-DA Commands Supported - Red Book audio can be read using the READ-CD command.

Bit 9 - CD-DA Stream is Accurate - This bit indicates that the Logical Unit supports an advanced feature that allows it to return to an audio location without losing place to continue the READ CD-DA command. 0 The Logical Unit is incapable of accurately restarting the CD-DA read operation, and a BUFFER OVERFLOW error shall be reported whenever a loss of streaming occurs. This error will be fatal and the command will have to be repeated from the beginning. 1 The Logical Unit can continue from a loss of streaming condition and no error will be generated.

Bit 10 - R-W Supported - The commands that return Sub-channel data can return the combined R-W information.

Bit 11 - R-W De-interleaved & Corrected - This indicates that the R-W sub-channel data will be returned de-interleaved and error corrected.

Bit 12 - C2 Pointers are Supported - This indicates that the Logical Unit supports the C2 Error Pointers. This also indicates that the Logical Unit is capable of returning the C2 Error Pointers and C2 Block Error flags in the READ CD command. Bit 13 ISRC The Logical Unit can return the International Standard Recording Code Information.

Bit 14 - UPC - The Logical Unit can return the Media Catalog Number (UPC)

Bit 15 - Read Bar Code - The Logical Unit is capable of reading the disc bar code.

Bit 16 - Lock - The PREVENT/ALLOW command is capable of actually locking the media into the Logical Unit.

Bit 17 - Lock State - This indicates the current state of the Logical Unit. 0 The Logical Unit is currently in the allow (Unlocked) state. Media may be inserted or ejected. 1 The Logical Unit is currently in the prevent (Locked) state. Media loaded in the Logical Unit may not be removed via a soft or hard eject. If the Logical Unit is empty, media may not be inserted if the Prevent Jumper is not present. If the jumper is present, then media may be inserted.

Bit 18 - Prevent Jumper - This indicates the state of the (Optional) Prevent/Allow Jumper. 0 Jumper is present. Logical Unit will power up to the allow state. Locking the Logical Unit with the Prevent/Allow Command shall NOT prevent the insertion of media. 1 Jumper is not present. Logical Unit will power up to the Prevent State (Locked). The Logical Unit will not accept new media or allow the ejection of media already loaded until an allow command is issued.

Bit 19 - Eject Command - The Logical Unit can eject the disc via the normal START/STOP command with the LoEj bit set. If the mechanism is a Changer that uses a Cartridge, then this bit indicates that the Cartridge can be ejected.

Bit 20 - Reserved

Bit 21-23 - Loading Mechanism Type - This field specifies the type of disc loading the Logical Unit supports.

0 0 0 Caddy type loading mechanism
0 0 1 Tray type loading mechanism
0 1 0 Popup type loading mechanism
0 1 1 Reserved
1 0 0 Changer with individually changeable discs
1 0 1 Changer using a Cartridge Mechanism
1 1 0 Reserved
1 1 1 Reserved

Bit 24 - Separate Volume Levels - The audio level for each channel can be controlled independently.

Bit 25 - Separate Channel Mute - The mute capability for each channel can be controlled independently.

Bit 26 - Supports Disc Present (SDP) - This bit indicates that the Logical Unit contains an embedded changer, and that after a reset condition or if a cartridge is changed, it can report the exact contents of the slots. The response to the MECHANISM STATUS command will contain valid Disc is Present status information for all slots.

Bit 27 - Software Slot Selection (SSS) - This bit controls the behavior of the LOAD/UNLOAD command when trying to load a Slot with no Disc present (see "Table 48 - Load/Unload or Optional Selection Operations" on page 101).

Bit 28 - Side Change Capable - This bit indicates that the Logical Unit is capable of selecting both sides of the Discs. This capability can be reported for Logical Units that have changer functions.

Bit 29 - P through W in Lead-In - This bit indicates that the Logical Units is capable of reading the raw R-W Sub-Channel information from the lead-in.

Bytes 8 & 9 are identified as obsolete in this standard. It was used in previous versions of this standard and should not be used in future developments.

The Number of Volume Levels Supported field returns the number of discrete levels. If the Logical Unit only supports turning audio on and off, the Number of Volume Levels field shall be set to 2.

The Buffer Size Supported field returns the number of bytes of buffer dedicated to the data stream returned to the Host Computer. This value is returned in Kbytes (Size/1024). If the Logical Unit does not have a buffer cache, the value returned shall be zero.

Byte 17 - is used to describe the format of the Logical Units digital output.

Bit 1 - BCKF Set if data valid on the falling edge of the BCK signal. Clear if data valid on the rising edge of the BCK signal

Bit 2 - RCK Set if HIGH on LRCK indicates left channel. Clear if HIGH on LRCK indicates right channel.

Bit 3 - LSBF Set if LSB first. Clear if MSB first.

Bit 4-5 - Length 00 32 BCKs 01 16 BCKs 10 24 BCKs 11 24 BCKs (I^2S)

The Copy Management Revision Supported Field indicates the version of the DVD Copy Protection scheme that is supported by the Logical Unit. This shall be 0001h to comply with this specification.