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**Information technology — IT asset
management —**

**Part 6:
Hardware identification tag**

Technologies de l'information — Gestion des actifs TI —

Partie 6: Étiquette d'identification du matériel

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Introduction

0.1 Overview

The ISO/IEC 19770 series for information technology (IT) asset management (ITAM) addresses both the processes and technology for managing software, hardware, and related IT assets. Because IT is an essential enabler for almost all activity in today's world, the ISO/IEC 19770 series integrates tightly into all of the IT functions. Hardware identification (HWID) tags have the capacity to assist in other management functions outside the scope of financial-focused or compliance-focused ITAM processes. From a technology perspective, ITAM standards for information structures provide the data interoperability of software and hardware management data, and the basis for many related benefits such as more effective security in the management of software and the authentication of hardware. ITAM standards for information structures also facilitate significant automation of IT functionality, such as improved authentication of software, and hardware for automated exposure of identification and mitigation.

0.2 Purpose of this document

This document is an International Standard for HWID tags. The hardware identification tag is a standardized data structure containing hardware identification information about a hardware product and/or the system configuration of multiple hardware products that supports new and automated management functions. Product information provided in the hardware identification tag structure is often provided in an XML data file, but the same HWID tag product information may be accessible through other means depending on the computing device being managed.

HWID tags are created by a HWID tag producer, for example, a hardware manufacturer who develops and distributes hardware. HWID tag data is utilized by HWID tag consumers, for example, an inventory tool or service that collects information from a physical or virtual device for a variety of purposes.

This document has been developed to facilitate automation of IT processes through the use of hardware identification tags and for applications which use those tags, for the purposes of inventory control, configuration management, hardware security, or logistics. This document includes information which facilitates human understanding (such as model and colloquial version name), but it is unrealistic to expect to create, manage, and use hardware identification tags without the use of automated capabilities built into specialist or generalized tools. The extent to which such capabilities are provided by specialist commercial products, open-source-type products, or platforms themselves, depends on market developments over time.

This document supports IT asset management processes as defined in ISO/IEC 19770-1. This document is also designed to work together with other parts in the ISO/IEC 19770 series, including ISO/IEC 19770-2, ISO/IEC 19770-3, ISO/IEC 19770-4, and ISO/IEC 19770-5, which are International Standards for software identification, entitlement, resource utilization measurement, and overview/vocabulary.

This document provides a common set of terms and associated transport format to facilitate the management of IT hardware. The intended benefits include easier demonstration of proof of ownership, improved asset management, and improved security.

Furthermore, an additional benefit of having a standard for describing hardware components is to encourage the normalization by industries of names for, and the details of, different types of hardware. A common lexicon is critical to standardization and shared understanding of terminology. The terms in this document should form a part of that lexicon over time.

Hardware identification tags can benefit all stakeholders involved in the development, manufacturing, distribution, deployment, installation, and on-going management of hardware. Key benefits associated with hardware identification tags include the following.

- a) The ability to consistently and authoritatively identify hardware products that need to be managed for any purposes of inventory control, configuration management, hardware security, or logistics or for the specification of dependencies. Hardware identification tags provide the meta-data

necessary to support more accurate identification than other traditional hardware identification techniques.

- b) The ability to identify groups of hardware products in the same way as individual hardware products (e.g., components and modules within a single system), thus enabling entire groups of hardware products to be managed as a system with the same flexibility as individual products.
- c) The ability to automatically relate installed hardware with other information such as repair installations, configuration issues, maintenance agreements or vulnerabilities.
- d) The ability to facilitate interoperability of hardware identification between different hardware manufacturers, different hardware platforms, different IT management tools, and within hardware manufacturing, as well as between HWID tag producers and HWID tag consumers.
- e) The ability to facilitate automated approaches to hardware inventory, using information both from the hardware identification tag and from the software identification schema as specified in ISO/IEC 19770-2.
- f) The ability to provide a comprehensive information structure that identifies different entities, including hardware manufacturers, packagers, distributors external to the hardware consumer, as well as various entities within the hardware consumer, associated with the system configuration, installation, and management of the product on an on-going basis.
- g) The ability to establish trust through the optional use of digital signatures by organizations creating hardware identification tags, the ability to validate that hardware identification is authoritative, and from a trusted source.
- h) The opportunity for entities other than original hardware manufacturers (e.g. independent providers or in-house personnel) to create non-authoritative hardware identification tags for legacy hardware, and/or for hardware from other manufacturers who do not provide hardware identification tags themselves.

[Annex A](#) contains the XML schema document for HWID tags; [Annex B](#) provides a UML diagram of the HWID tag schema; [Annex C](#) provides sample HWID tags.

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Information technology — IT asset management —

Part 6: Hardware identification tag

1 Scope

This document provides specifications for a transport format which enables the digital encapsulation of this data. This document refers to an encapsulation of hardware identification (HWID) data as a HWID tag, just as ISO/IEC 19770-2 refers to software identification (SWID) tags for software identification.

This document applies to the following.

- Tag producers: organizations that create HWID tags for use by others in the market. A tag producer can be part of the organization creating the hardware or a third-party organization. These organizations can be broken down into two major categories.
 - Device or component providers: entities responsible for the manufacturing or creation of the hardware device and/or associated operating system, virtual environment, or application platform. Platform providers which support this document can additionally provide tag management capabilities at the level of the platform or operating system.
 - Tag tool providers: entities that provide tools to create hardware identification tags. For example, tools within development environments that generate hardware identification tags, or installation tools that can create tags on behalf of the installation process, and/or desktop management tools that can create tags for underlying hardware, virtual machines, or platforms that did not originally have a hardware identification tag.
- Tag consumers: tools and/or organizations who utilize information from HWID tags are broken down into the following two major categories.
 - Device or component consumers: entities that purchase, install, integrate, and/or otherwise deploy physical or virtual hardware or components.
 - IT discovery and processing tool providers: entities that provide tools to collect, store, and process hardware identification tags. These tools may be targeted at a variety of different market segments, including security, asset management, and logistics.

This document deals only with hardware device or component identification.

This document does not detail information technology asset management (ITAM) processes required for discovery and management of hardware (which is provided in ISO/IEC 19770-1) software identification tags (as defined by ISO/IEC 19770-2), entitlement tags (as defined by ISO/IEC 19770-3), or resource utilization measurements (as defined by ISO/IEC 19770-4).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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/IEC 19770-2, *Information technology — IT asset management — Part 2: Software identification tag*

ISO/IEC 19770-3, *Information technology — IT asset management — Part 3: Entitlement schema*

ISO/IEC 19770-5, *Information technology — IT asset management — Part 5: Overview and vocabulary*

RFC 3986¹⁾, *Uniform Resource Identifier (URI): Generic Syntax*

RFC 7515²⁾, *JSON Web Signature*

XML Signature Syntax and Processing Version 1.1, W3C Recommendation 11 April 2013 <https://www.w3.org/TR/xmldsig-core1/>

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19770-5 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1.1

dynamic attribute

element of a HWID tag that may change over the life of the product or are defined after creation

3.1.2

HAM

hardware asset management

coordinated activity of an organization to realize value from hardware assets

Note 1 to entry: Hardware asset management is a specialization and sub discipline of IT asset.

3.1.3

HWID creator

entity that initially creates a HWID record

Note 1 to entry: This entity can be part of the organization that manufactured the component to which the record relates, in which case the HWID creator and component manufacturer are the same. The HWID creator can also be a separate organization or third party unrelated to the manufacturer (such as in the case where HWID records are created for existing hardware components by an operating system or a tool deployed by the device owner).

3.1.4

HWID schema

hardware Identification schema

information structure containing a digital description of a hardware component and its associated information

3.1.5

legacy hardware

hardware originally created without native information structures

1) <https://www.ietf.org/rfc/rfc3986.txt>.

2) <https://tools.ietf.org/html/rfc7515>.

3.1.6**software identification tag**

SWID tag

information structure containing identification information about a software configuration item.

[SOURCE: ISO/IEC 19770-5:2015, 3.40, modified — At the end of the definition, "which may be authoritative if provided by a software creator" has been removed.]

3.1.7**static attribute**

element of a HWID that do not change over the life of the product or are defined at creation

3.2 Abbreviated terms

Ent software Entitlement schema, Entitlement schema

GUID globally unique identifier

HAM hardware asset management

HWID hardware identification

IETF internet engineering task force

ITAM information technology asset management

JSON javascript object notation

OEM original equipment manufacturer

regid registration identifier

SAM software asset management

SKU stock keeping unit

SWID software identification

UNSPSC united nations standard products and services code

URI uniform resource identifier

URL uniform resource locator

W3C World Wide Web Consortium

XML extensible markup language

XSD XML schema document

4 Conformance**4.1 HWID tag conformance**

A hardware identification tag is in conformance with this document if the tag data structure meets all the requirements specified in this document.

4.2 Application conformance

Application conformance incorporates both syntax and semantics.

- A conforming tag consumer shall not reject any conforming HWID tag.
- A conforming tag producer shall be able to produce HWID tags conforming to this document.
- A conforming tag consumer shall treat the information in HWID tag in a manner consistent with the semantic definitions given in this document. An application's intended behaviour shall not require that application to process all of the information in a HWID tag. However, the information that it does process shall be processed in a manner that is consistent with the semantic definitions given in this document.
- A conforming tag consumer should, when necessary, be able to identify the version of the XML schema (XSD) used for a HWID tag and process information provided in older versions of HWID tags in a manner that is consistent with that version of the XSD.

4.3 Platform conformance

A platform is in conformance with this document if it provides a programmatic interface to add, retrieve, enumerate, and remove HWID tag data and/or if it provides support for HWID tags to be stored on and retrieved from a file storage environment on a specified device.

5 Interoperability

5.1 Overview and key design decisions

This clause explains the essential nature of HWIDs, and how the different types of HWID records interrelate and are designed to provide for interoperability of creation and usage by all parties involved with hardware component data.

5.2 Hardware identifiers - <hwidID>

The unique identifier for each HWID is the <hwidID>. This is a GUID which may be formed in different ways, as long as global uniqueness is achieved. A 16-byte GUID shall be used for this field – this provides global uniqueness without a significant amount of overhead for space. These GUIDs should be generated in a fashion compliant to ISO/IEC 9834-8.

For hwidID, if use of a 16 byte GUID is not possible, a text based globally unique ID may be constructed.

This ID should include a unique naming authority for the <entCreator> and sufficient additional details that the <hwidId> is unique for the entitlement. This can look as follows (+ is used as a string concatenation symbol):

regid + productName + version + edition + revision + ...

5.3 Use case overview

There are a number of basic use cases which can be supported by the definitions contained in this document. Note that the HWID merely records the state of an artifact at a certain point in time. For example, a HWID represents a specific piece of hardware, in a specific location, with a specific owner at a specific point in time. To transfer hardware to another organization, it is not sufficient just to create transfer transactions recording a change in ownership and location using HWIDs; rather, compliance with the necessary terms and conditions (e.g. of the hardware maintenance) for the transfer is required.

5.4 HWID type

5.4.1 General

The main use cases supported by the HWID specification are provided in [Table 1](#). Each provides a short explanation of how it is implemented.

The type of HWID is defined by the value `hwidType`.

Table 1 — hwidType values

hwidType value	Meaning
Primary	This is the “base” HWID tag for an asset, representing the primary attributes of the hardware being identified.
System	A tag establishing relationships between one or more primary and/or system tags for a given system. This is useful for connecting peripherals to a PC, virtual machines to a physical host or multiple systems together in a cluster.
Supplemental	Supplemental tags are designed to provide additional information to either primary or system tags.

5.4.2 Issuance of a primary HWID

Issuance of a primary HWID is the 'base' HWID type. It is expected that primary HWIDs should be issued by the hardware manufacturer, who should be able to provide authoritative information relating to the hardware's details. HWIDs may also be issued by third party suppliers but would be considered a non-authoritative tag. This may be necessary if manufacturers do not supply HWIDs, such as to encapsulate legacy hardware which had no associated HWIDs, etc.

Primary HWID tags are implemented by creating a HWID of `<hwidType> = 'Primary'`.

5.4.3 Adding information to a primary HWID

End-user organizations and third parties may wish to add information to a HWID, e.g. order information, entitled entities and or user configured identifiers.

Information is added to a HWID tag by creating a HWID of `<hwidType> = 'Supplemental'`, and with `<supplementalHWIDType> = 'InfoAdded'` which specifies a `<linkedToPrimaryhwidID>` equal to the `<hwidID>` of the primary HWID which is to be extended.

Example of a primary HWID:

```
fabrikam.com_MightyPC_AAA.HWID
<HWID
  HWIDID="AAA"
  hwidType="Primary"
```

Example of a linked supplemental HWID:

```
reseller.com_MightyPC_BBB.HWID
<HWID
  HWIDID="BBB"
  hwidType="Supplemental"
  supplementalhwType="InfoAdded"
<Link>
  linkedToPrimaryhwidID="AAA"
</Link>
```

5.4.4 Archiving a primary HWID

The purpose of archiving is to remove HWIDs from active use, so that they are no longer valid for hardware management purposes. This is appropriate, for example, for hardware that is no longer being used by the organization and which is no longer required to be tracked as an asset.

The archive functionality is implemented by creating a supplemental HWID of `type = 'Archived'`, this identifies the `<hwidID>` of the HWID which is to be revoked in `<linkedToPrimaryhwidID>` attribute.

5.4.5 Issuance of a system HWID

Issuance of a system HWID combines multiple primary HWIDs into a logical grouping of an entity that is treated as a single instance. It is expected that system HWIDs should be issued by the hardware manufacturer, who should be able to provide authoritative information relating to the hardware details during the manufacturing or assembly process. System HWIDs may also be issued by third party suppliers or system integrators as non-authoritative tags. The issuance of non-authoritative system HWIDs may be necessary if manufacturers do not supply system HWIDs.

System HWID tags are implemented by creating a HWID of `<hwidType> = 'System'`.

5.4.6 Adding information to a system HWID

End-user organizations and third parties may wish to add information to a system HWID, e.g. addition of additional information about the system.

Information is added to a HWID tag by creating a HWID of `<hwidType> = 'Supplemental'`, and with `<supplementalHWIDType> = 'InfoAdded'` which specifies a `<linkedToSystemhwidID>` equal to the `<hwidID>` of the primary HWID which is to be extended.

Example of a system HWID:

```
fabrikam.com_MightyPC_BBB.HWID
<HWID
  hwidID="BBB"
  hwidType="System"
  <Link>
    linkedToPrimaryhwidID="AAA"
  </Link>
```

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Example of a linked supplemental HWID:

```
reseller.com_MightyPC_CCC.HWID
<HWID
  hwidID="CCC"
  hwidType="Supplemental"
  supplementalhwType="InfoAdded"
  <Link>
    linkedToSystemhwidID="BBB"
```

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5.4.7 Archiving a system HWID

The purpose of archiving is to accomplish one of the following two goals.

- Remove system HWIDs from active use, so that they are no longer actively used for hardware management purposes. This would be appropriate, for example, for hardware that is no longer being used by the organization and which is no longer required to be tracked as a system.
- Remove system HWIDs where the makeup of the system has been altered sufficiently enough where it makes more sense to reissue a new system tag. At this point a new system tag may be generated.

The archive functionality is implemented by creating a supplemental HWID of `type = 'Archived'`, this identifies the `<hwidID>` of the HWID which is to be revoked in `<linkedToSystemhwidID>` attribute.

5.4.8 Systems of systems

As system tags define groups of hardware assets that logically belong together, system tags may also be used to link together logically grouped systems. For example, a data center server can be represented by a system HWID tag containing the server computer, the storage medium it uses, and a power supply. It may also be beneficial to think of the entire rack as a single unit of systems that includes multiple