DDP Specification

Version 2.10

(For DVD Only)

Table of Contents

Introduction

Disc Description Protocol identifies and describes collections of data that will be recorded onto a CD or DVD disc.. DDP allows for automated transfer of data from data publishers to CD manufacturers.

This document describes DDP according to the 2.10 specification/for DVD only.

This chapter introduces Disc Description Protocol and the files, called streams that make up DDP. DDP stands for the Disc Description Protocol developed by Doug Carson and Associates as a means of defining input media used for CD and DVD disc manufacturing. The DDP file will have the name DDPID.

If you have any questions or comments regarding the DDP specification, please contact ddpinfo@dcainc.com.

General Layout

The layout for the DVD image will be generally the same when applied to the same media. Different media types have their own strengths and weaknesses. Therefore the layout, although similar, will be different between different media types. Only one DVD layer will be allowed on the media. Therefore, for a dual layer DVD disc, two media will be required. Separate DDP will be used to describe each media. The files on the media consist of one DDP file followed by two or more other files.

DDP File

The DDP file is the root file on the media. This file is used to point to all other files on the media. Therefore this file has specific limitations with respect to location and name on the media. This file is used to describe the contents of the rest of the media and to contain instructions that the DVD physical formatter will use in creating the master DVD disc. It contains the DDPID packet, and one DDPMS packet for each additional file on the media. The DDPMS packets are used to point to other files on the media.

DDP Packets

There are 6 types of DDP packets in the DDPID file. These packets are shown in Figure 1. The DDPID packet is used to give general information about the DVD title being described. The DDPMS packets are used to describe the rest of the files on the media.

Figure 1: DDP Packets

DDP Packet	DDP Packet Type	Description	Number of times packet can be present
DDPID	DDPID	General DVD title information	1 (mandatory)
T5	DDPMS	Field oriented text data	0–1 (optional)
T2	DDPMS	Free format text data	0–n (optional)
D5	DDPMS	Video object location table	0–1 (optional)
D2	DDPMS	Lead-in control information	1 (mandatory)
D0	DDPMS	DVD image	1 (mandatory)

DDP File and Packet Order

The packets must be in the order shown in Figure 1. Furthermore, in the case of sequential access media such as DLT tape, the files pointed to by the DDPMS packets must be in the same order as the DDPMS packets in the DDP file. An example of correct order is shown in Figure 2.

Figure 2: An Example of Correct File Order
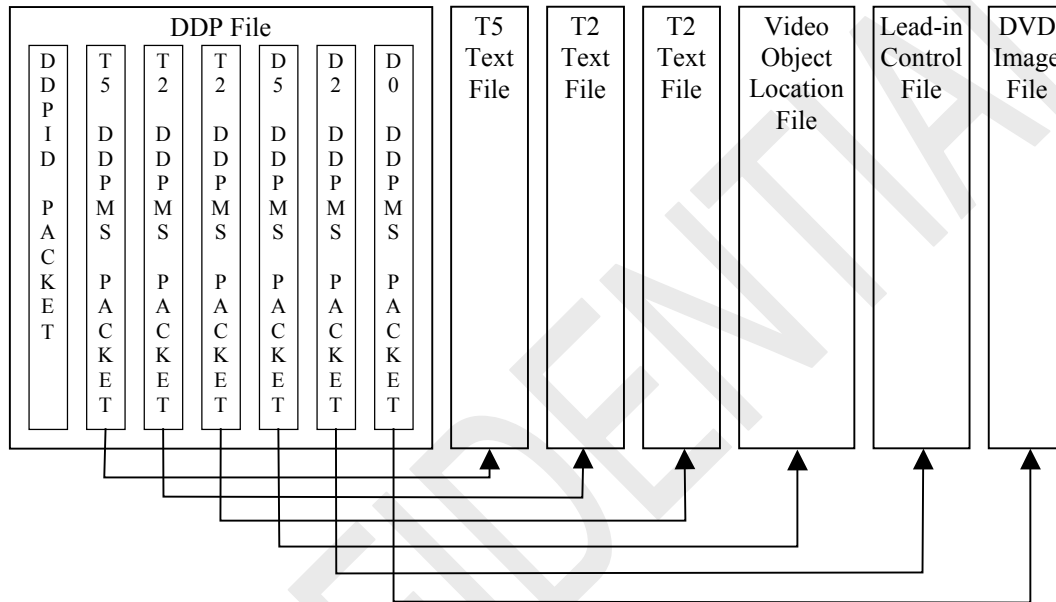
An example of incorrect file order is shown in Figure 3.

Figure 3: An Example of Incorrect File Order

In Figure 3, the DDPMS packets are in the correct order. However the files that they reference are not in
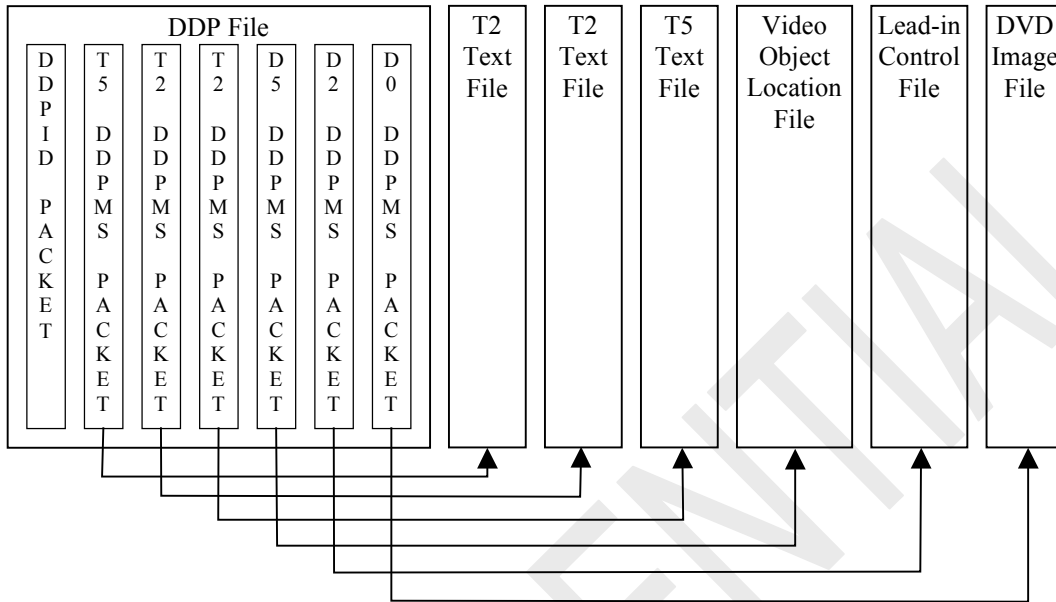
the same order. While this is acceptable on disk file system oriented media such as a network, it is not correct when the data is stored on sequential access media such as tape.

An example of incorrect DDPMS packet order is shown in Figure 4.

Figure 4: An Example of Incorrect Packet Order
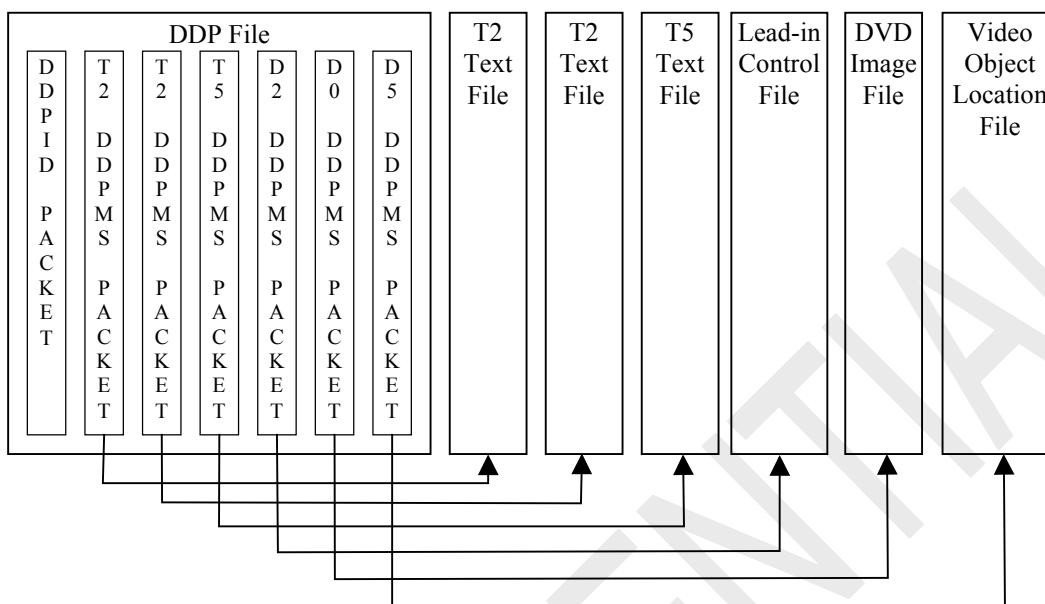
In Figure 4, the DDPMS packets are in the same order as the files in which they reference. However in this case, both the DDPMS packets and the files are not in the correct order. In this example, if the media is sequential access, the Video Object Location File cannot be accessed without first having the tape drive read or skip past the very large DVD Image File.

DDP Packet Contents

The DDP File is composed of several packets of 128 bytes each. The first packet is the DDPID packet. It contains information that describes the overall DVD image. Figure 5 shows the contents of the DDPID packet.

Figure 5: DDPID Packet Contents

Byte	Length	Symbol	Name	Value
0-7	8	DDPID	DDP level Identifier	ASCII characters 'DDP 2.10' (44h 44h 50h 20h 32h 2Eh 31h 30h)
8-37	30	-	Reserved	ASCII spaces (20h)
38-85	48	MID	Master ID	Unique character string determined by content owner for identification purposes. ASCII spaces (20h) when not used.
86	1	-	Reserved	ASCII space (20h)
87-88	2	TYPE	Type of disc	'DV' (44h 56h)
89	1	NSIDE	Number of disc sides	'1' (31h) if final disc will have one readable side. '2' (32h) if final disc will have two readable sides.
90	1	SIDE	Side of current surface	'0' (30h) = side 0 '1' (31h) = side 1
91	1	NLAYER	Number of disc layers	'1' (31h) if final disc will have one readable layer '2' (32h) if final disc will have two readable layers
92	1	LAYER	Layer of current surface	'0' (30h) = layer 0 '1' (31h) = layer 1
93	1	DIR	Direction of translation	'I' (49h) if translation is from inner radius to outer radius 'O' (4Fh) if translation is from outer radius to inner radius (Note: for Dual-Layer OTP case, this field should be set to 'O' (4Fh) for both layer 0 and layer 1.)
94	1	DSIZE	Replica Disc Size (Diameter)	'A' (41h) = 8 cm 'B' (42h) = 12 cm
95	1	SSCRST	Security System Status	'0' (30h) The final disc will not contain any security system. '1' (31h) This value reserved '2' (32h) This value reserved '3' (33h) This value reserved '4' = (34h) The final disc will contain a security system. The input media does not contain a security system, but contains a VOB Location Table file. Security system keys will be imported from a floppy disk. The DVD Physical Formatter must select the sectors within a VOB file that are to have the security system operation performed on them. '5' (35h) The final disc will contain a security system. The input media does not contain a security system, but contains a VOB Location Table file. The security system keys will be imported from a floppy disk. The sectors in the IMAGE.DAT file are tagged as to which sectors should have the security system operation performed on them.
96	1	SSCRMD	Security System Mode	'0' (30h) if DVD Video Version 1.0 Scrambling
97	1	CPSRAVAL	CPSTY_RMA Valid	'V' = (56h) Indicates that the CPS_TY and RMA fields contain valid information. In case of CPSRAVAL='V', the contents of CPS_TY and RMA in DDPID overrule the fields in CONTROL.DAT. No checks are performed on contents. ' ' = (20h) Indicates that the CPS_TY and RMA fields are reserved and should not be accessed.
98-99	2	CPS_TY	CPS_TY field	'01' (30h 31h) See DVD Specification Part 1 for meaning
100-101	2	RMA		Regional Coding '00' (30h 30h) See DVD Specification Part 1 for meaning
102-127	26	-	Reserved	ASCII spaces (20h)

After the DDPID packet are two or more DDPMS packets. Each DDPMS points to a file on the input media. Examples of the DDPMS packets for each type of file are shown below.

Figure 6: T5 DDPMS Packet Contents
(Field Oriented Text Data)

Byte	Length	Symbol	Name	Value
0-3	4	MPV	Map packet valid	'VVVM' (56h 56h 56h 4Dh)
4-5	2	DST	Data stream type	'T5' (54h 35h) = Field Oriented Customer Information
6-13	8	-	Reserved	ASCII spaces (20h)
14-21	8	DSL	Data stream length	'00001024' (30h 30h 30h 30h 31h 30h 32h 34h) = 1024 bytes
22-29	8	DSS	Data stream start	ASCII spaces (20h)
30-37	8	-	Reserved	ASCII spaces (20h)
38-39	2	CDM	DVD mode	ASCII spaces (20h)
40	1	SSM	Source storage mode	ASCII spaces (20h)
41	1	SCR	Source materials scrambled	ASCII spaces (20h)
42-70	29	-	Reserved	ASCII spaces (20h)
71-73	3	SIZ	Size of data stream identifier	'017' (30h 31h 37h)
74-90	17	DSI	Data stream identifier	ASCII characters 'T5TEXT.DAT' (54h 35h 54h 45h 58h 54h 2Eh 44h 41h 54h 20h 20h 20h 20h 20h 20h 20h)
91-127	37	-	Reserved	ASCII spaces (20h

Figure 7: T2 DDPMS Packet Contents
(Free Format Text Data)

Byte	Length	Symbol	Name	**Value**
0-3	4	MPV	Map packet valid	'VVVM' (56h 56h 56h 4Dh)
4-5	2	DST	Data stream type	'T2' (54h 32h) = Free Format Customer Information
6-13	8	-	Reserved	ASCII spaces (20h)
14-21	8	DSL	Data stream length	'00000960' (30h 30h 30h 30h 30h 39h 36h 30h) = 960 bytes in T2TEXT File (example only)
22-29	8	DSS	Data stream start	ASCII spaces (20h)
30-37	8	-	Reserved	ASCII spaces (20h)
38-39	2	CDM	DVD mode	ASCII spaces (20h)
40	1	SSM	Source storage mode	ASCII spaces (20h)
41	1	SCR	Source materials scrambled	ASCII spaces (20h)
42-70	29	-	Reserved	ASCII spaces (20h)
71-73	3	SIZ	Size of data stream identifier	'017' (30h 31h 37h)
74-90	17	DSI	Data stream identifier	ASCII characters 'T2TEXT0.DAT' (54h 32h 54h 45h 58h 54h 30h 2Eh 44h 41h 54h 20h 20h 20h 20h 20h 20h)
91-127	37	-	Reserved	ASCII spaces (20h)

Figure 8: D5 DDPMS Packet Contents
(Video Object Location Table)

Byte	Length	Symbol	Name	Value
0-3	4	MPV	Map packet valid	'VVVM' (56h 56h 56h 4Dh)
4-5	2	DST	Data stream type	'D5' (44h 35h) = VOB Location Table File
6-13	8	-	Reserved	ASCII spaces (20h)
14-21	8	DSL	Data stream length	'00000160' (30h 30h 30h 30h 30h 31h 36h 30h) = 160 bytes in VOBTABLE.DAT (example only)
22-29	8	DSS	Data stream start	ASCII spaces (20h)
30-37	8	-	Reserved	ASCII spaces (20h)
38-39	2	CDM	DVD mode	ASCII spaces (20h)
40	1	SSM	Source storage mode	ASCII spaces (20h)
41	1	SCR	Source materials scrambled	ASCII spaces (20h)
42-70	29	-	Reserved	ASCII spaces (20h)
71-73	3	SIZ	Size of data stream identifier	'017' (30h 31h 37h)
74-90	17	DSI	Data stream identifier	ASCII characters 'VOBTABLE.DAT' (56h 4Fh 42h 54h 41h 42h 4Ch 45h 2Eh 44h 41h 54h 20h 20h 20h 20h 20h)
91-127	37	-	Reserved	ASCII spaces (20h)

Figure 9: D2 DDPMS Packet Contents
(Lead-in Control Information)

Byte	Length	Symbol	Name	Value
0-3	4	MPV	Map packet valid	'VVVM' (56h 56h 56h 4Dh)
4-5	2	DST	Data stream type	'D2' (44h 32h) = DM (Main) – Leadin Control Data
6-13	8	-	Reserved	ASCII spaces (20h)
14-21	8	DSL	Data stream length	'00000016' (30h 30h 30h 30h 30h 30h 31h 36h) = 16 sectors of Leadin Control Data
22-29	8	DSS	Data stream start	'00193024' (30h 30h 31h 39h 33h 30h 32h 34h) = 02F200h, start physical sector address for Leadin Control Data
30-37	8	-	Reserved	ASCII spaces (20h)
38-39	2	CDM	DVD mode	'DV' = DVD Disc (44h 56h)
40	1	SSM	Source storage mode	'0' (30h) = User data only, 2048 bytes '1' (31h) = Complete, 2054 bytes
41	1	SCR	Source materials scrambled	'0' (30h) = data on input media is not scrambled
42-70	29	-	Reserved	ASCII spaces (20h)
71-73	3	SIZ	Size of data stream identifier	'017' (30h 31h 37h)
74-90	17	DSI	Data stream identifier	ASCII characters 'CONTROL.DAT' (43h 4Fh 4Eh 54h 52h 4Fh 4Ch 2Eh 44h 41h 54h 20h 20h 20h 20h 20h 20h)
91-127	37	-	Reserved	ASCII spaces (20h)

Figure 10: D0 DDPMS Packet Contents
(DVD Image)

Byte	Length	Symbol	Name	Value
0-3	4	MPV	Map packet valid	'VVVM' (56h 56h 56h 4Dh)
4-5	2	DST	Data stream type	'D0' (44h 30) = DM (Main) – DVD Image
6-13	8	-	Reserved	ASCII spaces (20h)
14-21	8	DSL	Data stream length	'02000000' (30h 32h 30h 30h 30h 30h 30h 30h) = 2,000,000 sectors
22-29	8	DSS	Data stream start	'00196608' (30h 30h 31h 39h 36h 36h 30h 38h) = 030000h physical sector address for start of Data Area
30-37	8	-	Reserved	ASCII spaces (20h)
38-39	2	CDM	DVD mode	'DV' = DVD Disc (44h 56h)
40	1	SSM	Source storage mode	'0' (30h) = User data only, 2048 bytes '1' (31h) = Complete, 2054 bytes '6' (36h) = Incomplete, 2064 bytes '7' (37h) = Complete, 2064 bytes
41	1	SCR	Source materials scrambled	'0' (30h) = data on input media is not scrambled '1' (31h) = data on input media is scrambled (only valid when SSM = 6 or 7) Note: This field is a reference to the sector scrambling as defined in the DVD Specifications (Part 1: Physical Specifications) and is not a reference to any security system.
42-70	29	-	Reserved	ASCII spaces (20h)
71-73	3	SIZ	Size of data stream identifier	'017' (30h 31h 37h)
74-90	17	DSI	Data stream identifier	ASCII characters 'IMAGE.DAT' (49h 4Dh 41h 47h 45h 2Eh 44h 41h 54h 20h 20h 20h 20h 20h 20h 20h 20h)
91-127	37	-	Reserved	ASCII spaces (20h)

File Names

The DDP file must have the file name **DDPID**. The names of the files that the DDPMS packets reference are recommended to be those described in Figure 11.

Figure 11: Recommended File Names

T5 Text File	T5TEXT.DAT
T2 Text File	T2TEXTn.DAT – where n is a number when more than one T2 Text file is present
Video Object Location File	VOBTABLE.DAT
Lead-in Control File	CONTROL.DAT
DVD Image File	IMAGE.DAT

The file names must follow the conventional 8.3 naming sequence. All alphabetic characters must be upper case. The file names in the DDPMS packets need to match with the actual file names on the media. Therefore any alphabetic characters used in the file names in the DDPMS packets must also be upper case. Figure 12 identifies the valid characters for file names.

Figure 12: Valid Characters for File Names

ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex
0	30	7	37	E	45	J	4C	S	53	Z	5A
1	31	8	38	F	46	M	4D	T	54		2D
2	32	9	39	G	47	N	4E	U	55		5F
3	33	A	41	H	48	O	4F	V	56		
4	34	B	42	I	49	P	50	W	57		
5	35	C	43	J	4A	Q	51	X	58		
6	36	D	44	K	4B	R	52	Y	59		

NOTE: The character '.' (2Eh) can be used only to separate the 8-character file name from the 3-character extension.

Required Files

There are three files required for all types of DVD layers. These files are the DDP file, the CONTROL.DAT file, and the IMAGE.DAT file. However, when a security system is to be placed on the DVD disc, other files will also be required. Figure 13 shows the required files when the final DVD disc will not contain any security system.

Figure 13: Required Files: No Security System

DDPID	Required
T5TEXT.DAT	Optional
T2TEXTn.DAT	Optional
VOBTABLE.DAT	Not Allowed
CONTROL.DAT	Required
IMAGE.DAT	Required

If the final disc is to contain a security system, then there are other files that are required. There are two possible formats for the input media.

The first format is where the IMAGE.DAT file tags the actual sectors that should receive the security system. The files required for this format are shown in Figure 14. The keys for some security system must be imported using a floppy disk.

Figure 14: Required Files: DVD Disc Will Contain Security System,
Image File on Input Media Tags Sectors for the Security System

DDPID	Required
T5TEXT.DAT	Optional
T2TEXTn.DAT	Optional
VOBTABLE.DAT	Required
CONTROL.DAT	Required
IMAGE.DAT	Required

The second format for a specifying security system requires the DVD Physical Formatter at the disc replicator to select the actual sectors that should receive the security system. The files required for this format are shown in Figure 15. The keys for the security system must be imported using a floppy disk.

Figure 15: Final DVD Disc Will Contain Security System,
Image File on Input Media Does Not Tag Sectors for the Security System

DDPID	Required
T5TEXT.DAT	Optional
T2TEXTn.DAT	Optional
VOBTABLE.DAT	Required
CONTROL.DAT	Required
IMAGE.DAT	Required

DDP File Contents

Field Oriented Customer Information (T5 Text File)

A T5 DDPMS packet points to the Field Oriented Customer Information file. The use of this file is in order to provide customer information in a specific format. The contents of this file are shown in Figure 16. Unless otherwise specified, the fields in this file are left justified and padded with blanks.

Figure 16: Field Oriented Customer Information File

Byte	Length	Symbol	Name	Value
0-7	8	CNTID	Content ID	Free format for identifying DVD categories. For example 'DVDVideo' for DVD Video
8-55	48	DID	Disc ID	Unique character determined by content owner
56-119	64	TID	Title Name	Title name or Disc name
120-183	64	CID	Customer ID	Customer name, Phone #, etc
184-247	64	AID	Authoring ID	Authoring studio name, etc
248-263	16	ADT	Authoring Date	Yyyy/mm/dd (i.e. '1998/01/31' = 31h 39h 39h 38h 2Fh 30h 31h 2Fh 33h 31h 20h 20h 20h 20h 20h)
264-391	128	PAD	Reserved for future use	
392-399	8	MDSN	Maximum Disc Set Number	Right justified, padded with blank (20h)
400-407	8	DSN	Disc Set Number	Right justified, padded with blank (20h)
408-423	16	MTP	Media type	'TAPE' = (54h 41h 50h 45h) Tape 'FILE' = (46h 49h 4Ch 45h) File System
424-551	128	PAD	Reserved for future use	
552-555	4	SIZ	Number of bytes in MEMO field	Right justified, padded with blank (20h)
556-1024	468	MEMO	Free for MEMO	

Video Object (VOB) Location File (D5)

The VOB Location Table file contains a VOB Location Table header record and one or more records each identifying the location of VOB files in the DVD Image file (IMAGE.DAT).

Figure 17: VOB Location Table File

VOB Location File Header
1st VOB Location Record
2nd VOB Location Record
.
.
nth VOB Location Record

The VOB Location Table file consists of a 16-byte header followed by one or more VOB Location Records of 16 bytes each. The format of the 16-byte header is shown in Figure 18.

Figure 18: VOB Location File Header

Byte	Length	Name	Value
0-4	5	VOB Header Record Signature	'VOBLT' (56h 4Fh 42h 4Ch 54h)
5-7	3	VOB Location Table Version	'1.0' (31h 2Eh 30h)
8-15	8	Reserved	(00h)

The VOB Header Record Signature is used to identify a VOB Location Table file. A VOB Location Table Version of '1.0' identifies that the VOB Location Table file complies with this specification (Version 2.10).

The VOB Location Record is used to identify the start and end addresses of sectors of the VOB, VMG, and Jacket Picture files within the DVD Image file that are to contain the Content Security System (CSS). Files within the DVD image file that will not contain a CSS cannot be listed in the VOB Location Table File. There may be up to 1197 VOB Location Records in the VOB Location Table file. This includes 6 records for the Jacket Picture files, 3 records for the Menu files and up to 12 records for each of the 99 possible Title files (6+3+(12*99)). The format of each VOB Location record is shown in Figure 19.

Figure 19: VOB Location Record

Byte	Length	Name	Value
0	1	Valid	This field specifies if the VOB record is valid or not. All valid VOB records must be stored contiguously within the VOB Location table file. 00h = Indicates an invalid VOB Location Record. 01h = Indicates a valid VOB Location Record
1	1	Title Number	This field contains the hexadecimal number that is used to identify the Video Title Set that contains the Video Object that is pointed to by this record. The Title Number shall have the following values. 00 - 00h – identifies Video Manager 01 - 01h – identifies VTS number 1 02 - 02h – identifies VTS number 2 nn - xxh – identifies VTS number nn 99 - 63h – identifies VTS number 99 (63h) 100 - 64h – identifies Jacket Picture
2	1	VCPR_MAI	This field specifies the value for the first byte of the CPR_MAI field in the sectors of the VOB being described.
3-7	5	PAD	00h 00h 00h 00h 00h
8-11	4	Start Address	This field contains the DVD Sector Number as stored on the final DVD disc for the first sector of the VOB. The value in this field is right justified. Please note that on Layer 1 of OTP disc, the DVD Sector Number is stored in a bit inverted format.
12-15	4	End Address	This field contains the DVD Sector Number as stored on the final DVD disc for the last sector of the VOB. The value in this field is right justified. Please note that on Layer 1 of OTP disc, the DVD Sector Number is stored in a bit inverted format.

Since there can be up to 1197 VOB Location Records, this file may contain up to 19168 bytes (16 bytes for the header + 16 bytes * 1197 records). All VOB Location Records must be stored contiguously in order of the Start Address field. The first VOB Location Record must be stored immediately after the VOB Header Record.

Dual Layer Considerations

The VOB Location Records in the VOB Location Table file point only to the sectors of VOB files that are within the DVD image being referenced by the DDP. For example, if Layer 0 of a dual layer DVD disc is being described, then the VOB Location Table file must point to only the VOB files contained on Layer 0. If a VOB file spans both layers, then the VOB Location Record will point to only that portion of the VOB file that is present on the layer.

Figure 20: Example of VOB Location File

Byte	0	1	2	3	4	5	6	7	8-11	12-15
0	56h	4Fh	42h	4Ch	54h	31h	2Eh	30h	00000000h	00000000h
16	01h	01h	F0h	00h	00h	00h	00h	00h	00031F00h	000437CEh
32	01h	02h	F0h	00h	00h	00h	00h	00h	00044000h	00044FFFh
48	01h	02h	F0h	00h	00h	00h	00h	00h	00050000h	0005236Dh
64	00h	00h	00h	00h	00h	00h	00h	00h	00000000h	00000000h

NOTE: The value 00031F00h is stored in byte 8=00h, byte 9=03h, byte 10=1Fh, byte 11=00h
The value 00437CEh is stored in byte 12=00h, byte 13=04h, byte14=37h, byte 15=CEh

Figure 20 gives an example of a VOB Location File. In this example, the VOB Location File is 72 bytes in length. In this file, the first 16 bytes contain the VOB File Header. The rest of the file contains three VOB Location records of 16 bytes each and one empty record. The VOB Location Table File does not need to end with an empty record. In general the VOB Location Table File should not contain any empty records and the empty record here included here only for the example.

The first VOB Location record indicates that a VOB file for Video Title 1 exists from DVD Sector number 031F00h through 0437CEh inclusively. The first byte of the CPR-MAI field for this Video Title is F0h.

The second VOB Location record indicates that a VOB file for Video Title 2 exists from DVD Sector number 044000h through 044FFFh inclusively. The first byte of the CPR-MAI field for this Video Title is F0h.

The third VOB Location record indicates that a VOB file for Video Title 2 exists from DVD Sector number 050000h through 05236Dh inclusively. The first byte of the CPR-MAI field for this Video Title is F0h.

Figure 21: DDPMS Packet for VOB Location File in Figure 20

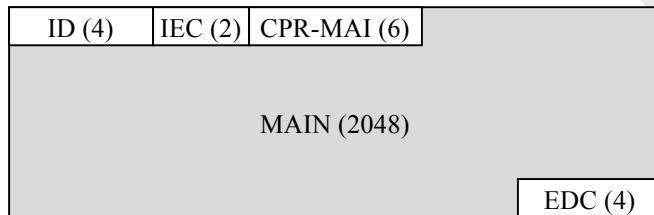| Byte	Length	Symbol	Name	Value
0-3	4	MPV	Map packet valid	'VVVM' (56h 56h 56h 4Dh)
4-5	2	DST	Data stream type	'D5' (44h 35h) = VOB Location Table File
6-13	8	-	Reserved	ASCII spaces (20h)
14-21	8	DSL	Data stream length	'00000072' (30h 30h 30h 30h 30h 30h 37h 32h) = 72 bytes in VOBTABLE.DAT
22-29	8	DSS	Data stream start	ASCII spaces (20h)
30-37	8	-	Reserved	ASCII spaces (20h)
38-39	2	CDM	DVD mode	ASCII spaces (20h)
40	1	SSM	Source storage mode	ASCII spaces (20h)
41	1	SCR	Source materials scrambled	ASCII spaces (20h)
42-70	29	-	Reserved	ASCII spaces (20h)
71-73	3	SIZ	Size of data stream identifier	'017' (30h 31h 37h)
74-90	17	DSI	Data stream identifier	ASCII characters 'VOBTABLE.DAT' (56h 4Fh 42h 54h 41h 42h 4Ch 45h 2Eh 44h 41h 54h 20h 20h 20h 20h 20h)
91-127	37	-	Reserved	ASCII spaces (20h)

CONTROL.DAT File

The CONTROL.DAT file contains the 16 sectors of the Lead-in Control information that is to be placed on the DVD disc. Although the file on the media contains only 16 sectors, these sectors are repeated 192 times when they are placed on the DVD disc. The CONTROL.DAT consists of one Physical Format Information Sector, one Disc Manufacturing Information Sector, and fourteen Content Provider Information Sectors (sometimes referred to as Copyright Information Sectors). The contents of these sectors should be in accordance to the DVD Part 1 Physical Specification.

CONTROL.DAT Sector Sizes

The CONTROL.DAT file contains the data that is used to make up the Lead-in Control Area on the DVD disc. This file contains only the 16 sectors that make up one ECC Block of this area. The CONTROL.DAT file can be stored in either 2048 byte or 2054 byte DVD sectors. Figure 22 identifies the parts of the DVD sectors that are included in these byte sizes.

Figure 22: CONTROL.DAT Sector Sizes

ID (4)	IEC (2)	CPR-MAI (6)	
		MAIN (2048)	
			EDC (4)

DDP Source Storage Mode = 0 (2048)

ID (4)	IEC (2)	CPR-MAI (6)	
		MAIN (2048)	
			EDC (4)

DDP Source Storage Mode = 1 (2054)

☐ Data on media, copied onto DVD disc
☐ Data not on media, will be generated

IMAGE.DAT File

The IMAGE.DAT file contains the DVD image that is to be placed in the Data Area on the DVD disc. The IMAGE.DAT file can be stored in 2048 byte, 2054 byte, or 2064 byte DVD sectors. The IMAGE.DAT file contains the DVD application.

IMAGE.DAT Sector Sizes

The IMAGE.DAT file can be stored in 2048 byte, 2054 byte, or 2064 byte DVD sectors.
Figure 23 identifies the parts of the DVD that are included in these byte sizes.

Figure 23: IMAGE.DAT Sector Sizes
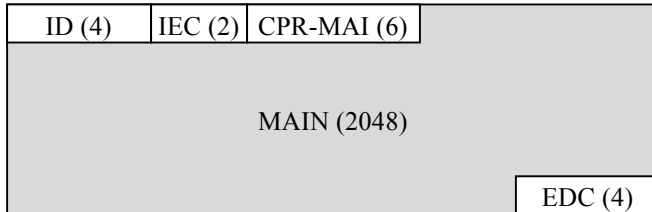
DDP Source Storage Mode = 0 (2048)
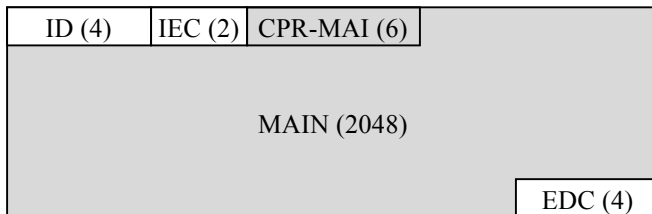
DDP Source Storage Mode = 1 (2054)
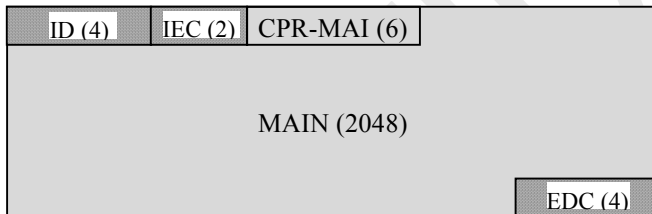
DDP Source Storage Mode = 6 (2064 Incomplete)
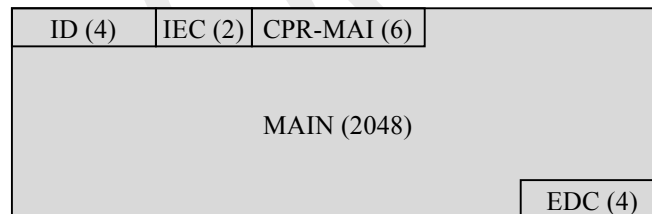
DDP Source Storage Mode = 7 (2064 Complete)

☐ Data on media, copied onto DVD disc
☐ Data not on media, will be generated
▨ Data on media, but will be ignored and other data generated in its place

Appendix A: Security System Issues

This appendix is applicable when the authoring studio desires a Security System to be placed on the DVD disc. When the final DVD disc is to have a Security System, then a DDP file will always be required regardless of input media. For DDP 2.10, there are two possible methods that can be used to place a Security System on a DVD disc. Each of the methods requires different formats for the input media.

NOTE: Any bits within sector that pertain to Security System should also be set to indicate that the sector does not have the Security System applied.

Method 1) Input Media Does Not Tag Sectors for Security System

With this method, the IMAGE.DAT file does not tag specific sectors for the security system. Instead a VOB Location Table file is used to indicate the VOB sectors in the IMAGE.DAT file. Using the VOB Location Table File, the DVD Physical Formatter must select the sectors that should have the Security System on them. To use this method, the SSCRST field in the DDPMS packet for the IMAGE.DAT file must be set to '4' (34h). The DVD sectors in the IMAGE.DAT file can be stored in any of the valid sector sizes (2048, 2054, or 2064 Incomplete). If the IMAGE.DAT file contains 2054 or 2064 byte DVD sectors, Figure 24 shows the contents of the CPR-MAI field for all sectors.

NOTE: If the DVD image is stored in 2064 bytes, then it must be in the 2064 Incomplete format (DDP SSM = '6' (36h).

Figure 24: CPR-MAI when IMAGE.DAT Does Not Tag Sectors for Security System

Byte	Description	Contents		
0	CPS_TY	B7	1	CPM
		b6	0	CP_SEC: Sector does not require scrambling
		b5-b4	00	CGMS: Copying is permitted without restriction
			01	CGMS: Reserved
			10	CGMS: One generation of copies can be made
			11	CGMS: No copying is permitted
		b3-b0	00	Reserved
1-5	Reserved	00h		

Method 2) Input Media Tags Sectors for Security System Information

This method requires the IMAGE.DAT file to tag every sector in order to indicate whether it should have the Security System applied. To use this method, the SSCRST field in the DDPMS packet for the IMAGE.DAT file must be set to '5' (35h). This format requires the DVD sectors in the IMAGE.DAT file to be stored in at least 2054 byte format. The contents of the CPR-MAI must be set appropriately depending on the following:

- The sector is not part of a file that contains a security system.
- The sector is part of a file that contains a security system, but the individual sector does not contain a security system.
- The sector is part of a file that shall contain a security system, and the individual sector contains a security system.

The DVD authoring system used by the DVD content provider must select within a VOB file that contains the Security System.

Appendix B: DDP Tables

DDPID

DDPID identifies the presence and level of DDP. The DDPID packet is similar to the DDPID in levels 1.00, 1.01, and 2.00. The contents of the DDPID packet are listed in Figure 25.

Figure 25: DDPID Packet Contents

Byte	Length	Symbol	Name
0-7	8	DDPID	DDP level identifier
8-37	30	-	Reserved
38-85	48	MID	Master ID
86	1	-	Reserved
87-88	2	TYPE	Type of disc
89	1	NSIDE	Number of sides on final disc
90	1	SIDE	Side of current surface
91	1	NLAYER	Number of layers on final disc
92	1	LAYER	Layer of current surface
93	1	DIR	Direction of Translation
94	1	DSIZE	Replicate Size (8 or 12 cm)
95	1	SSCRST	Security System Status
96	1	SSCRMD	Security System Mode
97	1	CPSRAVAL	CPSTY_RMA Valid
98-99	2	CPS_TY	Copy Protection System Type
100-101	2	RMA	Regional Coding
102-127	26	-	Reserved

DDPID — DDP level Identifier
Definition: DDPID contains both the DDP identifier and the DDP level number.
Byte: 0-7
Length: 8
Usage: nnnnnnnn = ASCII characters (44h 44h 50h 20h 32h 2Eh 31h 30h 'DDP 2.10' for DDP level 2.10).

Reserved — Reserved
Definition: Reserved.
Byte: 8-37
Length: 30
Usage: ASCII spaces

MID — Master ID
Definition: MID contains the Master ID, a unique character string used by mastering to identify jobs or clients. MID is filled with ASCII spaces when it is not used or when Master ID is not known.
Byte: 38-85
Length: 48
Usage: nnnnnn...nnnnnn = ASCII characters

Reserved — Reserved
Definition: Reserved.
Byte: 86
Length: 1
Usage: **n** = an ASCII space

TYPE — TYPE of disc
Definition: TYPE contains the type of the disc being mastered.
Byte: 87-88
Length: 2
Usage: **DV** (**44h 56h**) = DVD disc

NSIDE — Number of SIDEs on final disc
Definition: NSIDE contains the total number of readable sides on the final disc.
Byte: 89
Length: 1
Usage: **1 = (hex 31)** the final disc will have one readable side.
   2 = (hex 32) the final disc will have two readable sides.

SIDE — current SIDE of disc
Definition: SIDE contains the current side of the image being mastered.
Byte: 90
Length: 1
Usage: **0 = (hex 30)** side 0
   1 = (hex 31) side 1

NLAYER — Number of LAYERs on final disc
Definition: NLAYER contains the total number of layers on a side of the final disc.
Byte: 91
Length: 1
Usage: **1 = (hex 31)** the final disc will have one readable layer.
   2 = (hex 32) the final disc will have two readable layers.

LAYER — current LAYER of disc
Definition: LAYER contains the current layer of the image being mastered.
Byte: 92
Length: 1
Usage: **0 = (hex 30)** layer 0
   1 = (hex 31) layer 1

DIR — Direction of Translation
Definition: This field describes the direction of translation of Layer 1 of a dual layer DVD disc. It is valid only when there is more than one layer on the disc. Since there are unique sets of DDP for each layer, this field must contain the same value for the DDP used on both layers. That is, if Layer 1 is opposite track path, then this field shall contain *O* (hex 4F) for both layers.
Byte: 93
Length: 1
Usage: I = (hex 49) From inner radius to outer radius
      O = (hex 4F) From outer radius to inner radius

DSIZE — Size of Disc
Definition: This field specifies the size of the disc to be mastered. A value of *A* indicates an 8 cm disc; a value of *B* indicates a 12 cm disc.
Byte: 94
Length: 1
Usage: A = (hex 41) 8 cm
      B = (hex 42) 12 cm

SSCRST — Security System Status
Definition: This field specifies the status of the security system for the disc to be created.
Byte: 95
Length: 1
Usage: 0 = (hex 30) The final disc will not contain any security system.
      1 = (hex 31) This value reserved.
      2 = (hex 32) This value reserved.
      3 = (hex 33) This value reserved.
      4 = (hex 34) The final disc will contain a security system. The input media does not contain the security system. The security system keys will be imported from a floppy disk. The DVD Physical formatter must select the sectors to receive the security system operation. (This value of SSCRST allows the DVD Image file to be stored in any of the valid DDP sector sizes.)
      5 = (hex35) The final disc will contain a security system. The input media does not contain the security system. The security system keys will be imported from a floppy disk. The DVD Image file must tag the sectors to receive the security system operation. (This value of SSCRST requires the DVD Image files to be stored in either 2054 bytes or 2064 bytes, complete or incomplete.)

SSCRMD — Security System Mode
Definition: This field specifies the type of security system that is to be on the final disc.
Byte: 96
Length: 1
Usage: 0 = (hex 30) DVD Video Version 1.0 Scrambling

CPSRAVAL — CPSTY_RMA Valid

Definition: This field specifies whether the CPS_TY and the RMA fields are valid.

Byte: 97

Length: 1

Usage: 'V' = (hex 56) Indicates that the CPS_TY and RMA fields contain valid information. In case of CPSRAVAL='V', the contents of CPS_TY and RMA in DDPID overrule the fields in CONTROL.DAT. No checks are performed on contents.

' ' = (Hex 20) Indicates that the CPS_TY and RMA fields do not contain valid information.

CPS_TY — DVD Copy Protection Type

Definition: This field can be used to specify the Copy Protection Type for the DVD disc. If this field is valid, then the value in this field will be placed in the CPS_TY byte in the CPR-MAI field of the Contents Provider Information sectors in the Lead-in-Control sectors on the DVD disc. This field stores the ASCII equivalent of the hexadecimal value stored on the DVD disc. For example if the value on the DVD disc is 01 hex, then this field has the value 30 31 hex ('01'). NOTE: The contents of this field must match with the related fields in the DVD File systems and the DVD Video system.

Byte: 98-99

Length: 2

Usage: Refer to Part 1 of the DVD specification for the valid values for this field.

RMA — Regional Coding

Definition: This field can be used to set the Regional Management Authorization for the DVD disc. If this field is valid, then the value in this field will be placed in the Regional Management Authorization byte of the CPR-MAI field in the Contents Provider Information sectors of the Lead-in Control on the DVD disc. This field stores the ASCII equivalent of the hexadecimal value stored on the DVD disc. For example if the value on the DVD disc is C0 hex, then this field has the value 43 30 hex ('C0'). NOTE: The contents of this field must match with any related fields in the DVD File systems and the DVD Video system.

Byte: 100-101

Length: 2

Usage: Refer to Part 1 of the DVD specification for the valid values for this field.

Reserved — Reserved

Definition: Reserved

Byte: 102-127

Length: 26

Usage: ASCII spaces

DDPMS

The DDPMS packets are used to identify other files on the input media. There is one DDPMS packet for each file present other than the DDP file. The contents of the DDPMS packet are listed in Figure 26.

Figure 26: DDPMS Packet Contents

Byte	Length	Symbol	Name
0-3	4	MPV	Map packet valid
4-5	2	DST	Data stream type
6-13	8	-	Reserved
14-21	8	DSL	Data stream length
22-29	8	DSS	Data stream start
30-37	8	-	Reserved
38-39	2	CDM	DVD mode
40	1	SSM	Source storage mode
41	1	SCR	Source materials scrambled
42-70	29	-	Reserved
71-73	3	SIZ	Size of data stream identifier
74-90	17	DSI	Data stream identifier
91-127	37	-	Reserved

Each DDPMS packet contains pointers and other information about data and other files. DDPMS packets are stored in the order in which the data is to be stored on the DVD disc.

MPV — Map Packet Valid
Definition: MPV has the ASCII value of **VVVM** and identifies valid 128-byte map packets from invalid unused space in the map stream.
Byte: 0-3
Length: 4
Usage: **VVVM** = a valid 128-byte map packet

DST — Data Stream Type
Definition: DST contains identification for the type of data described by this map packet.
Byte: 4-5
Length: 2
Usage: **D0** = DM (Main) — data stream
    D2 = DM (Main) — lead-in data
    D5 = DM (Main) — VOB location table (optional)
    T2 = TS (Text) — customer information (optional)
    T5 = TS (Text) — field oriented customer information (optional)
All others reserved

NOTE: D2 describes streams that contain the 16 sectors of Control Data that is to be placed in the Lead-in of the DVD Disc. The stream does not contain the entire contents of the Lead-in. DVD Disc formatters must insert the contents of the stream into the lead-in being generated during mastering.

D5 describes streams that contain a table that identifies the location of the DVD VOB files on the final DVD disc. A stream pointed to be a D5 DDPMS packet is described in the section titled VOB Location Table.

T5 describes streams that contain customer information in a specific field oriented manner.

Reserved — Reserved
Definition: Reserved
Byte: 6-13
Length: 8
Usage: ASCII spaces

DSL — Data Stream Length
Definition: DSL contains the amount of data in the stream described by the map packet. In the case of D0 and D2 stream types, DSL contains the number of DVD sectors and must be divisible by 16. The number of sectors for lead-in control is 16. The DM file must be padded when required to extend the length of Program Area to a multiple of 16 sectors (the transition from Data Area to Lead-out or Middle Area within the DVD disc is governed by the appropriate end sector address field within the Lead-in Control file on the media). In the case of D5, D2, and T5 stream types, the DSL contains the exact number of valid bytes in the input file.
Byte: 14-21
Length: 8
Usage: 11111111 = the decimal number of sectors for D0 and D2 data or the decimal number of bytes for D5, T2, and T5 data.

DSS — Data Stream Start
Definition: DSS contains the address of the physical DVD Disc sector where DM (Main) data are placed on the DVD Disc. The address is stored in this field in base 10 format. This field is required for all surfaces. For Layer 1 Opposite Track Path DVD discs, the value for the address is the 1's complement of the actual address on the disc where the data will be placed.

The address of the physical start sector for Lead-in Control Data is 193024.

Example 1:
The address of the first sector of the data area on the disc is 030000 (base 16); the value stored in this field will be 196608.

Example 2:
On Layer 1 Opposite Track Path, the surface will be cut from outer radius to inner radius. Therefore the first sector of data area is towards the outer radius of layer 1. If the address of the first sector of the data area on layer 1 is to be FCEFF0 *) (base 16), then the value for this field is computed as follows:

1's complement of FCEFF0 is 3100F (base 16)
3100F (base 16) is converted to 200719 (base 10)

The value stored in this field should then be 200719 (32 30 30 37 31 39 hex)
*) The value FCEFF0 is divisible by 16.
Byte: 22-29
Length: 8
Usage: ssssssss = the decimal address of physical sector expressed in ASCII characters.

Reserved — Reserved
Definition: Reserved
Byte: 30-37
Length: 8
Usage: ASCII spaces.

CDM — DVD Disc Mode
Definition: CDM describes what mode of data is to be recorded on the DVD Disc for this particular map packet. This is independent of how data is stored on the input media. CDM is filled with ASCII spaces when map packet is used for a file that will not be placed on the DVD disc.
Byte: 38-39
Length: 2
Usage: `DV` = DVD Disc

SSM — Source Storage Mode
Definition: SSM contains a description of how the input data is stored on the input media and is used in conjunction with CDM. SSM is filled with an ASCII space when a map packet is used for a file that will not be placed on the DVD disc.
Byte: 40
Length: 1
Usage: `0` = (30 hex) User data only, 2048 bytes
       `1` = (31 hex) Complete 2054
       `6` = (36 hex) Incomplete, 2064 bytes
       `7` = (37 hex) Complete, 2064 bytes

NOTE: DVD discs contain 2064 bytes of information per sector, divided as follows: ID (4 bytes), IEC (2 bytes), CPR_MAI (6 bytes), user data (2048 bytes) and error detection code (EDC) (4 bytes). When SSM = 0, ID, IEC, and EDC is generated, the CPR_MAI bytes are set to zero, and the user data is sent without modification. When SSM = 1, ID, IEC, and EDC is generated, and the CPR_MAI bytes and user data are sent without modification. When SSM = 6, ID, IEC, and EDC are ignored and regenerated, and the CPR_MAI bytes and user data are sent without modification. When SSM=7, the entire sector is sent without modification. On D2 (Lead-in Control) map packets '0' and '1' are the only values that are valid for this field.

SCR — Source material scrambled
Definition: SCR contains information whether the data on input media has already been scrambled. An SCR of 1 is used only when SSM = 6 or 7. SCR is filled with an ASCII space when the map packet is used for TS (Text) data.
Byte: 41
Length: 1
Usage: `0` = (hex 30) indicates data on input media is not scrambled.
      `1` = (hex 31) indicates data on input media is scrambled.

Reserved — Reserved
Definition: Reserved
Byte: 42-70
Length: 29
Usage: ASCII spaces

SIZ — Size of DSI
Definition: SIZ contains the size, in decimal, of the data stream identifier (DSI) entry immediately following SIZ. For DDP level 2.00, DSI is 17 characters. SIZ is filled with ASCII spaces when no DSI is present.
Byte: 71-73
Length: 3
Usage: nnn = a decimal number expressed in ASCII form (017 for DDP level 2.10).

DSI — Data Stream Identifier
Definition: DSI contains the name of the TS (Text) file when used with logically accessed input media such as labeled tape or disc files. DSI also contains the name of DM (Main) files when used with logically accessed direct access media such as DOS files. Since DM (Main) type files must be mastered in the order in which they are stored on sequential logically accessed input media, such as 8mm tape, DSI is not required for DM (Main) files, but is included anyway for operator convenience, although it is ignored by mastering. The file name needs to conform to the 8.3 file name convention. Furthermore the file name must be upper case in this field as well as in the actual file names on the media.
Byte: 74-90
Length: 17
Usage: nnnnnnnnnnnnnnnnn = 17 ASCII characters

Reserved — Reserved
Definition: Reserved
Byte: 91-127
Length: 36
Usage: ASCII spaces

Appendix C: Media Specific Requirements

Tape Media

All tapes have generally the same layout. The format of the tape must be in accordance to the ANSI Tape Label Format (ANSI X3.27). This document is available from the address below.

American National Standards Institute
Attn: Customer Service
11 West 42nd Street
New York, NY 10036, USA
http://www.ansi.org

One tape is used to contain the data for one layer on a DVD disc. In the case of a dual layer DVD disc, two tapes will be required. The tapes should contain the files in accordance to that described in Figure 1.

The DDPID file must be the first file on the tape. The other files must be in the order that the DVD physical formatter will be accessing them. Therefore the file order in Figure 2 must be maintained.

The DDPMS packets must be in the same order as the files that they point to. The files on the tape will be recorded in Fixed Length Records and will have the following tape block and record sizes.

Figure 27: Record and Block Sizes of Files on Tape

File Name	Record Size	Block Size
DDPID	128	128
T5TEXT.DAT	1024	1024
T2TEXTn.DAT	Any value [1]	Any value [2]
VOB Location Table	16	1024
CONTROL.DAT	2048 or 2054	32768, or 32864
IMAGE.DAT	2048, 2054, or 2064	32768, 32864, or 33024

[1] Must be less than the block size. According to the ANSI Tape Label Specification (ANSI X3.27), if the file contains fixed length records, then the record size must be an integral fraction of the block size.

[2] Up to a maximum of 32768 bytes.

NOTE: The Tape Record Size for the CONTROL.DAT and IMAGE.DAT files (and any Text files present) should be consistent with the value stored in the Source Storage Mode in the DDP Map packet that is describing the file. The Tape Block Size is the actual size that the data blocks are written to the tape. For the CONTROL.DAT and IMAGE.DAT files, the Tape Block Size should be in 16 times the value for the Tape record Size.

Index