

**Image Save And Carry (IS&C) Standard Version 1.00**

**Data Format**

**By IS&C Committee, Working Group 2**

**Issued on February 21, 1992  
Revised on October, 1993**

**English Version by Michio Kimura and Chieko Lobjinsky**

## Image Save And Carry (IS&C) ver1.00 Data Format

1. Foreword	2
2. Scope of the IS&C Data format	3
3. Outline of the IS&C Data Format	4
3.1. Information Object	4
3.2. The Relationship among IS&C Standard, ACR-NEMA and MIPS Standard	5
3.3. Multimedia Applications	5
4. File Management of IS&C	6
5. Description of Data Format	7
5.1. Structure of Data Format	7
5.2. Description of Header Data	8
5.3. Groups for Each Information Type	9
5.4. Description of Serial Images	10
5.5. Example of Header Data	11
5.6. Representation of Image Data	12
5.7. Diagnostic Reports	12
6. Descriptions of Groups and Elements	13
6.1. Legends for Group Element Table	13
6.2. Group Element Table	14
7. Examples of Group/Element Table	
7.1. CR	
7.2. Study with Contrast Agent	
7.3. DSA	
7.4. Nuclear Medicine	
7.5. CT	
7.6. MRI	
7.7. DR	
7.8. Film digitizer	
7.9. Ultrasound	
7.10. 3-D Data	

(Note for English version: Section 7 is not included in this English version. This is to be published in other volume.)

8. Representation of Other Images (Proposal)	
8.1 Representation of Color Images	
8.2. Representation of Waveform Data	
8.3. Endoscope and ECG	

(Note for English version: Section 8 is not included in English version, because other new data format for these data, which has no compatibility with the format herewith proposed, has been proposed already.)

Annex. Japanese Character Handling	38
------------------------------------	----

(Note for English version: This annex is originally from section 3 of "Supplements for Data Format v.1.0".)

## 1. Foreword

IS&C Committee has been engaged in development of data format standards for filing of medical images, texts etc.

The Data Format was made giving good considerations to following points:

1. IS&C system, as an archiving system, should feature its high speed input/output and its optimum resource utilization.
2. IS&C standard should have respect to communication standards because archiving is a part of communication in a broad sense.

Thus, IS&C standard, although it's well based on MIPS standard or ACR-NEMA standard, includes some typical items required to archiving systems, i.e. byte order regulations, new information types and indices etc..

By FSC (Format Study Committee), which was established in the Summer of 1990, theoretical simulation regarding several modalities were done.

Now, the each group element table for more than 10 modalities are normalized. The group element table for Endoscope or handling of wave-form data will be included after IS&C standard version 2.0. Format of series data will be investigated along with the study of ACR-NEMA version 3.0.

Up till now, meetings of Working Group 2 were held 23 times, the joint meeting with MIPS committee were held 10 times, through which IS&C committee could contribute MIPS standard as well.

In addition to that, Working group 2 investigated in its conformance tests, compression technic of image data, interfacing technic with the compact media, etc.. Norms of such items will be described in other documents.

\* If the temporally normalized items in version 1.0 should be implemented, it should be noted that upper compatibility of the system is not guaranteed.

(Note for English version: This means the contents of section 8.)

## 2. Scope of the IS&C Data Format

The IS&C system is composed of 6 hierarchical layers. They are:

1. Application layer
2. Data format management layer
3. Disk format management layer (File manager)
4. Driver management layer
5. Operating system
6. Physical layer (SCSI interface, MOD drive unit and MOD)

Data Format Management layer defines the format of the data which is directly read or written in the Application layer.

How the data should be stored on the disk is defined in the Disk Format Management layer, which is briefly described in the section 4.

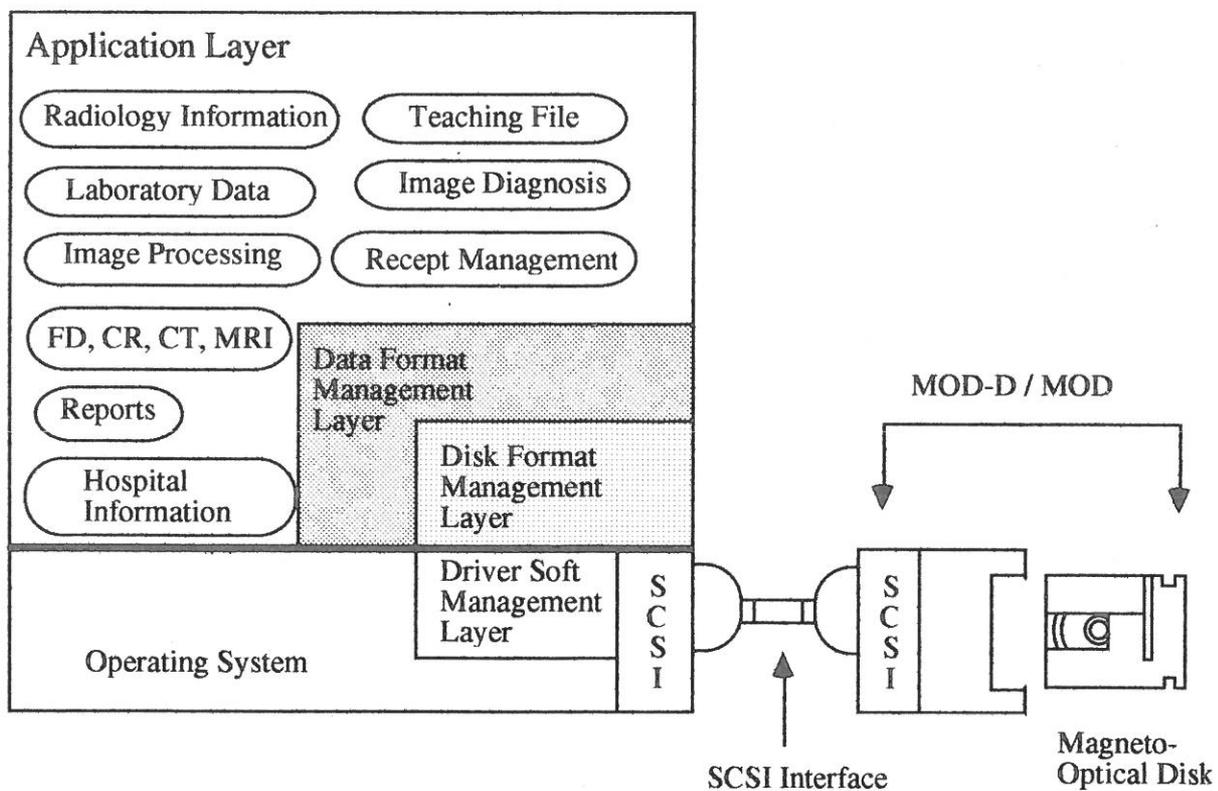


Fig. 2.1. Hierarchical structure of IS&C system

### 3. Outline of the IS&C Data Format

The characteristic of IS&C standard is that it deals with wide range of medical informations, not only radiological image data but also endoscopic images, cardiograms etc.. IS&C standard borrows the contents about radiological images from ACR-NEMA standard or MIPS standard. The contents about other kind of informations are added by IS&C committee.

#### 3.1. Information Object

##### (1) Radiological images

Images acquired at CT (Computed Tomography), NM (Nuclear Medicine), MR (Magnetic Resonance), US (Ultrasound), DS (Digital Subtraction Angiography), DR (Digital Radiography), CR (Computed Radiography), ET (Emission Tomography), FD (Film Digitizer), XF (X-ray film) or OT (Other) are included in this category. The value of the element (0009H,7E00H) is 'RAD'. The definition of such groups/elements as Patient information, Identifying information, Acquisition information etc. which accompany with Image data is borrowed from ACR-NEMA standard or MIPS standard, and supplemented with IS&C specific elements in shadow groups.

##### (2) Radiological diagnostic reports

The value of the element Information Object (0009H,7E00H) is 'REP'. Radiological diagnostic reports has no pixel data to write in the data area. The elements in the group Report Information 4001H are particularly for reports.

##### (3) Endoscopic images (Color pictures)

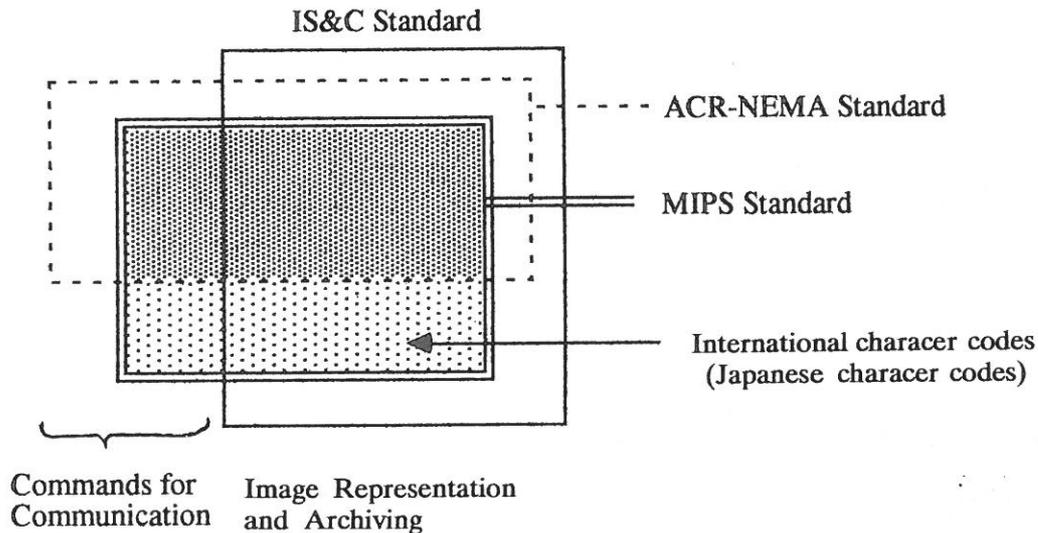
This defines the recording format of color pictures. There are two formats for arrangement of each red, green and blue data : (1) pixel interleave and (2) frame interleave. How to convert into electric signal is not specified here. (Ref. section 8).

##### (4) Cardiograms (Wave-shape data)

To file cardiograms, the data should be digitized first. Two kinds of digitizing method were considered here. One is to digitize the analog signal from cardiographic instrument with A-D converter, and the other is to use an image digitizer. (Ref. section 8).

### 3.2. The Relationship among IS&C standard, ACR-NEMA standard and MIPS standard.

MIPS standard is regarded as a subset of ACR-NEMA standard with definition of the elements whose value should be written in Japanese character code. IS&C standard is regarded as a subset of ACR-NEMA standard and MIPS standard with definition of the elements which are specific to IS&C standard.



### 3.3. Multimedia Applications

In IS&C standard, applications for non-radiological images such as reports, endoscopic images etc., are taken into consideration. The Information Object is recognized through the value in the element (0009H, 7E00H) as shown below.

3D-voxel:	Three dimensional voxel data
3D-display:	Two dimensional images for three dimensional presentation
PAT:	Patient information
INS:	Insurance information
DIS:	Disease information
DOC:	Information for doctors
MED:	Prescription data
CHE:	Clinical chemistry examination data
EEG:	Electroencephalograms
MEG:	Magnetoencephalograms
EMG:	Electromyograms
PAH:	Pathologic images
PHY:	Physiological examination
OTHER:	Others

#### 4. File Management of IS&C

Figure 4.1 shows file management method of IS&C. For detailed information, see document "IS&C Format, ver.1.0, Disk Format."

As shown in figure 4.2, header data, which are the demographic data for images they describe, are separated from image data. They are stored in a specific region (header zone) in a disk. This allows high speed sequential search and retrieve of header data.

(Note for English version: Fig. 4.1 and 4.2 are not included in this English version. They appear in "Disk Format" document.)

##### 1) System area

System area is for management of whole volume and each file. It comprises; volume management information, zone table, sector table, and index table.

Some part of system area are often rewritten, while other part may never be erased.

Zone table tells what kind of zone each zone of a disk is, and where vacancies of the disk are.

Sector table is made of bits representing each logical sector, showing vacancy of the volume. "1" in sector table means the logical sector it represents is used. "0", unused.

Index table has many indices which are managing data as files in a volume.

##### 2) Header zone

This zone is made of header data only. Each header data comprises demographic data for image data they represents. The structure of header data is described in Chapter 5.

A subset of this structure is compatible with ACR-NEMA and MIPS standard. This structure, however, has additional specifications for IS&C standard only. In the same time, some parts of the ACR-NEMA and the MIPS standard are deleted or shortened, especially what are not necessary for the IS&C standard.

##### 3) Data area

Image data files and directory files are accommodated in this area, according to the orders described in the system area.

Suitable sized blocked zone is used for image data files, depending on its size.

Any directory is handled as a regular data file. Its use is fully depended on its application. Its structure, however, is regulated.

## 5. Description of Data Format

### 5.1 Structure of Data Format

Header data which is separated from image data is composed of variable length data elements as shown in Figure 5.1. A space (20H) must be supplemented to a string of odd numbered bytes, because any data length must be even numbered.

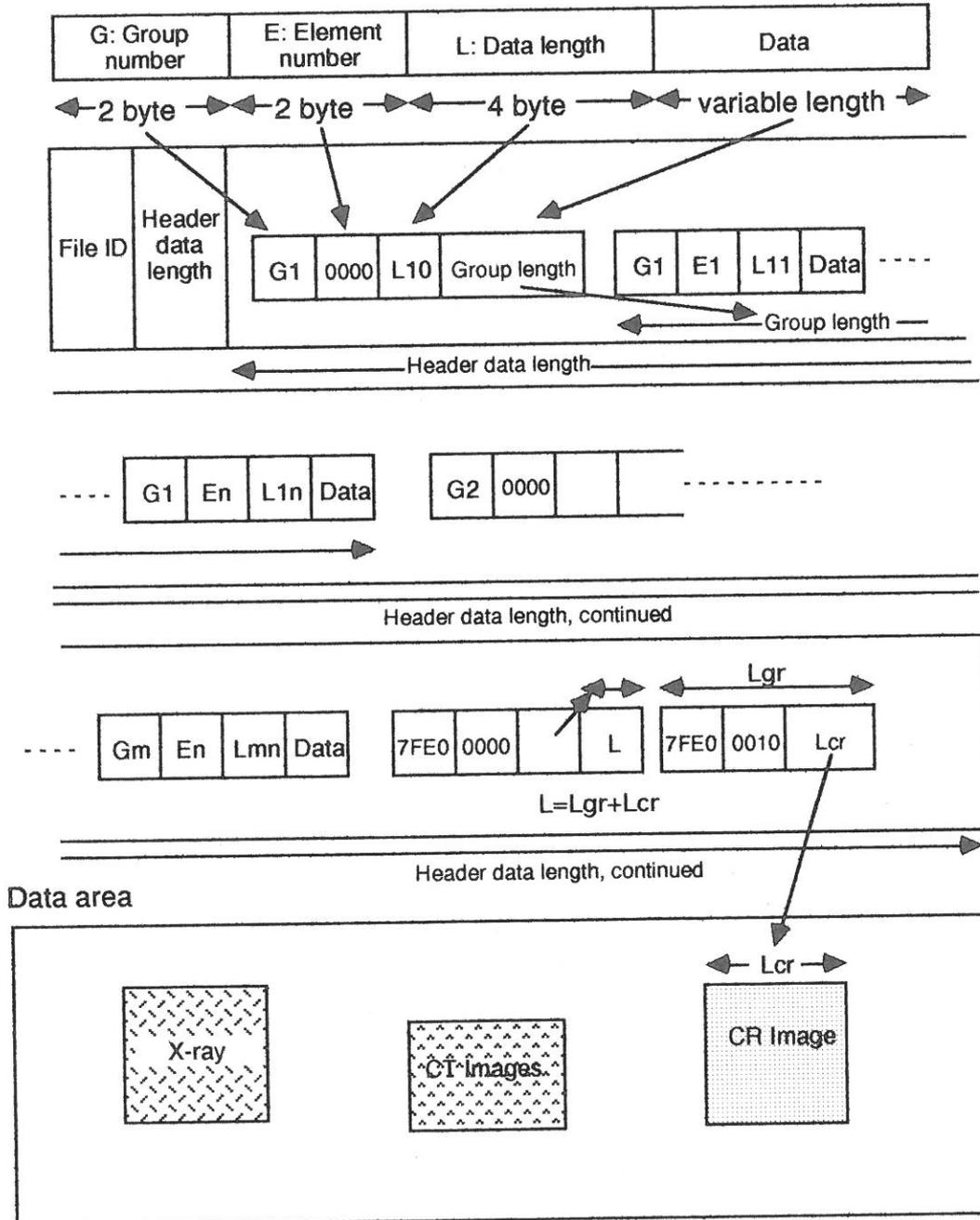


Figure 5.1 Structure of Data Format in IS&C

Data element is identified by group number and element number. Detailed description is in 6.2 Group Element Table.

In Figure 5.1, "Lcr" of group:7FE0 element:0010 stands for length of image data. Unlike ACR-NEMA or MIPS, where image data themselves follow, no image data come after this, within this group. As

described before, image data are stored in a separated region.

Contents of a data region are usually image data. Depending on applications, however, this can be other type of data such as digitized data of electrocardiogram, coded data of laboratory examination, etc.

## 5.2 Description of Header Data

### 1) Groups and their contents

Group Number	Information	Contents
0001	Other Information	Authorization information
0003	Character Set Information	Multi byte character extension
0008	ID Information	Image identifying information
0009	ID Information	Shadow group for 0008
0010	Patient Information	Information concerning the patient
0011	Patient Information	Shadow group for 0010
0018	Acquisition Information	Information on image diagnostic instruments and on image processing
0019	Acquisition Information	Shadow group for 0018
0020	Relationship Information	Image position, location, etc.
0021	Relationship Information	Shadow group for 0020 (Index information is included here.)
0028	Image Presentation Information	Pixel size, image format, manipulated image, etc.
0029	Image Presentation Information	Shadow group for 0028
4000	Information by Characters	
4001	Information on Image Reading	Information on diagnostic reports
6000	Overlay	Image overlay
7FE0	Image Data	Image data length (not image data themselves)

### 2) Relation with ACR-NEMA and MIPS

IS&C standard is designed to have utmost compatibility with ACR-NEMA and MIPS standards. Therefore, form of each datum consists of group number (2 bytes), element number (2 bytes), data length (4 bytes) and data (even numbered bytes), which are the same with the standards. These data are stored in the header zone, sorted by group number and element number in incremental order. In each group, element:0000 is for the length of the group. Image data are stored in group:7FE0 in ACR-NEMA and MIPS, while, in IS&C, image data are stored in separated data zone, for the purpose of high speed browsing of demographic data and directories.

### 3) Difference from ACR-NEMA and MIPS

#### a. Implicit default value for data type for null group

When a group has a group length zero, which means there is no element in this group, this whole group can be omitted. In ACR-NEMA and MIPS, type 1 cannot be omitted.

#### b. Byte order presentation method

The byte order presentation method in the volume management information (zone A) the header zone (zone B) is "Motorola" method. In image data (zone C to H), this is defined at group:0029 element:7E00. In ACR-NEMA and MIPS, it is "Intel" method.

#### c. Information type

IS&C standard is extended to host endoscope images, electrocardiogram, or laboratory examination, etc. which cannot be handled by ACR-NEMA and MIPS. Information type (group:0009, element:7E00) is used to specify this. "RAD" in this element means that this data is usual radiology image data.

#### d. Index

This is introduced to allow quick search and retrieval of images. This offers seven keys (index 1-7) for each image data. Index is valid within an examination. Element for this index is BI type (binary 16 bit). Meaning of each index depends on type of index;

- A type: nominal identification (the value has no meanings)
- B type: nominal identification (the value has meanings)
- C type: identification of sequence (order of the value has meanings)

Meaning of each index is defined for each imaging modality. For modalities which are not described in Chapter 6 group element table, data type for this is 3 and use of this element is discretion of users.

#### e. Pixel data

Image data are separated from header data, for the purpose of high speed addressing.

#### f. Kanji (Japanese character) code

JIS X0208 code with JIS X0202 escape sequence is used for Kanji characters. This combination allows mixed use of one byte ASCII characters and two byte Kanji characters. Escape sequence within ASCII strings tells that following codes should be recognized as two byte characters. Another escape sequence within Kanji characters puts the recognition to ASCII strings. In IS&C standard, any type of multiple byte characters can be used in elements with Value Type IT only. See appendix for multiple byte character use.

#### 4) Identification of IS&C standard

"IS&C 1.00" (Note this has even numbered bytes.) in group:0008 element:0010 declares that this is IS&C format. 1.00 is a version number.

#### 5) Default value for group 0001

Group	Element	Default value	Meaning
0001	0000	0000	group length
0001	007E	IS&C 1.00	IS&C version 1.00
0001	7E00	NULL	Authorization ID

### 5.3 Groups for Each Information Type

Information Type must be specified in IS&C standard. According to this information, application program can display or archive demographic informations, as well as images. Depending on information type, kinds of informations at header zones vary. Figure 5.3 shows which groups are required, optional, or not allowed for each information type.

Groups Information Types	0008	0009	0010	0018	0020	0028	4000	4001	6000	7FE0
	ID	Info. type	Pat.	Acq.	Relat.	Pres.	Char.	Rep.	O'lay	Pixel
RAD 3D-VOXEL 3D-DISPLAY	R	R	R	R	R	R	O	N	O	R
REP	R	R	R	O	O	O	O	R	N	N
END	R	R	R	R	R	R	O	N	O	R
ECG	R	R	R	R	R	R	O	N	O	R
PAT, INS, DIS, DOC, MED, CHE	R	R	R				R	N	N	N
OTHER	O	R	O	O	O	O	O	N	O	O
EEG, EMG, PAH, PHY	R	R	R				O	N		

R: required O: optional N: not allowed  
Empty: not yet defined

Figure 5.3 Information Types and Groups

#### 5.4 Description of Serial Images

X-CT, MRI, endoscopy produce series of images at an examination. They are usually handled by a series of images, not by a single image. IS&C should handle them in this way.

Policy of IS&C on this matter is to consider the result of folder description of ACR-NEMA DICOM ver.3.0, in a viewpoint of having maximum compatibility with the ACR-NEMA DICOM standard. For the time being, however, one of following methods may be applied to the archiving of serial images within the specification of IS&C ver.1.00;

1) by header information

This is to sort or display images according to the contents of the headers of the images.

2) by directory file

This is to make a directory file which describes the relations between the images. (Folder by reference)

3) by naming of file

This is to name each image files in a certain regulation. This is not recommended because IS&C does not check file names.

4) by filing serial images within a file

This is to merge image data within an image data. (Folder by value) As merging technique is not described explicitly, this method may lack compatibility between many applications.

As a current conclusion, IS&C committee recommends method 1) or 2).

## 5.5. Example of Header Data

Following Figure 5.5 shows an example of header data, sorted by group number and element number.

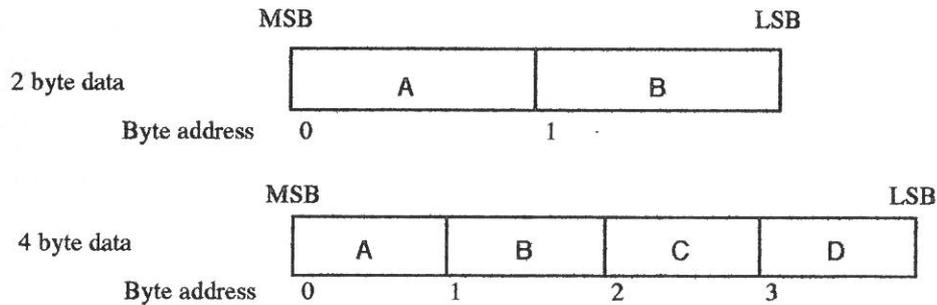
Figure 5.5 Example of Header Data

Group	Element	Data Length	Contents	Explanations
0008	0000	0000 0004	0000 007E	An even number of bytes from the end of the value field to the beginning of the next group.
0008	0001	0000 0004	0010 0164	An even number of bytes of all groups and elements of this header, from the top of the next element, plus the pixel data.
0008	0010	0000 000A	4953 2643 2031	[IS&C 1.00 ] Recognition code
			2E30 3020	
0008	0020	0000 000A	3139 3835 2E31	[1985. 11. 25] Study date
			312E 3235	
0008	0030	0000 0008	3132 3A30 353A	[12:05:59] Study time
			3539	
0008	0040	0000 0002	0000	Data set type = IMAGE
0008	0060	0000 0002	4452	[DR] Modality
0008	0070	0000 0004	4142 4344	[ABCD] Manufacturer
0008	0080	0000 000E	4D45 4449 5320	[MEDIS HOSPITAL] Institution ID
			484F 5350 4954	
			414C	
0008	0090	0000 0004	4142 4344	[ABCD] Referring Physician
0009	0000	0000 0004	0000 001E	An even number of bytes from the end of the value field to the beginning of the next group.
0009	007E	0000 000A	4953 2643 2031	[IS&C 1.00 ] Recognition code
			2E30 3020	
0009	7E00	0000 0004	5241 4420	[RAD ] Information type = Radiology related image
0010	0000	0000 0004	0000 0040	An even number of bytes from the end of the value field to the beginning of the next group.
0010	0010	0000 000C	5941 4D41 4441	[YAMADA TARO ] Patient name
			2054 4152 4F20	
0010	0020	0000 0008	3130 322D 3330	[102-304 ] Patient ID
			3420	
0010	0030	0000 000A	3139 3236 2E31	[1926. 11. 25] Patient birthdate
			312E 3235	
0010	0040	0000 0002	4D20	[M ] Patient sex
0018	0000	0000 0004	0000 0000	An even number of bytes from the end of the value field to the beginning of the next group.
0020	0000	0000 0004	0000 0018	An even number of bytes from the end of the value field to the beginning of the next group.
0020	0010	0000 0004	3239 3033	[2903] Study number
0020	0020	0000 0004	525C 4620	[RVF ] Patient orientation
0028	0000	0000 0004	0000 002C	An even number of bytes from the end of the value field to the beginning of the next group.
0028	0010	0000 0002	0400	Rows = 1024
0028	0011	0000 0002	0400	Columns = 1024
0028	0030	0000 0006	202E 335C 2E33	[ . 3%. 3] Pixel size = 0.3 x 0.3 (mm)
				(Note for English version: 1-byte JIS code of the "¥" is 5C, which is in ASCII "\")
0028	0100	0000 0002	0008	Bits allocated = 8
7FE0	0000	0000 0004	0010 0008	An even number of bytes from the end of the value field to the beginning of the next group, including the pixel data.
7FE0	0010	0010 0000		Pixel data size = 1,048,576 bytes.

## 5.6 Representation of Image Data

### 5.6.1 Byte Order Presentation

There are two methods of byte order presentation; Big endien (Motorola method) and Little endien (Intel method). Discrimination between these can be done by group:0029 element:7E00. The header data itself, however, allows only Big endien, as shown below.



### 5.6.2 Pixel Data Representation

For gray scaled image, group:0008 element:0040 "Data Set Type" should be "0000" (IMAGE). Presentation factors should be described in elements of group:0028.

### 5.6.3 Description of Image Data Length

For the purpose of keeping compatibility with ACR-NEMA and MIPS, group:7FE0 element:0000 and group:7FE0 element:0010, which specifies the beginning of pixel data in ACR-NEMA and MIPS, are positioned at the end of the header data of IS&C, as if pixel data were following the header data. Data length described at group:0008 element:0001 must include the length of pixel data.

## 5.7 Diagnostic Reports

In order to describe a diagnostic report in IS&C, an independent file of report, whose group:0009 element:7E00 "Information Type" is "REP", should be made. Diagnostic report file has only header informations. Image data may not be attached.

Content of a report must be described as a text data of characters. Here, digitized handwritten report scanned by a scanner is not within consideration. This should be handled as "an image".

Content of a report is stored in elements of group:4001. For the time being, findings (4001/7E10) and diagnosis (4001/7E20) have type 2 (except for other identifying informations.) All the other informations such as diagnostic code, recommended examinations, etc. are type 3.

Method of description of findings and diagnoses are at the discretion of users. Multiple contents can be described, provided that a delimiter is "\", according to the ACR-NEMA and MIPS standards.

Because current file manager is not fully able to control accesses to header informations, application software should check the access right to the findings and the diagnoses.

## 6. Descriptions of Groups and Elements

### 6.1 Legends for Group Element Table

Modality Symbols (for radiologic images, whose INFORMATION TYPE is RAD)

CT	X-ray Computed Tomography (including plain X-ray image, produced by this apparatus, for the purpose of slice location description)
NM	Nuclear Medicine
MR	Magnetic Resonance Imaging (including MR Spectroscopy)
US	Ultrasound
DS	Digital Subtraction Angiography
DR	Digital Radiography (which are not CT, DS, FD)
CR	Computed Radiography
ET	Emission Tomography
FD	Film Digitizer (Type of the film content is to be described in 0019/7E02 "Original Data".)
XF	X-ray Film
OT	Other

VR: Value Representations

BI	16 bit binary (2's complement, except for pixels which are separately labeled)
BD	32 bit binary, used for group length
AN	ASCII numeric (numerics described by ASCII characters 0-9, +, - and .)
AT	ASCII text (character text described by JIS X0201 (almost same as ASCII) characters 20-7E, 0A, and 0D)(5C can only be used for delimiter)
IT	International text, which allow multiple byte characters (See Annex for multi byte character use.)

VT: Value Types

EV	Enumerated value for which a list of appropriate entries are given in the dictionary
DF	Defined format (AN or AT)
FF	Free form (AN, AT or IT)
HX	Any hexadecimal number (BI or BD)

VM: Value Multiplicity

S	Single
M	Multiple

Type

1	Essential for archival and display, and the value field must contain valid data (However, if there is no content in the whole group, the group may be omitted.)
1D	Same as above. Default value stated in the standard is used in case of absence of description
2	Essential for diagnosis, and must contain valid data. If the value for s data element is not known, that data element must have the length set to zero and with no value.
2D	Same as above. Default value stated in the standard is used in case of absence of description
3	Use is at the discretion of users

Notes

Only when Modality (G:0008 E:0060) is FD, XF can be used for Original Data Modality (G:0019 E:7E02).

When the Data Type is not listed under the type column, the Data Type is modality specific and listed under symbols for the modality. If the Type Default is modality dependent and not defined for a given modality, it is type 3 for that modality if used.

All group and element numbers are in hexadecimal.

All dates are given in "yyyy.mm.dd". For example, it is like 1991.11.01 with the decimal points explicitly present.

Unless explicitly stated otherwise, all times are given in "hh:mm:ss.frac" in 24 hour time with the colons and decimal point explicitly present.

When enumerated values, defined format values or defaults are shown in the element descriptions, padding spaces (if needed) are not shown. Any necessary padding, however, shall be included in actual messages and files.

## 6.2. Group Element Table

### Notes

Elements with number 7Exx in shadow groups (odd numbered groups) are originated by IS&C committee. Their group and element numbers are shown as 0001 7E00.

Elements with number 7Fxx are originated by MIPS committee and thus inherited to this standard. Their group and element numbers are shown as 0009 7F01.

In both case of IS&C addition and MIPS addition, elements for group length (E:0000) and recognition code (E:007E) shall be introduced.

Group 0001, 0003, 0011 are optional informations which are common to every information type. Refer to figure 5.3 for other groups.

Elements which have \*\* before element number (such as "\*\*\*7E01") are tentative definitions. Upper compatibility at future versions are not guaranteed.

Groups which have Group Length element only can be omitted.

Data Length of (G:0008, E:0001) and (G:7FE0, E:0000) includes pixel data length.

Each elements are recorded in disk, according incrementally first to group number, second to element number.

Elements with VR value "AT\*" have shadow elements with same name but different character code.

Values in [ ] by Gothic font are data themselves. Note that bytes in [] must be even numbered.

**GROUP 0001**  
**OTHER INFORMATION (Optional)**

<u>Group</u>	<u>Element Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
0001	0000 Group Length	BDHX	S	1			An even number of bytes from the end of the value field to the beginning of the next group.
0001	007E Recognition Code	A	TEV	S	1		[IS&C 1.00 ]
<u>0001</u>	<u>7E00</u> Recognition ID	IT	FF	S	2D	NONE	Recognition identification

-Recognition ID will be added, when file manager will change from the original file to authorized original file.

GROUP 0003  
CHARACTER SET INFORMATION (Optional)

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
0003	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the beginning of the next group.
0003	007E	Recognition Code	AT	EV	S	1		[ IS&C 1.00 ]
<u>0003</u>	<u>7E00</u>	Default Character Set	AT	EV	S	2D	[14]	ECMA registration number of default character set for VR=IT elements. ASCII=2, JIS Kana=13, JIS Roman=14, JIS Kanji=87
<u>0003</u>	<u>7E10</u>	Extended Character Set	AT	EV	S	2D	NONE	ECMA registration number of extended character which can be used in elements of VR=IT. See appendix for extension technique.

**GROUP 0008  
IDENTIFYING INFORMATION**

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
0008	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the beginning of the next group.
0008	0001	Length to End	BD	HX	S	1		An even number of bytes from the end of the value field to the end of the data set.
0008	0010	Recognition Code	AT	EV	S	1		[ IS&C 1.00 ]
0008	0020	Study Date	AT	EV	S	2		The date on which the study started. the form is yyyy.mm.dd; e.g. 1984.07.18.
0008	0021	Series Date	AT	DF	S	3		The date on which the series started. The format is yyyy.mm.dd.
0008	0022	Acquisition Date	AT	DF	S	3		The date on which the acquisition started. The format is yyyy.mm.dd.
0008	0023	Image Date	AT	DF	S	3		The date on which reconstruction of this image started. The format is yyyy.mm.dd.
0008	0030	Study Time	AT	DF	S	2 (3 for FD)		The time the study started. The format is hh:mm:ss.frac; e.g., 10:05:03.0001(24 hour time.)
0008	0031	Series Time	AT	DF	S	3		The time the series started. The format is hh:mm:ss.frac; e.g., 10:05:03.0001(24 hour time.)
0008	0032	Acquisition Time	AT	DF	S	3		The time the acquisition started. The format is hh:mm:ss.frac(24 hour time).
0008	0033	Image Time	AT	DF	S	3		The time at which reconstruction of this image started. The format is hh:mm:ss.frac(24 hour time).
0008	0040	Data Set Type	BI	EV	S	1		The data set type being

						sought or transmitted. Enumerated values listed as following IMAGE = 0000 GRAPHICS = 0002 OTHER = 0100 NULL = 0101 IDENTIFIER = 0102
0008	0041	Data Set Subtype	AT EV S	3		For future use
0008	0060	Modality	AT EV S	2		Source equipment for the image. Values are CT,NM, MR,DS,DR,US,CR,ET, FD,OT.
0008	0070	Manufacturer	AT*FF S	2		Manufacturer of the equipment that produced the digital image. In the case of digitized film, the manufacturer of the digitizer.
0008	0080	Institution ID	AT*FF S	2		Institution at which the digital image originated.
0008	0090	Referring Physician	AT*FF M	2		Patient's primary referring physician.
0008	1010	Station ID	AT FF S	2		Label identifying the machine that generated the digital image.
0008	1040	Institutional Department	AT*FF S	3		For example: radiology, cardiology, nuclear medicine, medical imaging, radiation therapy, etc.
0008	1060	Radiologist	AT*FF M	3		Radiologist interpreting the examination.
0008	1070	Operator Identification	AT*FF M	3		Technologist supporting the examination.
0008	1080	Admitting Diagnosis	AT*FF M	3		Description of admitting diagnosis.
0008	4000	Comments	AT*FF M	3		

GROUP 0009  
IDENTIFYING INFORMATION (Shadow)

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
0009	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the beginning of the next group.
0009	007E	Recognition Code	AT	EV	S	1		[IS&C 1.00 ]
<u>0009</u>	<u>7E00</u>	Information Type	AT	EV	S	1		RAD: Radiology related image 3D-VOXEL:3D Voxel Data REP:Report PAT:Patient information INS:Insurance information DIS:Disease information DOC:Document MED:Medicine CHE:Laboratory test END:Endoscopic image ECG:Electrocardiogram EEG:Electroencepharogram EMG:Electromyogram PAH:Pathological information PHY:Physiological exam. OTHER:Other information
<u>0009</u>	<u>7E03</u>	Referring Department	IT	FF	S	3		Clinical department where examination was requested.
<u>0009</u>	<u>7E90</u>	Organ	AT	FF	M	3		Organ of interested or target organ (for 3D).
<u>0009</u>	<u>7E91</u>	Pixel Value	AT	FF	M	3		Pixel width for each organ described in G:0009 E:7E90.
<u>0009</u>	<u>7E92</u>	Creator	AT	FF	M	2		Person who created 3D (for 3D only) images.
<u>0009</u>	<u>7E93</u>	Processing System	AT	FF	M	2		System name which (for 3D only) processed 3D images.
0009	007F	Recognition Code	AT	EV	S	1		[MIPS 2.1] Shadow user registration for elements 7F00-7FFF.
<u>0009</u>	<u>7F01</u>	Manufacturer	IT	FF	S	2		Manufacturer of the equipment that produced the digital image. In the case of digitized film, the manufacturer of the digitizer.
<u>0009</u>	<u>7F02</u>	Institution ID	IT	FF	S	2		Institution at which the digital image originated.

<u>0009</u>	<u>7F03</u>	Referring Physician	IT	FF	M	2	Patient's primary referring physician.
<u>0009</u>	<u>7F05</u>	Institutional Department	IT	FF	S	3	For example: radiology, cardiology, nuclear medicine, medical imaging, radiation therapy, etc.
<u>0009</u>	<u>7F06</u>	Radiologist	IT	FF	M	3	Radiologist interpreting the examination.
<u>0009</u>	<u>7F07</u>	Operator Identification	IT	FF	M	3	Technologist supporting the examination.
<u>0009</u>	<u>7F08</u>	Admitting Diagnosis	IT	FF	M	3	Description of admitting diagnosis.
<u>0009</u>	<u>7F40</u>	Comments	IT	FF	M	3	

**GROUP 0010  
PATIENT INFORMATION**

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
0010	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the beginning of the next group.
0010	0010	Patient Name	AT*FF		S	2		Patient's legal name.
0010	0020	Patient ID	AT	FF	S	2		Primary hospital identification number or code for the patient.
0010	0030	Patient Birthdate	AT	DF	S	2		Date of birth of the named patient. The format is yyyy.mm.dd. For example: 1984.11.01.
0010	0040	Patient Sex	AT	EV	S	2		Sex of the named patient: M,F, or O for Other or unknown.
0010	1000	Other Patient ID	AT	FF	S	2D	NONE	Other identification numbers or codes used to identify the patient.
0010	1010	Patient Age	AT	DF	S	3		Patient age given as xxxD, xxxW, xxxM, or xxxY, for day, week, month, or year.
0010	4000	Comments	AT*FF		M	3		

**GROUP 0011**  
**PATIENT INFORMATION (Shadow)**

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
0011	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the beginning of the next group.
0011	007F	Recognition Code	AT	EV	S	1		[MIPS 2.1] Shadow user registration for elements 7F00-7FFF.
<u>0011</u>	<u>7F01</u>	Patient Name (Kana)	IT	FF	S	3		Patient's name in 1 byte Kana characters. If Default Character Set (G:0003 E:7E00) is other than JIS Kana, certain escape sequence must be inserted.
<u>0011</u>	<u>7F02</u>	Patient Name (Kanji)	IT	FF	S	3		Patient's name in Kanji characters.
<u>0011</u>	<u>7F03</u>	Patient Other Name	IT	FF	M	3		Patient alias name to identify the patient.
<u>0011</u>	<u>7F40</u>	Comments	IT	FF	M	3		

GROUP 0018  
ACQUISITION INFORMATION  
(\*: See ACR-NEMA v.2 for Definitions.)

Group	Element	Name	VR	VT	VM	Type Default										Definition		
						CT	NM	MR	DS	US	DR	CR	ET	FD				
0018	0000	Group Length	BD	HX	S	1												An even number of bytes from the end of the value field to the beginning of the next group.
0018	0010	Contrast/ Bolus Agent	AT*FF	M	2D	NONE												Contrast or bolus agent: NONE means none used. Multiple entries refer to multiple injections. See (0018,1040-1044) for optional further description.
0018	0020	Scanning Sequence	AT	FF	M		2	2	2	2	2D	2D	-	2	-			Description of the type of data taken. IR,SE,PS etc. for MR. Dual energy, cardiac gated, etc. for CT.
0018	0030	Radio- nuclide	AT	FF	M		-	2	-	-	-	-	-	-	-			Name of isotope administered. See (0018,1070-1075). If multiple isotopes, all elements have values in corresponding order.
0018	0040	Cine Rate	AN	FF	S	2D												Number of images per second.
0018	0050	Slice Thickness	AN	FF	S		2	2	2	-	3	3	-	2	-			Nominal slice thickness in mm.
0018	0060	KVP	AN	FF	M		2	-	-	3	-	3	3	-	-			KV output of the x-ray generator used.
0018	0070	Counts Accumulated	AN	FF	S		-	2	-	-	-	-	-	2	-			Sum of all gamma events.
0018	0080	Repetition Time	AN	FF	S		-	-	2	-	-	-	-	-	-			The period of time in msec. between the beginning of a pulse sequence and the beginning of the succeeding pulse sequence.
0018	0081	Echo Time	AN	FF	S		-	-	2	-	-	-	-	-	-			*
0018	0082	Inversion Time	AN	FF	S		-	-	2	-	-	-	-	-	-			*

0018	0083	Number of Averages	AN FF S 3								*
0018	0084	Imaging Frequency	AN FF S	-	-	2	-	-	-	-	*
0018	0085	Imaged Nucleus	AT FF S	-	-	2	-	-	-	-	*
0018	0086	Echo Number	AN FF M 3								*
0018	0090	Data Collection Diameter	AN FF S 3								*
0018	1000	Device Serial Number	AT FF S 3								*
0018	1020	Software Version	AT FF S 3								*
0018	1030	Protocol	AT FF S 3								*
0018	1040	Contrast /Bolus Route	AT*FF M 3								*
0018	1041	Contrast /Bolus Volume	AN FF M 3								*
0018	1042	Contrast /Bolus Start Time	AT DF M 3								*
0018	1043	Contrast /Bolus Stop Time	AT DF M 3								*
0018	1100	Reconstruction Diameter	AN FF S	3	-	3	-	-	-	3	*
0018	1110	Distance Source to Detector	AN FF S	3	3	-	3	-	3	3	*
0018	1111	Distance Source to Patient	AN FF S	3	-	-	3	-	-	3	*
0018	1120	Gantry Tilt	AN FF S	3	-	-	-	-	-	3	*
0018	1130	Table Height	AN FF S	3	-	-	-	-	-	3	*
0018	1151	Exposure Rate	AN FF S	3	-	-	3	-	3	3	*
0018	1152	Exposure	AN FF S	3	-	-	3	-	3	3	*
0018	1160	Filter Type	AT*FF M	3	-	-	3	-	3	3	*
0018	1200	Date of Last Calibration	AT DF M	3	3	3	-	-	-	3	*
0018	1201	Time of Last Calibration	AT DF M	3	3	3	-	-	-	3	*
0018	1210	Convolution	AT FF M	3	-	-	-	-	-	3	*

## Kernel

0018	1240	Upper/Lower Pixel Values	AN FF M	-	3	-	-	-	-	-	3	-	*
0018	1242	Data Acquisition Duration	AN FF S	-	3	-	-	-	-	-	3	-	*
0018	1243	Count Rate	AN FF S	-	3	-	-	-	-	-	3	-	*
0018	1250	Receiving Coil	AT FF S	-	-	3	-	-	-	-	-	-	*
0018	1251	Transmitting Coil	AT FF S	-	-	3	-	-	-	-	-	-	*
0018	4000	Comments	AT*FF M	3									
0018	5000	Output Power	AN FF M	-	-	-	-	3	-	-	-	-	*
0018	5010	Transducer Data	AT FF M	-	-	-	-	3	-	-	-	-	*
0018	5020	Preprocessing Function	AT FF S	-	-	-	-	3	-	-	-	-	*
0018	5021	Postprocess- ing Function	AT FF S	-	-	-	-	3	-	-	-	-	*
0018	5030	Dynamic Range	AN FF S	-	-	-	-	3	-	-	-	-	*
0018	5040	Total Gain	AN FF S	-	-	-	-	3	-	-	-	-	*
0018	5050	Depth of Scan Field	AN FF S	-	-	-	-	3	-	-	-	-	*
0018	5100	Patient Posture	AT FF S	3									*





<u>0019</u>	<u>7EA2</u>	Method of	IT	FF	M	3		(e.g., [INTERPOLATION ENHANCEMENT THRESHOLDING]).
<u>0019</u>	<u>7EFF</u>	Comment	IT	FF	M	3		
<u>0019</u>	<u>007F</u>	Recognition Code	AT	EV	S	1		[MIPS 2.1]
<u>0019</u>	<u>7F01</u>	Contrast/Borus	IT	FF	M	3		Name(s) of contrast/borus agent. (See 0018/1040).
<u>0019</u>	<u>7F02</u>	Contrast/Borus Route	IT	FF	M	3		Administration route of contrast agent. (See 0018/1041).
<u>0019</u>	<u>7F40</u>	Comment	IT	FF	M	3		
<u>0019</u>	<u>7F52</u>	CR Sensitivity	AN	FF	S		<u>CT NM MR DS US DR CR ET FD</u> - - - - - 2 - -	Sensitivity of CR.

GROUP 0020  
 RELATIONSHIP INFORMATION  
 (\*: See ACR-NEMA v.2 for Definitions.)

Group	Element	Name	VR	VT	VM	Type Default											Definition	
						CT	NM	MR	DS	US	DR	CR	ET	FD				
0020	0000	Group Length	BD	HX	S	1												*
0020	0010	Study	AT	FF	S	2												*
0020	0011	Series	AN	FF	S	2D	1											*
0020	0012	Acquisition	AN	FF	S	2D	1											*
0020	0013	Image	AN	FF	S	2D	1											*
0020	0020	Patient Orientation	AT	EV	M		2	2	2	2	3	3	3	2	3			*
0020	0030	Image Position	AN	FF	M		2	2	2	-	-	-	-	2	-			*
0020	0035	Image Orientation	AN	FF	M					1	0	0	0	1	0			*
							1	0	0	0	0	1	0	0	0	1		(for 3D)
							2D	2D	2D	-	-	-	-	2D	-			
0020	0050	Location	AN	FF	S		2	2	2	-	2	-	-	2	-			*
0020	0060	Laterality	AT	EV	M	2D												Not paired structure *
0020	0070	Image Geometry Type	AT	FF	S	2D												Planar *
0020	0080	Masking Image	AT	FF	M	2D												Not subtraction image *
0020**	1002	Images in Acquisition	AN	FF	S	3												*
0020	1020	Reference	AT	DF	M		-	3	-	-	-	-	-	3	-			*
0020	1040	Position Reference Indicator	AT*	FF	S		3	-	3	-	-	-	-	3	-			*
0020	1041	Slice	AN	FF	S		3	-	3	-	-	-	-	3	-			*
0020	4000	Comment	AT*	FF	M	3												
0020	5000	Original Image Identification	BI	HX	M	2D												*
0020	5002	Original Image Identification Nomenclature	AT	FF	M	2D												*

GROUP 0021  
RELATIONSHIP INFORMATION (Shadow)

Group	Element	Name	VR	VT	VM	Type Default										Definition	
						CT	NM	MR	DS	US	DR	CR	ET	FD			
0021	0000	Group Length	BD	HX	S	1											An even number of bytes from the end of the value field to the beginning of the next group.
0021	007F	Recognition Code	AT	EV	S	1											[IS&C 1.00 ]
							CT NM MR DS US DR CR ET FD										
<u>0021</u>	<u>7E01</u>	Index 1	BI	HX	S		2	3	3	3	3	3	2	3	*		Index 1
<u>0021</u>	<u>7E02</u>	Index 2	BI	HX	S		2	3	3	3	3	3	2	3	*		Index 2
<u>0021</u>	<u>7E03</u>	Index 3	BI	HX	S		2	2	3	3	3	3	2	2	*		Index 3
<u>0021</u>	<u>7E04</u>	Index 4	BI	HX	S		2	3	3	3	3	3	2	3	*		Index 4
<u>0021</u>	<u>7E05</u>	Index 5	BI	HX	S		2	2	3	3	3	3	2	2	*		Index 5
<u>0021</u>	<u>7E06</u>	Index 6	BI	HX	S		2		3	3	3	3	2		*		Index 6
<u>0021</u>	<u>7E07</u>	Index 7	BI	HX	S		2		3	3	3	3					Index 7
							(See next page figure for contents of indices.) (* at FD is: 2, if original modality(0019/7E02) = XF, otherwise, 3.)										
<u>0021</u>	<u>7E10</u>	Original Image Identification	BI	HX	M	2D											The ordered sets of groups, that specify the structure used to uniquely identify the image.
<u>0021</u>	<u>7E11</u>	Original Image	AT	FF	M	2D											The ordered naming sets that specify the naming structure used to uniquely identify the image.
0021	007F	Recognition Code	AT	FF	S	1											[MIPS 2.1]
<u>0021</u>	<u>7F01</u>	Position Reference Indicator	IT	FF	S	3	-	-	-	-	-	-	-	-	-	-	Part of the patient's anatomy used as a reference.
<u>0021</u>	<u>7F40</u>	Comment	IT	FF	M	3											

## Index Contents

	X-ray Film CR		CT		NM		ET		MR	
		Type		Type		Type		Type		Type
Index 1	Region	A	Region	A	Region	A	Region	A	Region	A
Index 2	Imaging method	A	Type of image (*1)	B	Method of acquisition (*2)	B	Method of acquisition (*2)	B	Type of image (Change of TR,TE,TI, flip angle,,)	A
Index 3	Contrast/Borus agent (*3)	B	Contrast/Borus agent (*3)	B	Radionuclide	A	Radionuclide	A	Contrast/Borus agent (*3)	B
Index 4	Tomography (*4)	B	Reference anatomical point	A	Type of image (raw, processed, composite,,)	A	Type of image (planar, transaxial, sagittal, coronal, locator,,)	A	Echo number	C
Index 5	Sequence of acquisition date, time	C	Sequence of offset from reference point	C	Sequence of image generation date, time	C	Sequence of image generation date, time	C	Referencel point of slice location	A
Index 6	Sequence of depth	C	Sequence of scan start date, time	C					Sequence of offset from reference point	C
Index 7			Optional information	C					Sequence of acquisition date, time	C

Indices for MR is tentative.

Indices for US, DR are not stated in this version.

Index type      A: Nominal, with no meaning of value  
                     B: Nominal, with meanings of value specified  
                     C: Sequence

\*1      0000: Scout image, 0001: Axial scan image, 0002-000F: Reserved for future use.

\*2      0000: Static, 0001: Dynamic, 0002: Gate, 0003-000F: Reserved for future use.

\*3      0000: Without contrast, 0001: With contrast, 0002-000F: Reserved for future use.

\*4      0000: Not a tomography, 0001: Tomography, 0002-000F: Reserved for future use.

**GROUP 0028**  
**IMAGE PRESENTATION INFORMATION**  
 (\*: See ACR-NEMA v.2 for Definitions.)

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>											<u>Default</u>	<u>Definition</u>
						<u>CT</u>	<u>NM</u>	<u>MR</u>	<u>DS</u>	<u>US</u>	<u>DR</u>	<u>CR</u>	<u>ET</u>	<u>FD</u>				
0028	0000	Group Length	BD	HX	S	1												*
0028	0005	Image Dimensions	BI	HX	S	1D									0002			0003=VOXEL
0028	0010	Rows	BI	HX	S	1												*
0028	0011	Columns	BI	HX	S	1												*
0028	0030	Pixel Size	AN	FF	M		2	2	2	3	2	3	2	2	3			*
0028	0100	Bits Allocated	BI	HX	S	1D									0010			1 or 8, 16, 24,,
0028	0101	Bits Stored	BI	HX	S	1D									Allocated bits			*
0028	0103	Pixel Representation	BI	EV	S	1D									0001			*
0028	1050	Window Center	AN	FF	M	3												*
0028	1051	Window Width	AN	FF	M	3												*
0028	1052	Rescale Intercept	AN	FF	M	3												*
0028	1063	Rescale Slope	AN	FF	M	3												*
0028	4000	Comment	AT*FF	M	3													

**GROUP 0029**  
**IMAGE PRESENTATION INFORMATION (Shadow)**

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type Default</u>							<u>Definition</u>	
						<u>CT</u>	<u>NM</u>	<u>MR</u>	<u>DS</u>	<u>US</u>	<u>DR</u>	<u>CR</u>		<u>ET</u>
0029	0000	Group Length	BD	HX	S	1								An even number of bytes from the end of the value field to the beginning of the next group.
0029	007F	Recognition Code	AT	EV	S	1								[IS&C 1.00 ]
0029	7E00	Byte Order	BI	EV	S	1								Byte order of pixel 0000=Big endien (Motorola) 0001=Little endien (Intel)
0029	7E80	Color/BW	BI	EV	S	1D	0000							0000=Monochrome 0001=Color (RGB)
0029	7E81	Interleave Type	BI	EV	S	1D	0000							0000=Frame interleave 0001=Pixel interleave
0029	7E82	Padding	BI	EV	S	1D	0000							0000=No padding 0001=With padding
0029	7E83	Padding Length	BI	EV	M	1D	0000							Length of padding data (byte)
0029	7EA0	Depth of 3D Image	BI	HX	S	(1 for 3D)								Pixels of depth direction
0029	7EA1	Presentation of 3D image	AT	FF	S	(2 for 3D)								volume rendering, surface rendering, stereo, etc.
0029	7EA2	Sequence of Stereo Image	AT	DF	S	2D	RL (for 3D stereo)							Image sequence, RL or LR.
0029	7EA3	Viewing Point	AT	FF	S	(2 for 3D)								Angle, vector, anatomical descriptions, etc.
0029	007F	Recognition Code	AT	FF	S	1								[MIPS 2.1]
0029	7F40	Comment	IT	FF	M	3								

GROUP 4000  
TEXT

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
4000	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the beginning of the next group.
4000	0010	Arbitrary	IT	FF	M	1		Text
4000	4000	Comment	IT	FF	M	3		

GROUP 4001  
REPORT INFORMATION (Shadow)

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
4001	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the beginning of the next group.
4001	007E	Recognition Code	AT	EV	S	1		[ IS&C 1.00 ]
<u>4001</u>	<u>7E00</u>	Reporter Name	IT	FF	M	2		Doctor who made interpretation, and diagnosis.
<u>4001</u>	<u>7E01</u>	Report Date	AT	FF	M	2		
<u>4001</u>	<u>7E02</u>	Report Time	AT	FF	M	2		
<u>4001</u>	<u>7E03</u>	Correction Date	AT	FF	M	2		
<u>4001</u>	<u>7E04</u>	Correction Time	AT	FF	M	2		
<u>4001</u>	<u>7E05</u>	Corrector Name	IT	FF	M	2		Doctor who corrected the report.
<u>4001</u>	<u>7E10</u>	Findings	IT	FF	M	2		
<u>4001</u>	<u>7E20</u>	Diagnosis	AT	FF	M	2		
<u>4001</u>	<u>7E22</u>	Diagnostic Code	AT	FF	M	3		
<u>4001</u>	<u>7E30</u>	Recommended Future Examination	IT	FF	M	3		
<u>4001</u>	<u>7E80</u>	Teaching File	IT	FF	M	3		For teaching file memo.
<u>4001</u>	<u>7E90</u>	Follow Up	IT	FF	M	3		For follow up memo.
<u>4001</u>	<u>7EA0</u>	Comment	IY	FF	M	3		For diagnostic/interpretive comment.
<u>4001</u>	<u>7EB0</u>	Reported Image Identification	BI	HX	M	2D		The ordered sets of groups that specify the structure used to uniquely identify the image(s), in which the report was

<u>4001</u>	<u>7EB2</u>	Reported Image Identification Nomenclature	AT FF M	2D	concerned. The ordered naming sets that specify the naming structure used to uniquely identify the image(s).
<u>4001</u>	<u>7EC0</u>	Original Image Identification	BI HX M	2D	The ordered sets of groups that specify the structure used to uniquely identify the image(s).
<u>4001</u>	<u>7EC2</u>	Original Image Identification Nomenclature	AT FF M	2D	The ordered naming sets that specify the naming structure used to uniquely identify the image(s) in which the report was concerned.
<u>4001</u>	<u>7EB0</u>	Referring Image Identification	BI HX M	2D	The ordered sets of groups that specify the structure used to uniquely identify the referring image(s).
<u>4001</u>	<u>7EB2</u>	Referring Image Identification Nomenclature	AT FF M	2D	The ordered naming sets that specify the naming structure used to uniquely identify the referring image(s).

**GROUP 6000  
OVERLAY (Optional)**

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
6000	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the beginning of the next group.
6000	0040	Graphics/ROI	AT	EV	S	1D	R	G=Graphics, R=ROI.
6000	0100	Bits Allocated	BI	HX	S	1		Number of bits allocated in the overlay.
6000	0102	Bit Position	BI	HX	S	1		Bit position where overlay is stored.
6000	3000	Overlay	BI	DF	M	1		Overlay data.
6000	4000	Comment	AT	FF	M	3		

**GROUP 7FE0  
PIXEL DATA**

<u>Group</u>	<u>Element</u>	<u>Name</u>	<u>VR</u>	<u>VT</u>	<u>VM</u>	<u>Type</u>	<u>Default</u>	<u>Definition</u>
7FE0	0000	Group Length	BD	HX	S	1		An even number of bytes from the end of the value field to the end of this group, plus pixel data, otherwise stored.
7FE0	0010	Pixel Data	BI	DF	M	1		Length field of this element is the pixel data size, described by the elements of group 0028. Pixel data themselves are not in this element.. This element has no value field. Usually, header data set (B zone) is followed by Pixel data sets (combinations of C-H zones), on IS&C media.

## Annex. Japanese Character Handling

Kanji character set used in IS&C is so-called "new JIS code", JIS X 0208-1983. "Old JIS code", JIS C 6226-1978 shall not be used.

There are two levels of character sets described in JIS X 0208-1983, the 1st level and the 2nd level. Characters not included in either of the level sets, usually handled as "local definition characters", shall not be used in IS&C. JIS X 0201, which is for one byte 7 bits character set is used for one-byte Japanese KANA, and one-byte Japanese Roman characters.

Usually, each element of AN, AT uses ASCII character set. Therefore, character codes without escape sequences described below, are assumed as JIS X 0201, which is almost similar to ASCII. (5D is "¥" in JIS X 0201, "\" in ASCII.) Character set in use shall be explicitly described in Group:0003 Element:7E00,7E10.

Kanji characters shall be described as extensions from one-byte character set, using extension technique stated in JIS X 0202-1991. This is similar to ISO 2022-1986. To extend from one byte character set to desired multi-byte character set, registered escape sequence, shown in following figure, shall be used, according to JIS X 0202-1991.

To put multiple byte character set in

G0 set:	ESC 2/4 2/8 F
G1 set:	ESC 2/4 2/9 F
G2 set:	ESC 2/4 2/10 F
G3 set:	ESC 2/4 2/11 F

Character Set	F	ECMA registration number
Japanese Kanji (JIS X 6226-1978)(Old JIS)	4/0	42
Chinese Hanji (CS 2312-80)	4/1	58
Japanese Kanji (JIS X 0208-1983)(New JIS)	4/2	87
Korean Graphic Characters (KS C 5601-1987)	4/3	143

"4/0", "2/11" means hexadecimal "40", "2B".

JIS X 0202 (=ISO 2022) is also used for extension to one-byte character sets.

To put registered character set in

G0 set:	ESC 2/8 F
G1 set:	ESC 2/9 F
G2 set:	ESC 2/10 F
G3 set:	ESC 2/11 F

Character Set	F	ECMA registration number
ISO 646 IRV:1983	4/0	2
ISO 646 UK (BSI 4730)	4/1	4
ISO 646 USA (X3,4-1968)	4/2	6
Japanese one-byte Kana (JIS X 0201)	4/9	13
Japanese one-byte Roman (JIS X 0201)	4/10	14

Example: To put "MEDIS HOSPITAL医療情報システム病院メディカル", escape sequences should be inserted as; "MEDIS HOSPITAL[ESC1]医療情報システム病院[ESC2]メディカル"

where; [ESC1] ESC 2/4 2/8 4/2  
1BH "\$" "(" "B"  
[ESC2] ESC 2/8 4/9  
1BH "(" "I"

Hexadecimal data after [ESC1] is;

1B 24 28 42 30 65 4E 45 3E 70 4A 73 25 37 25 39 25 46 25 60 49 42 31 21 1B 28 49 52 43 5E 28  
3D 4E 3D 4B 5F 40 59

In this case, 0003/7E00 shall be set to 14 (JIS X 0201), 0003/7E10 to 87 (JIS X 0208).

Any inquiries concerning IS&C standard should be addressed to;

IS&C Headquarters  
MEDIS-DC (Medical Information System Development Center)  
10F Landic Akasaka Bldg.  
2-3-4 Akasaka Minato  
Tokyo 107 Japan.

tel. +81-3-3586-6321  
fax. +81-3-3505-1996



Questions about IS&C Specification should be addressed to Headquarters of IS&C committee shown below.

Copyright belongs to IS&C committee.

HEADQUARTERS of IS&C OFFICE

MEDIS-DC

(The Medical Information System Development Center)

TEL : 03-3586-6321

FAX : 03-3505-1996

ADDRESS : 10F Landic Akasaka Bldg.,  
2-3-4 Akasaka Minatoku  
Tokyo 107, Japan





