SLOVENSKI STANDARD
SIST ISO 15740:2011

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Fotografija - Digitalno upodabljanje mirujočih slik - Protokol za prenašanje slik pri fotografskih napravah za mirujoče slike (PTP)

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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37.040.99	Drugi standardi v zvezi s fotografijo	Other standards related to photography

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INTERNATIONAL STANDARD

ISO 15740

Second edition
2008-05-01

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

Reference number
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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*.

This second edition cancels and replaces the first edition (ISO 15740:2005) which has been technically revised.

Introduction

This second edition of ISO 15740 (hereinafter designated PTP v1.1) provides optional support for new increased performance and compatibility. All new constructs are fully backward compatible with the first edition (hereinafter designated PTP v1.0) and are optional. See 5.5.2 for standard version.

For the purposes of this International Standard, digital still photography devices (DSPDs) are defined as devices with persistent storage which 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 facilitate 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 and

  — 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[15] 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 this International Standard, which instead references the USB still device class document developed by the Device Working Group of the USB Implementers Forum.

PTP v1.1 provides optional support for new increased performance and compatibility. All new constructs are fully backward compatible with PTP v1.0 and are optional.

— Performance Enhancements:

  — Support for retrieval of ObjectHandles in enumerated chunks, via specification of three new optional operations and a new response code. This may reduce long response times for some initiators that possess large numbers of objects.

  — Support for optional arbitrary resizing prior to image transmission via specification of a new operation GetResizedImageObject. In PTP v1.0, image sizes might be requested in full-resolution or thumbnail size only.

  — Support for arrays of datasets. This can be used to reduce the number of required transactions necessary for device characterization from being a function of the number of objects on the device to one.

  — An optional fast file characterization operation called GetFilesystemManifest that exploits dataset arrays to request, in a single transaction, only the minimum data required to characterize a typical filesystem. Many initiators, particularly in printing scenarios, are interested in fast filesystem characterization for access to a specifically named file in a particular place. This capability can significantly improve end-user workflow latency. This single operation replaces the typical series of many GetObjectInfo requests with a binary filesystem manifest. This manifest is defined as a simple array of a subset of the standard ObjectInfo dataset called the ObjectFilesystemInfo dataset. This operation replaces the need for many GetObjectInfo calls, while also avoiding the need for responders to perform many internal file-opens on the fly, or to cache ObjectInfo image data that is often held persistenly only “inside” internal image files (e.g. TIFF tags inside EXIF JPEGs), to quickly communicate only the fast filesystem information.

— Compatibility Enhancements:

  — An optional mechanism to support multiple vendor extension sets. This is specified via the new VendorExtensionMap dataset, and two new optional operations that may be invoked outside of a session (GetVendorExtensionMaps and GetVendorDeviceInfo).

  — The optional fast file characterization method GetFilesystemManifest natively supports extremely large objects, by requiring 8-bytes for object size (UINT64), as opposed to the standard 4-bytes.

  — A new standard ObjectFormatCode to support the Digital Negative file format (DNG).

— Feature Enhancement:

  — An optional mechanism for handling streaming content. This is specified via the new StreamInfo dataset, as well as the supporting GetStreamInfo and GetStream operations, as well as some optional new supporting DeviceProperties. This is described in a new Clause 14.

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, *Data elements and interchange formats — Information interchange — Representation of dates and times*

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

ISO/IEC 10646, *Information technology — Universal Multiple-Octet Coded Character Set (UCS)*

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

IEC 61966-2-1, *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 might or might not be a physical folder in a filesystem. In this International Standard, an album is a type of association.

3.2
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 can be nested using a standard branched hierarchical tree structure.

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

3.3
connection
transport-provided mechanism for establishing paths for transferring data between devices

3.4
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

3.5
data object
image or other type of data that typically exists in persistent storage of a DSPD or other device

3.6
dataset
transport-independent collection of one or more individual data items with known interpretations

NOTE Datasets are not necessarily opaque nor atomic to transport implementations.

3.7
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

3.8
device discovery
act of determining the set of all devices present on a particular transport or platform that are physically or logically accessible

3.9
digital still photography device
DSPD
device with persistent storage which captures a two-dimensional digital still image

3.10
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.

3.11
enumeration
act of creating an ordered increasing numerical list that contains one representative element for each member of a set

3.12
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.

3.13
folder
optional sub-structure in a hierarchical storage area that can contain data objects

3.14
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.

3.15
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/s

NOTE IEEE 1394 is often referred to as FireWire.

3.16
image aspect ratio
ratio of the image width to the image height

3.17
image capture device
device for converting a scene or a fixed image, such as a print, film or transparency, to digital image data

3.18
image output device
device that can render a digital image to hardcopy or softcopy media

3.19
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.

3.20
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.

3.21
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.

3.22
Infrared Data Association
IrDA
infrared wireless communication system that currently supports wireless communication at data rates between 9 600 bps and 4 Mbps.

3.23
Joint Photographic Experts Group
JPEG
specific image compression method defined in ISO/IEC 10918-1

3.24
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.

3.25
Most Significant Nibble
MSN
most significant four bits of the most significant byte

3.26
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

3.27
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.

3.28
out-of-band event
event transmitted on a different logical connection to that for operations and responses

NOTE Out-of-band events are asynchronous from operation transactions.

3.29
personal computer
PC
any personal computing device, which may employ various hardware architectures and operating systems

3.30
PhysicalStorageID
most significant sixteen bits of a StorageID

NOTE This value uniquely identifies one physical storage area on a device, although there may be more than one logical store per physical store.

3.31
Portable Network Graphics
PNG
extensible file format for lossless, portable, compressed storage of raster images

NOTE PNG supports indexed colour, greyscale, truecolour and an optional alpha channel.

3.32
protocol
defined mechanisms for exchanging data between devices

3.33
pull model
use paradigm for DSPDs where the object receiver initiates the operation requests to transfer data objects from the sender

3.34
push model
use paradigm for DSPDs where the object sender initiates the operation requests to transfer data objects to the receiver

3.35
QuickDraw picture
file format consisting of sequences of saved drawing commands

NOTE QuickDraw files are commonly referred to as PICT files.

3.36
responder
device that responds to operations from the initiator

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

3.37
session
logical connection between two devices defining a period of time during which obtained state information, such as handle persistence, may be relied upon

3.38
square pixel sampling
image having equal sample spacing in the two orthogonal sampling directions

3.39
StorageID
device-specific four-byte unsigned integer (UINT32) that represents a unique storage area that may contain data objects

NOTE The most significant sixteen bits of a StorageID represent the PhysicalStorageID, whilst the least significant sixteen bits of a StorageID represent the LogicalStorageID.

3.40
transport aggregation
act of taking one or more transport-specific list of conforming devices that are logically or physically accessible in a system and grouping them in one set that spans all transports across the particular system

3.41
transport
means of attaching the digital capture device to some other digital device including a physical wire or a wireless connection

3.42
Universal Serial Bus
USB
digital interface for connecting up to 127 devices in a tiered-star topology

NOTE See http://www.usb.org.

4 Digital still photography device model

4.1 Overview

Digital still photography devices (DSPDs) are used to acquire digitally encoded still images. These devices include a persistent storage capability so that any digital images and other data acquired by the device are preserved across power cycle operations unless they are specifically deleted.