

## **1. Document Rules**

### **1.1 Terminology for Structure Name**

#### **1.1.1 Field**

The field is the minimum unit for storing data that contains a value.

#### **1.1.2 Record**

The record is multiple fields to be handled as a single unit of data.

#### **1.1.3 Table**

The table is a sequence of fixed-length records of the same type.

#### **1.1.4 List**

The list is a sequence of variable-length records of the same type.

#### **1.1.5 Frame**

The frame is made up of multiple tables or lists.

#### **1.1.6 Distribution Header**

The distribution header is placed at the top of a frame. The distribution header contains description about locations and sizes of the lists or tables stored in the frame.

#### **1.1.7 Attribute Header**

The attribute header is placed at the top of data groups, and describes the attributes and address location.

## 1.2 Data Type

### 1.2.1 Natural number Type (N)

Value range: Represents a range of 0 to the maximum value that is positive and determined by the field length.

(Example: The natural number type with a two-byte field can represent from 0 to 65535. 0 is assigned to "Null".)

### 1.2.2 Integer Type (I)

Representation method: Uses the two's-complement form (the first bit means a plus or minus sign).

Value range: Represents a range between the maximum negative value and maximum positive value that are determined by the field length.

(Example: The integer type with a two-byte field can represent from -32768 to +32767. 0 is assigned to "Null".)

### 1.2.3 1-byte String Type (C)

Representation method: Uses the sequence of a 1-byte code (such as the JIS octet code).

### 1.2.4 Meta-dependent String Type (CC)

Representation method: Uses the sequence of a linguistic string code (such as the SJIS code) defined with metadata.

### 1.2.5 Bit Type (B)

Representation method: Uses a group of bits binary-coded as one field.

### 1.2.6 Normalized Type (NZ)

Value range: Represents the integer part of a normalized value (0.0 value in the field 1.0) multiplied by n.

### 1.2.7 Sector Address Type (SA)

Representation method: Represents the physical sector address on the storage medium using the 3-byte sector address and 6-bit logical sector count. The size of one logical sector is variable between 32 bytes and 256 bytes.

0-Word

No.	Bit	Description
1	15 to 0	Sector Address

1-Word

No.	Bit	Description		
1	15 to 8	Sector Address		
2	7	Disk Fide Flag	bit7	Meaning
			0	Side A
			1	Side B
3	6	Storage Layer Flag	bit6	Meaning
			0	Single layer
			1	Double layer
4	5 to 0	Number of Logical Sectors		

Value range: Represents a range of 0 [Sector Address], 0 [Logical Sector] to 16777215 [Sector Address], 63 [Logical Sector].

For a CD-ROM/DVD-ROM, one sector is fixed at 2048 bytes. The following table shows the size and the number of logical sectors per block.

Size per 1 logical sector	Range of the number of logical sectors
32 bytes	0 to 63
64 bytes	0 to 31
128 bytes	0 to 15
256 bytes	0 to 7

Reserved value: 4294967295 (FFFFFFFF(16)) is assigned to the 4 bytes when the sector address is "insignificant (null)."

### 1.2.8 Logical Sector Size Type (BS)

Representation method: Represents the data size using the number of logical sectors. The size of one logical sector is variable between 32 bytes and 256 bytes.

Value range: Represents a range of 0 to the maximum value that is positive and determined by the field length.

(Example: The block size type with a two-byte field can represent from 0 to 65535. 0 (0000(16)) is assigned to "Null".)

### 1.2.9 Displacement Type (D)

Value range: Represents a range of 0 to the maximum value that is positive and determined by the field length.

Value unit: Short word (2 bytes)

Reserved value: The maximum value determined by the field length is assigned "when there is no entity to be specified (to null)."

(Example: The displacement type with a 2-byte field represents a range of 0 to 65534, and 65535 (FFFF(16)) is assigned to "null." Therefore, up to 131068 bytes can be specified. The displacement type with a 4-byte field represents a range of 0 to 4294967294, and 4294967295 (FFFFFFFF(16)) is assigned to "null." Therefore, up to 8589934588 bytes can be specified.)

### 1.2.10 Displacement Sector Address Type (DSA)

Representation method: Same with the sector address type (SA). Relative sector address is used by representing the beginning of a file containing a DSA-represented field (the beginning of the all data management frames when the entire data consists of a file) as 0.

When the sector address is represented together with the file name, an address relative to the top of the file is specified. For example, when a management file name is set in the management header record (see Chapter 5), the management header address is an address relative to the top of the management file.

### 1.2.11 Short Word Size Type (SWS)

Value range: Represents a range of 0 to the maximum value that is positive and determined by the field length.

Value unit: Short word (2 bytes)

(Example: The short word size type with a two-byte field can represent from 0 to 65535. 0 (0000(16)) is assigned to "Null". Therefore, up to 131070 bytes can be specified.)

### 1.2.12 Long Word Size Type (LWS)

Value range: Represents a range of 0 to the maximum value that is positive and determined by the field length.

Value unit: Long word (4 bytes)

When the size of data with short words is odd, it is necessary to add 2 bytes to the end of the data in order to adjust its boundary.

(Example: The long word size type with a two-byte field can represent from 0 to 65535. 0 (0000(16)) is assigned to "Null". Therefore, up to 262140 bytes can be specified.)

**1.2.13 Parcel ID Number Type (PID)**

Representation method: Parcel ID number type is represented by the latitude and longitude using 2-words respectively.

A flag is contained in the beginning bit at the top word.

The subsequent 20 bits represent latitude and longitude in seconds.

The subsequent 3 bits represent latitude and longitude in 0.125 seconds (1/8 seconds).

The remaining 8 bits are used for expansion.

Word 0

No.	bit	Description		
1	15	North/South Flag	bit15	Meaning
			0	North latitude
			1	South latitude
2	14 to 0	Latitude/Seconds (SEC)		

Word 1

No.	bit	Description		
1	15 to 11	Latitude/Seconds (SEC)		
2	10 to 8	Latitude in 0.125 seconds (1/8 seconds)		
3	7 to 0	For expansion		

Note: The north latitude indicates a range of 0 ° 0' 0" (equator) to 90 ° 0' 0" (North Pole). The south latitude indicates a range of 0 ° 0' 0" to 90 ° 0' 0" (South Pole).

Word 2

No.	bit	Description		
1	15	East/West Flag	bit15	Meaning
			0	East longitude
			1	West longitude
2	14 to 0	Longitude/Seconds (SEC)		

Word 3

No.	bit	Description		
1	15 to 11	Longitude/Seconds (SEC)		
2	10 to 8	Longitude in 0.125 seconds (1/8 seconds)		
3	7 to 0	For expansion		

Note: The east longitude indicates a range of 0 ° 0' 0" (Greenwich meridian) to 180 ° 0' 0" (exclusive). The west longitude indicates a range of 0 ° 0' 0" to 180 ° 0' 0". To represent the North Pole or South Pole, set the east longitude to 0 ° 0' 0".

The distance of about 30 meters can be represented by second. In addition, to increase the accuracy, the distance of 3.75 meters can be represented by 0.125-second.

The least significant 8 bits are used for expansion.

**1.2.14 Manufacturer Identification Type (MID)**

name [Manufacturer Identification Type]

No.	Offset	Data length	Data type	Item name
1	0	8	PID	Latitude and longitude at which manufacturer's office is located
2	8	1	I	Information about floor on which manufacturer's office is located. (The floor is represented with a signed number relative to the ground floor "0".)
3	9	1		(RESERVED)
4	10	2	N	Date at which manufacturer's identification was set (Number of days relative to January 1, 1997 "0")

When the MID does not depend on the system, fill them with FF(16).

Specify the PID for the manufacturer identification type (MID) using the World Geodetic System (ITRF) regardless of geodetic systems used for other data.

**1.2.15 Boundary Type (BR)**

Representation method: Represented with the sequence of 0(0000(16)). It is an area for adjusting the boundary.

Value range: 0

**1.2.16 Metadata Type (M)**

Specify representation methods or value ranges using metadata.

## 1.3 How to Read Tables

### 1.3.1 How to Read Data Items

name [ . . . ] (1)

No.	offset	Data length	Data type	Item name	Remarks	Classification
(2)	(3)	(4)	(5)	(6)	(7)	(8)

(1) [ . . . ]:

Indicates the name of a record, table, or frame.

(2) No.

Indicates the item number assigned to each item.

(3) Offset

Indicates the relative address of the beginning of a record, table, list, or frame to which the item belongs (using the number of bytes from the beginning). However, fields with Classification C (option) are optional, thus offsets of the field with Classification C are used as reference.

When the offset size for an item is not fixed, it is indicated with 01, 02 . . . . When the offset size is optional, it is indicated with "free."

(4) Data Length:

Indicates the size of data for the item (using the number of bytes)

When the data length is not fixed for an item, the data length and lengths for subsequent items are indicated with B1, B2 . . . .

(5) Data Type:

Indicates the data type of the item. When an item contains multiple fields, they are separated with a comma (:). When an item or field contains multiple data types, they are separated with square brackets and commas ([, , ]).

(6) Item Name

Indicates the name of the item.

Assign 0 to all "(RESERVED)" fields and "a" to their Classification fields. When it is 0, the software always have to mask the field then ignore the field.

The "(KIWI expansion field)" is secured for future format expansion. It is needed that information specified in other fields can be used to determine whether this field is secured or not. Also, the application programs must be set so as to ignore incomprehensive data specified in the expansion field.

The "(individual expansion field)" is a manufacturer-specific expansion field. Systems that do not support the individual expansion field must be also set so as to ignore it.

The word "(expansion field)" is used as a generic term when both the KIWI expansion field and individual expansion field exist.

(7) Remarks

Indicates comments for the item. (The number indicated in this column refers to the numbered paragraph described below the table.)

## (8) Classification

Indicates that a significant value must always be stored (the field is allocated) or the item can be deleted when a significant value does not have to be stored.

- a: A significant value must be always stored. (The field must always be allocated.)
- b: An "insignificant value (null)" may be stored in some case. (The field must always be allocated.)
- c: The item must be deleted when it is unnecessary. (As for the frames\* which manage a sequence of frames, however, even if all frame classifications are 'c', at least one frame must exist to secure the relation with managed frames.)

**1.3.2 How to Read Field Data**

(n) . . . (1)

No.	bit	Description		
(2)	(3)	(4)	bitm	Meaning
			(5)	(6)

(1) (n) . . . :

Indicates the name of a record or another item. (n) indicates the comment number.

(2) No.:

Indicates the item number given to each field.

(3) bit:

Indicates the range of a bit field.

(4) Description:

Indicates the name of the field.

(5) bitm:

Indicates the value for the bit to be assigned.

(6) Meaning:

Indicates what the value of the bit assigned means.

## 1.4 Expansion Method for the Format

This section describes the rules to implement upgrade of the KIWI specification and upgrade of other manufacturers' programs simultaneously, and handle the individual versions of multiple manufacturers' programs in a medium.

### 1.4.1 Rules for Upgrade in KIWI

- (1) RESERVED areas in the initial version are to be used for upgrade.
- (2) To upgrade which may influence the structure such as addition of fields or description, the rules used for individual upgrade of each manufacturer's program is applied.

### 1.4.2 Rules for Individual Upgrade

- (1) When each manufacturer uses the extended data, it requires its definition and the certain amount of the area allocated.
- (2) For individual upgrade, no RESERVED area must be used. New fields must be added.
- (3) For fields no longer used in a new version, apply invalid values (for fixed fields) or size 0 (for variable fields). These fields must not be reused for a new version.

### 1.4.3 How to Define Expansion

#### 1.4.3.1 Classifications for Individual Manufacturers

Define a manufacturer identification code by manufacturer using a metadata to identify (possible) manufacturers who provided programs to be individually-expanded in the medium. The metadata must contain the following:

```
Manufacturer identification code table {
  Number of manufacturer identification codes
  for ( i =0; i <= Manufacturer identification codes ;). {
    Index number;                ... Sequentially numbered from 0
    Manufacturer identification number {
      System-specific identification MID;
      Data author identification MID;    ... If unnecessary, 0 is assigned to this field.
      Start time;                      ... For management of history of the manufacture.
    }
  }
}
```

#### 1.4.3.2 All Expanded Data

name [All Expanded Data] (When the number of manufacturer identification codes is 1)

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	O	B1		Expanded Data		a

name [All Expanded Data] (When the number of manufacturer identification codes is 2 or more)

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	O	B1		A Sequence of Expanded Data Frames		a



**1.4.3.3 Expanded Data frame**

name [Expanded Data frame]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	B:B:N:N	Expansion Header Information		a
2	O1	2	N	Additional Manufacturer Identification Code		c
3	O2	2	SWS	Additional Expanded Data Size		c
4	O3	B1		Expanded Data		c

**1.4.3.4 Expansion Header Information**

No.	bit	Description		
1	15	Manufacturer Identification Area Type	bit15	Meaning
			0	Manufacturer identification code
			1	Additional table for manufacturer identification codes exists.
2	14	Expanded Data Size Area Type	bit14	Meaning
			0	Expanded data size
			1	Additional table for expanded data sizes exists.
3	13 to 10	Manufacturer identification Area (1)		
4	9 to 0	Expanded Data Size area (2)		

**(1) Manufacturer Identification Area**

When the manufacturer identification area type is the "Manufacturer identification code," specify the index number in the additional table for manufacturer identification codes. The allowable range is between 0 and 15.

When the manufacturer identification area type is "Additional table for manufacturer identification codes exists," this field is invalid.

**(2) Expanded Data Size Area**

When the expanded data size area type is the "Expanded data size," specify the expanded data size in the expanded data frame.

Data size = ("Expanded data size"+1) X 2. The allowable range is between 2 and 128.

When the expanded data size area type is "Additional table for expanded data sizes exists," this field is invalid.

**1.4.3.5 Additional Manufacturer Identification Code**

name [Additional Manufacturer Identification Code]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	N	Manufacturer Identification Code		a

- (1) Enabled when the manufacturer identification area type is "Additional table for manufacturer identification codes exists." Specify the index number in the additional table for manufacturer identification codes. The allowable range is between 0 and 65535.

**1.4.3.6 Additional Extended Data Size**

name [Additional Extended Data Size]

No.	offset	Data length	Data format	Item name	Remarks	Classification
1	0	2	SWS	Expanded Data Size		a

- (1) Enabled to indicate the expanded data size of the expanded data frame when the expanded data size area type is "Additional table for expanded data sizes exists." The allowable range is between 0 and 65535.

The expanded data size is ("Expanded data size"+1) X 2. The representation range is between 2 and 131070.

**1.4.3.7 Expanded Data**

For expanded data, entities of data are specified according to the specification specific to the manufacturer indicated with the manufacturer identification code.

**1.4.3.8 Example of Expansion**

```

for (Number of manufacturer identification codes){
  Header information {
    Manufacturer identification code (index for MID definition table) ... Defined by the KIWI specification
    Expansion part size (in 2 bytes) ... Defined by the KIWI specification
  }
  Entity of expansion block { ... Defined by the manufacturer
    for (number of nodes){ ... Same with the sequence of node records of
      Expansion node attribute ... basic part
      Expansion link attribute
      Additional node information flag
      Offset to additional expansion node information ... Offset from the beginning of expansion part
    }
    Additional node information {
      for (number of nodes with additional information){
        Sequence of information ... To be specified if necessary.
      }
    }
  }
}

```