



Information technology—Computer graphics and image processing— Encoding for the Image Interchange Facility (IIF)



This Australian Standard® was prepared by Committee IT-031, Computer Modelling and Simulation. It was approved on behalf of the Council of Standards Australia on 20 April 2015. This Standard was published on 12 May 2015.

The following are represented on Committee IT-031:

- ANZLIC—The Spatial Information Council
 - Department of Defence (Australia)
 - Simulation Australia
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This Standard was issued in draft form for comment as DR AS ISO/IEC 12089:2015.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Australian Standard[®]

**Information technology—Computer
graphics and image processing—
Encoding for the Image Interchange
Facility (IIF)**

First published as AS ISO/IEC 12089:2015.

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Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 1 76035 048 2

PREFACE

This Standard was prepared by the Standards Australia Committee IT-031, Computer Modelling and Simulation.

The objective of this Standard is to define the encoding rules which shall apply to the representation of Image Processing and Information – Image Interchange Facility (IPI-IIF) image data. The IPI-IIF data format is defined in AS ISO/IEC 12087.3. IPI-IIF facilitates the interchange of digital images. It consists of two major parts:

- (a) The IPI-IIF data format (IIF-DF) definition.
- (b) The IPI-IIF gateway definition whose functionality is described by an application programmers interface.

This Standard is identical with, and has been reproduced from ISO/IEC 12089:1997, *Information technology—Computer graphics and image processing—Encoding for the Image Interchange Facility (IIF)*.

As this Standard is reproduced from an International Standard, the following applies:

- (i) In the source text ‘this International Standard’ should read ‘this Australian Standard’.
- (ii) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>	<i>Australian Standard</i>
12087 Information technology—Computer graphics and image processing—Image Processing and Interchange (IPI)—Functional specification	12087 Information technology—Computer graphics and image processing—Image Processing and Interchange (IPI)—Functional specification
12087-1 Part 1: Common architecture for imaging	12087.1 Part 1: Common architecture for imaging
12087-2 Part 2: Programmer's imaging kernel system application programme interface	12087.2 Part 2: Programmer's imaging kernel system application programme interface
12087-3 Part 3: Image Interchange Facility (IIF)	12087.3 Part 3: Image Interchange Facility (IIF)

Only normative references that have been adopted as Australian or Australian/New Zealand Standards have been listed.

AUSTRALIAN STANDARD

Information technology—Computer graphics and image processing—Encoding for the Image Interchange Facility (IIF)**1 Scope**

This International Standard defines the encoding rules which shall apply to the representation of IPI-IIF image data. The IPI-IIF data format is defined in ISO/IEC 12087-3, called „Image Interchange Facility (IIF)“. It is Part 3 of the Image Processing and Interchange International Standard, defined in ISO/IEC 12087. The IPI-IIF facilitates the interchange of digital images. It consists of two major parts:

- (1) the IPI-IIF data format (IIF-DF) definition, whose syntax is described using ASN.1;
- (2) the IPI-IIF gateway definition, whose functionality is described by an application programmers interface.

The IPI-IIF is based on the definition described in Part 1, *Common Architecture for Imaging* (CAI) of the ISO/IEC 12087.

Due to the fact that the syntax of the IIF-DF is expressed using the *Abstract Syntax Notation One* (ASN.1), defined by ISO/IEC 8824, this standard makes use of the *Basic Encoding Rules* (BER) for ASN.1, by referring to ISO/IEC 8825 for the definition of encoding rules.

NOTE - A rationale for the introduction of new encoding rules in addition to those defined by the BER is given in clause 4.

Reference shall be made to this International Standard, and its definitions shall be employed, whenever images are interchanged, according to the IIF-DF, defined in ISO/IEC 12087-3.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

- ISO/IEC 8632:(all parts), *Information technology - Computer graphics - Metafile for the storage and transfer of picture description information.*
- ISO/IEC 8824:1990, *Information technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1).*
- ISO/IEC 8825:1990, *Information technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).*
- ISO/IEC 8825-2:1996, *Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER).*
- ISO/IEC 12087-1:1995, *Information technology - Computer graphics and image processing - Image Processing and Interchange (IPI) - Functional specification - Part 1: Common architecture for imaging.*
- ISO/IEC 12087-2:1994, *Information technology - Computer graphics and image processing - Image Processing and Interchange (IPI) - Functional specification - Part 2: Programmer's imaging kernel system application programme interface.*
- ISO/IEC 12087-3:1995, *Information technology - Computer graphics and image processing - Image Processing and Interchange (IPI) - Functional specification - Part 3: Image Interchange Facility (IIF).*

NOTE - Some ISO Standards are technically aligned with CCITT Recommendations, in particular the ASN.1 Standard (ISO Standards 8824/8825 and CCITT Recs. X.208/X.209). The differences between the International Standard definitions and the CCITT definitions are quite small, and should not affect interoperability between implementations written against either document. Within this part of ISO/IEC 12087, the ISO Standards are referenced whenever possible.

3 Definitions and abbreviations

ASN.1 Abstract Syntax Notation One

BER Basic Encoding Rules

frc fraction

lsb least significant bit

lsB least significant Byte

msb most significant bit

msB most significant Byte

s sign

NOTE - For definitions and abbreviations concerning the Image Processing and Interchange Standard (IPI), refer also to clause 3 of ISO/IEC 12087-1, ISO/IEC 12087-2 and ISO/IEC 12087-3.

4 Encoding rules for the IIF syntax entities

The encoding of syntax entities shall conform to the *Basic Encoding Rules* (BER) for ASN.1 - ISO/IEC 8825.

NOTE - Using the BER encoding overheads may occur. In particular, the encoding of a large pixel data field can produce considerable space and processing time overhead, when every pixel is represented as an elementary ASN.1 data entity, consisting of a „tag“ and a „length“ field that proceeds the „value“ field.

For this reason this International Standard describes additional encoding methods that may be applied to pixel fields. These methods may neither be regarded as extensions, nor as changes to the tag-length-value concept of the BER. Instead, they only describe how to interpret the data contained in the elementary ASN.1 type OCTET STRING, when this elementary type was used to encode an entire field of pixel values (instead of just one value). Thus, these encoding rules may rather be regarded to lie „on top of“ BER encoding/decoding tools.

This International Standard defines additional encodings for space-efficient representation of pixel fields. They are outlined in clause 5 in conjunction with additional IIF syntax entities which describe the degree of freedom for the selection of an encoding method.

5 IIF syntax entities for the representation of pixel fields

The syntax is expressed in ASN.1 (Abstract Syntax Notation One), according to ISO/IEC Standard 8824, "Specification of Abstract Syntax Notation One (ASN.1)." ASN.1 is a formal description language. It defines a set of primitive data types, such as `INTEGER`, `ENUMERATED`, and `REAL` and provides a facility to construct new elements with their own typing inherent in the structure using the constructors `SEQUENCE`, `SEQUENCE OF` and `CHOICE`. This allows for new data types to be defined which are uniquely recognisable within an application. To make these definitions more readable, textual labels may be associated with the elements in a constructor type. In order to distinguish different occurrences of the same type within one constructor, various types of tags are provided that may be associated with the constructor's elements.

Within the semantic description each element (which is either a primitive data type or a constructed type) is called *syntax entity*. According to ASN.1, the names of the syntax entities begin with capital letters. Syntax entities consist of a number of *components*. According to ASN.1, the component labels begin with lower case letters.

In the following, ASN.1 code is indicated by `courier` font. All syntax rules are preceded by a semantics statement. Some rules are succeeded by constraints statements. The rules are ordered in prefix form.

IIF module declaration***IIFEncoding*****Semantics**

IIFEncoding is the name of the ASN.1 module responsible for the encoding of fields of pixel values to be used mainly by the IIF-DF. Besides the full syntax (given by the *PixelFieldEncoding* entity), the module also exports the *BooleanEncoding*, *IntegerEncoding*, *FixedPointEncoding*, *RealEncoding*, *ComplexEncoding* and the *EnumeratedEncoding* entities. This provides other ASN.1 notated applications with direct access to these sub-objects. No objects are imported.

In order to obtain the full syntax for the module specification, the term <<declarations>> needs to be replaced with the syntax portions of all subsequent syntax entities within this clause.

```
IIFEncoding {iso(1) standard (0) ipi-encoding(12089)
             iif-encoding(1) }
```

DEFINITIONS ::=

BEGIN

EXPORTS

```
PixelFieldEncoding,
BooleanEncoding,
IntegerEncoding,
FixedPointEncoding,
RealEncoding,
ComplexEncoding,
EnumeratedEncoding;
```

IMPORTS;

<<declarations>>

END

Constraints

None.