
**Photography — Electronic still picture
imaging — Picture transfer protocol
(PTP) for digital still photography devices**

*Photographie — Imagerie des prises de vue électroniques — Protocole
de transfert d'images (PTP) pour les appareils photographiques
électroniques numériques*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15740 was prepared by Technical Committee ISO/TC 42, *Photography*.

Introduction

For the purposes of this International Standard, digital still photography devices (DSPDs) are defined as devices with persistent storage that capture a digital two-dimensional image at a discrete point in time. Most DSPDs include interfaces that can be used to connect to a host computer or other imaging device, such as a printer. A number of high speed interface transports has been developed, including USB, TCP/IP and IEEE 1394 (Firewire). This International Standard is designed to provide requirements for communicating with DSPDs. This includes communications with any type of device, including host computers, direct printers and other DSPDs over a suitable transport. The requirements include standard image referencing behaviour, operations, responses, events, device properties, datasets, and data formats to ensure interoperability. This International Standard also provides optional operations and formats, as well as extension mechanisms.

This International Standard specifies the following:

- behaviour requirements for DSPDs; this includes the baseline features a device needs to support in order to provide interoperability over conforming transports;
- functional requirements needed by a transport to enable the creation of a transport-dependent implementation specification that conforms to this International Standard;
- a high-level protocol for communicating with and between DSPDs consisting of operation, data and response phases;
- sets of suggested data codes and their usages including:
 - OperationCodes
 - ResponseCodes
 - ObjectFormatCodes
 - DevicePropCodes
 - EventCodes
 - required datasets and their usages
 - a means of describing data object associations and filesystems
 - mechanisms for implementing extensibility.

This International Standard does not attempt to define any of the following:

- any sort of device discovery, enumeration or transport aggregation methods; implementation of this functionality is left to the transports and the platforms upon which support for this International Standard is implemented;
- an application programming interface; this is left to the platforms upon which support for this International Standard is implemented.

This International Standard has been designed to appropriately support popular image formats used in digital still cameras, including the Exif and TIFF/EP formats defined in ISO 12234-1 and ISO 12234-2, as well as the Design Rule for Camera Filesystem (DCF) and the Digital Print Order Format (DPOF).

The technical content of this International Standard is closely related to PIMA 15740:2000. The main difference is that PIMA 15740:2000 includes an informative annex describing a USB implementation of ISO 15740. This information is not included in ISO 15740, which instead references the USB still device class document developed by the Device Working Group of the USB Implementers Forum.

Photography — Electronic still picture imaging — Picture transfer protocol (PTP) for digital still photography devices

1 Scope

This International Standard provides a common communication protocol for exchanging images with and between digital still photography devices (DSPDs). This includes communication between DSPDs and host computers, printers, other digital still devices, telecommunications kiosks and image storage and display devices.

This protocol is transport- and platform-independent.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8601:2004, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ISO 12234-1:2001, *Electronic still-picture imaging — Removable memory — Part 1: Basic removable-memory module*

ISO 12234-2:2001, *Electronic still-picture imaging — Removable memory — Part 2: TIFF/EP image data format*

ISO/IEC 10646-1:1993, *Information technology — Universal Multiple-Octet Coded Character Set (UCS) — Part 1: Architecture and Basic Multilingual Plane*

ISO/IEC 10918-1:1994, *Information technology — Digital compression and coding of continuous-tone still images: Requirements and guidelines*

IEC 61966-2-1:1999, *Multimedia systems and equipment — Colour measurement and management — Part 2-1: Colour management — Default RGB colour space — sRGB*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

album

end-user created object used to logically group data objects according to some user-defined criteria

NOTE An album may or may not be a physical folder in a filesystem. In this International Standard, an album is a type of association.

3.2

Application Programming Interface

API

high-level functional description of a software interface

NOTE An API is typically language-dependent.

3.3

association

logical construct used to expose a relationship between discrete objects

NOTE Associations are used to indicate that separate data objects are related. Associations are represented like folders, and may be nested using a standard branched hierarchical tree structure.

EXAMPLE A time sequence, or user-defined groupings by content or capture session.

3.4

connection

transport-provided mechanism for establishing paths for transferring data between devices

3.5

datacode

16-bit unsigned integer whose Most Significant Nibble (4 bits) is used to indicate the category of code and whether the code value is standard or vendor-extended

3.6

data object

image or other type of data that typically exists in persistent storage of a DSPD or other device

3.7

dataset

transport-independent collection of one or more individual data items with known interpretations

NOTE Data sets are not necessarily opaque nor atomic to transport implementations.

3.8

Design Rule for Camera Filesystem

DCF

standard convention for camera filesystems which specifies the file format, foldering and naming conventions in order to promote file interoperability between conforming digital photography devices

3.9

device discovery

act of determining the set of all devices present on a particular transport or platform that are physically or logically accessible

3.10**Digital Still Photography Device
DSPD**

device with persistent storage that captures a two-dimensional digital still image

3.11**Digital Print Order Format
DPOF**

standardized ASCII file stored on removable media along with the image files that indicates how many copies of which images should be printed

NOTE DPOF also allows index prints, cropping, and text overlays to be specified.

3.12**enumeration**

act of creating an ordered increasing numerical list that contains one representative element for each member of a set

3.13**Exif/JPEG**

compressed file format for digital cameras in which the images are compressed using the baseline JPEG standard described in ISO 12234-2

NOTE In Exif, metadata and thumbnail, images are stored using TIFF tags within an application segment at the beginning of the JPEG file.

3.14**folder**

optional sub-structure in a hierarchical storage area that can contain data objects

3.15**FlashPix**

image file format, defined in *FlashPix Format Specification*, using a structured storage file containing metadata and a tiled, hierarchical image representation

NOTE The tiles in a FlashPix image are normally baseline JPEG images, and individual image tiles of a particular resolution can be easily accessed for rapid display and editing.

3.16**ICC profile**

data file that characterizes the colour characteristics of an image capture or image output device

3.17**IEEE 1394**

high-speed serial bus standardized by the IEEE (Institute of Electrical and Electronics Engineers) currently having clock rates of 100, 200 and 400 Mbits/sec

NOTE IEEE 1394 is often referred to as FireWire.

3.18**image aspect ratio**

ratio of the image width to the image height

3.19**image capture device**

device for converting a scene or a fixed image such as a print, film or transparency, to digital image data

3.20**image output device**

device that can render a digital image to hardcopy or softcopy media

3.21

in-band event

event transmitted on the same logical connection as operations and responses

NOTE Events are only asynchronous to the degree of data precision for which the transport implementation allows event interleaving.

3.22

initiator

device that initiates a conversation by opening a session, and issues all formal operations to the responder

NOTE The initiator is analogous to the client in the client/server paradigm.

3.23

International Imaging Industry Association

I3A

organization that serves to represent the common interests among manufacturers of imaging technology products

NOTE See <http://www.i3a.org>.

3.24

Infrared Data Association

IrDA

infrared wireless communication system that currently supports wireless communication at data rates between 9 600bps and 4Mbps.

3.25

Joint Photographic Experts Group

JPEG

specific image compression method defined in ISO/IEC 10918-1

3.26

LogicalStorageID

least significant sixteen bits of a StorageID

NOTE This value uniquely identifies one logical storage area within the physical store indicated in the PhysicalStorageID.

3.27

Most Significant Nibble

MSN

most-significant four bits of the most-significant byte

3.28

object aggregation

act of taking one or more location-specific lists of objects that exist on a particular device and grouping them together in one set

3.29

ObjectHandle

device-unique 32-bit unsigned integer assigned by a device to each data object in local persistent storage which is provided to external devices

NOTE External recipients of an ObjectHandle must use it to reference that piece of data in subsequent transactions. ObjectHandles are guaranteed to be persistent over at least a session.



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