CybOX™ Version 2.1.1. Part 21: Disk Partition Object

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Technical Committee:

OASIS Cyber Threat Intelligence (CTI) TC

Chair:

Richard Struse (Richard.Struse@HQ.DHS.GOV), DHS Office of Cybersecurity and Communications (CS&C)

Editors:

Desiree Beck (dbeck@mitre.org), MITRE Corporation
Trey Darley (trey@kingfisherops.com), Individual member
Ivan Kirillov (ikirillov@mitre.org), MITRE Corporation
Rich Piazza (rpiazza@mitre.org), MITRE Corporation

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Related work:

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- *STIX™ Version 1.2.1*. Edited by Sean Barnum, Desiree Beck, Aharon Chernin, and Rich Piazza. 05 May 2016. OASIS Committee Specification 01. http://docs.oasis-open.org/cti/stix/v1.2.1/cs01/part1-overview/stix-v1.2.1-cs01-part1-overview.html.

Abstract:

The Cyber Observable Expression (CybOX™) is a standardized language for encoding and communicating high-fidelity information about cyber observables, whether dynamic events or stateful measures that are observable in the operational cyber domain. By specifying a common structured schematic mechanism for these cyber observables, the intent is to enable the potential for detailed automatable sharing, mapping, detection, and analysis heuristics. This specification document defines the Disk Partition Object data model, which is one of the Object data models for CybOX content.

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Notices

Table of Contents

1 Introduction

[All text is normative unless otherwise labeled.]

The Cyber Observable Expression (CybOX™) provides a common structure for representing cyber observables across and among the operational areas of enterprise cyber security. CybOX improves the consistency, efficiency, and interoperability of deployed tools and processes, and it increases overall situational awareness by enabling the potential for detailed automatable sharing, mapping, detection, and analysis heuristics.

This document serves as the specification for the CybOX Disk Partition Object Version 2.1.1 data model, which is one of eighty-eight CybOX Object data models.

In Section **1.1** we discuss additional specification documents, in Section **1.2** we provide document conventions, and in Section **1.3** we provide terminology. References are given in Section **1.4**. In Section **2**, we give background information necessary to fully understand the Disk Partition Object data model. We present the Disk Partition Object data model specification details in Section **3** and conformance information in Section **4**.

1.1 CybOX™ Specification Documents

The CybOX specification consists of a formal UML model and a set of textual specification documents that explain the UML model. Specification documents have been written for each of the individual data models that compose the full CybOX UML model.

CybOX has a modular design comprising two fundamental data models and a collection of Object data models. The fundamental data models – CybOX Core and CybOX Common – provide essential CybOX structure and functionality. The CybOX Objects, defined in individual data models, are precise characterizations of particular types of observable cyber entities (e.g., HTTP session, Windows registry key, DNS query).

Use of the CybOX Core and Common data models is required; however, use of the CybOX Object data models is purely optional: users select and use only those Objects and corresponding data models that are needed. Importing the entire CybOX suite of data models is not necessary.

The *CybOX™ Version 2.1.1 Part 1: Overview* document provides a comprehensive overview of the full set of CybOX data models, which in addition to the Core, Common, and numerous Object data models, includes various extension data models and a vocabularies data model, which contains a set of default controlled vocabularies. *CybOX™ Version 2.1.1 Part 1: Overview* also summarizes the relationship of CybOX to other languages, and outlines general CybOX data model conventions.

1.2 Document Conventions

The following conventions are used in this document.

1.2.1 Fonts

The following font and font style conventions are used in the document:

- Capitalization is used for CybOX high-level concepts, which are defined in *CybOX™ Version 2.1.1 Part 1: Overview*.

Examples: Action, Object, Event, Property

- The `Courier New` font is used for writing UML objects.

  Examples: `ActionType`, `cyboxCommon:BaseObjectPropertyType`

  Note that all high-level concepts have a corresponding UML object. For example, the Action high-level concept is associated with a UML class named, `ActionType`.

- The '*italic'* font (with single quotes) is used for noting actual, explicit values for CybOX Language properties. The *italic* font (without quotes) is used for noting example values.

  Example: *'HashNameVocab-1.0,' high, medium, low*

1.2.2 UML Package References

Each CybOX data model is captured in a different UML package (e.g., Core package) where the packages together compose the full CybOX UML model. To refer to a particular class of a specific package, we use the format `package_prefix:class`, where `package_prefix` corresponds to the appropriate UML package.

The package_prefix for the Disk Partition data model is `DiskPartitionObj`. Note that in this specification document, we do not explicitly specify the package prefix for any classes that originate from the Disk Partition Object data model.

1.2.3 UML Diagrams

This specification makes use of UML diagrams to visually depict relationships between CybOX Language constructs. Note that the diagrams have been extracted directly from the full UML model for CybOX; they have not been constructed purely for inclusion in the specification documents. Typically, diagrams are included for the primary class of a data model, and for any other class where the visualization of its relationships between other classes would be useful. This implies that there will be very few diagrams for classes whose only properties are either a data type or a class from the CybOX Common data model. Other diagrams that are included correspond to classes that specialize a superclass and abstract or generalized classes that are extended by one or more subclasses.

In UML diagrams, classes are often presented with their attributes elided, to avoid clutter. The fully described class can usually be found in a related diagram. A class presented with an empty section at the bottom of the icon indicates that there are no attributes other than those that are visualized using associations.

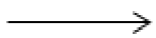
1.2.3.1 Class Properties

Generally, a class property can be shown in a UML diagram as either an attribute or an association (i.e., the distinction between attributes and associations is somewhat subjective). In order to make the size of UML diagrams in the specifications manageable, we have chosen to capture most properties as attributes and to capture only higher-level properties as associations, especially in the main top-level component diagrams. In particular, we will always capture properties of UML data types as attributes.

1.2.3.2 Diagram Icons and Arrow Types

Diagram icons are used in a UML diagram to indicate whether a shape is a class, enumeration, or a data type, and decorative icons are used to indicate whether an element is an attribute of a class or an enumeration literal. In addition, two different arrow styles indicate either a directed association relationship (regular arrowhead) or a generalization relationship (triangle-shaped arrowhead). The icons and arrow styles we use are shown and described in **Table 1-1.**

Table 1-1. UML diagram icons

Icon	Description
	This diagram icon indicates a class. If the name is in italics, it is an abstract class.
	This diagram icon indicates an enumeration.
	This diagram icon indicates a data type.
	This decorator icon indicates an attribute of a class. The green circle means its visibility is public. If the circle is red or yellow, it means its visibility is private or protected.
	This decorator icon indicates an enumeration literal.
	This arrow type indicates a directed association relationship.
	This arrow type indicates a generalization relationship.

1.2.4 Property Table Notation

Throughout Section **3**, tables are used to describe the properties of each data model class. Each property table consists of a column of names to identify the property, a type column to reflect the datatype of the property, a multiplicity column to reflect the allowed number of occurrences of the property, and a description column that describes the property. Package prefixes are provided for classes outside of the Disk Partition Object data model (see Section **1.2.2**).

Note that if a class is a specialization of a superclass, only the properties that constitute the specialization are shown in the property table (i.e., properties of the superclass will not be shown). However, details of the superclass may be shown in the UML diagram.

1.2.5 Property and Class Description

Each class and property defined in CybOX is described using the format, “The X property verb Y.” For example, in the specification for the CybOX Core data model, we write, “The `id` property specifies a globally unique identifier for the Action.” In fact, the verb “specifies” could have been replaced by any number of alternatives: “defines,” “describes,” “contains,” “references,” etc.

However, we thought that using a wide variety of verb phrases might confuse a reader of a specification document because the meaning of each verb could be interpreted slightly differently. On the other hand, we didn’t want to use a single, generic verb, such as “describes,” because although the different verb choices may or may not be meaningful from an implementation standpoint, a distinction could be useful to those interested in the modeling aspect of CybOX.

Consequently, we have preferred to use the three verbs, defined as follows, in class and property descriptions:

Verb	CybOX Definition
captures	Used to record and preserve information without implying anything about the structure of a class or property. Often used for properties that encompass general content. This is the least precise of the three verbs.
	Examples: The `Observable_Source` property characterizes the source of the Observable information. Examples of details captured include identifying characteristics, time-related attributes, and a list of the tools used to collect the information. The `Description` property captures a textual description of the Action.
characterizes	Describes the distinctive nature or features of a class or property. Often used to describe classes and properties that themselves comprise one or more other properties.
	Examples: The `Action` property characterizes a cyber observable Action. The `Obfuscation_Technique` property characterizes a technique an attacker could potentially leverage to obfuscate the Observable.
specifies	Used to clearly and precisely identify particular instances or values associated with a property. Often used for properties that are defined by a controlled vocabulary or enumeration; typically used for properties that take on only a single value.
	Example: The `cybox_major_version` property specifies the major version of the CybOX Language used for the set of Observables.

1.3 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in **[RFC2119]**.

1.4 Normative References

[RFC2119] Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. http://www.ietf.org/rfc/rfc2119.txt.

2 Background Information

In this section, we provide high-level information about the Disk Partition Object data model that is necessary to fully understand the specification details given in Section **3**.

2.1 Cyber Observables

A cyber observable is a dynamic event or a stateful property that occurs, or may occur, in the operational cyber domain. Examples of stateful properties include the value of a registry key, the MD5 hash of a file, and an IP address. Examples of events include the deletion of a file, the receipt of an HTTP GET request, and the creation of a remote thread.

A cyber observable is different than a cyber indicator. A cyber observable is a statement of fact, capturing what was observed or could be observed in the cyber operational domain. Cyber indicators are cyber observable patterns, such as a registry key value associated with a known bad actor or a spoofed email address used on a particular date.

2.2 Objects

Cyber observable objects (Files, IP Addresses, etc) in CybOX are characterized with a combination of two levels of data models.

The first level is the Object data model which specifies a base set of properties universal to all types of Objects and enables them to integrate with the overall cyber observable framework specified in the CybOX Core data model.

The second level are the object property models which specify the properties of a particular type of Object via individual data models each focused on a particular cyber entity, such as a Windows registry key, or an Email Message. Accordingly, each release of the CybOX language includes a particular set of Objects that are part of the release. The data model for each of these Objects is defined by its own specification that describes the context-specific classes and properties that compose the Object.

Any specific instance of an Object is represented utilizing the particular object properties data model within the general Object data model.

3 Data Model

3.1 DiskPartitionObjectType Class

The `DiskPartitionType` class is intended to characterize partitions of disk drives. The UML diagram corresponding to the `DiskPartitionObjectType` class is shown in **Figure 3-1**.

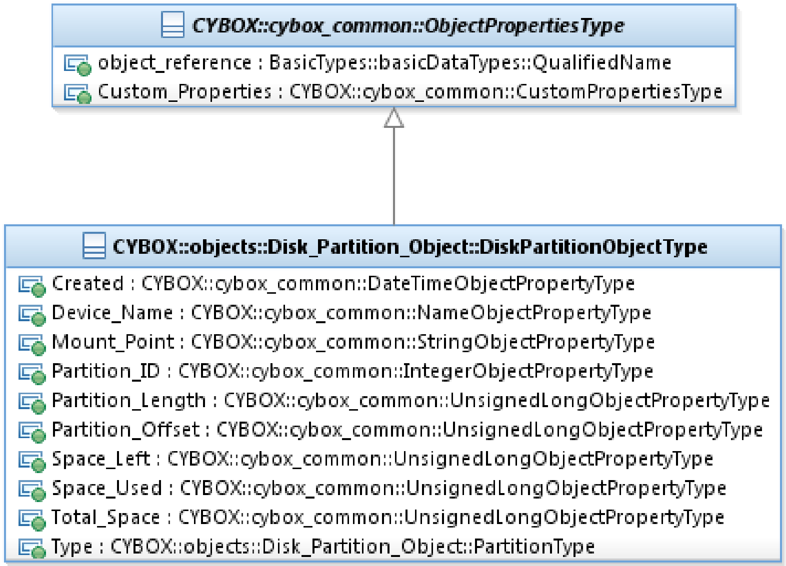


Figure 3-1. UML diagram of the `DiskPartitionObjectType` class

The property table of the `DiskPartitionObjectType` class is given in **Table 3-1**.

Table 3-1. Properties of the `DiskPartitionObjectType` class

Name	Type	Multiplicity	Description
Created	`cyboxCommon:`	0..1	The `Created` property specifies the date/time when the

	DateTimeObjectPropertyType		partition was created.
Device_Name	cyboxCommon: NameObjectPropertyType	0..1	The `Device_Name` property specifies the name of the device on which the partition resides.
Mount_Point	cyboxCommon: StringObjectPropertyType	0..1	The `Mount_Point` property specifies the mount point of the partition.
Partition_ID	cyboxCommon: IntegerObjectPropertyType	0..1	The `Partition_ID` property specifies the numerical identifier of the partition.
Partition_Length	cyboxCommon: UnsignedLongObjectPropertyType	0..1	The `Partition_Length` property specifies the length of the partition, in bytes.
Partition_Offset	cyboxCommon: UnsignedLongObjectPropertyType	0..1	The `Partition_Offset` property specifies the starting offset of the partition, in bytes.
Space_Left	cyboxCommon: UnsignedLongObjectPropertyType	0..1	The `Space_Left` property specifies the amount of space left on the partition, in bytes.
Space_Used	cyboxCommon: UnsignedLongObjectPropertyType	0..1	The `Space_Used` property specifies the amount of space used on the partition, in bytes.
Total_Space	cyboxCommon: UnsignedLongObjectPropertyType	0..1	The `Total_Space` property specifies the total amount of space available on the partition, in bytes.
Type	PartitionType	0..1	The `Type` property specifies the type of partition being characterized.

3.2 PartitionType Data Type

The `PartitionType` data type specifies the partition type. Its core value SHOULD be a literal found in the `PartitionTypeEnum` enumeration. It extends the `BaseObjectPropertyType` data type, in order to permit complex (i.e., regular-expression based) specifications.

3.3 PartitionTypeEnum Enumeration

The literals of the `PartitionTypeEnum` enumeration are given in **Table 3-2**.

Table 3-2. Literals of the `PartitionTypeEnum` enumeration

Enumeration Literal	Description
PARTITION_ENTRY_UNUSED	Indicates an unused partition entry.
PARTITION_FAT_12	Indicates a FAT 12 partition.
PARTITION_XENIX_1	Indicates a XENIX type 1 partition.
PARTITION_XENIX_2	Indicates a XENIX type 2 partition.
PARTITION_FAT_16	Indicates a XENIX FAT 16 partition.
PARTITION_EXTENDED	Indicates a XENIX extended partition.
PARTITION_HUGE	Specifies an MS-DOS V4 huge partition. This value indicates that there is no Microsoft file system on the partition. Use this value when creating a logical volume.
PARTITION_IFS	Indicates an IFS partition.
PARTITION_OS2BOOTMGR	Indicates an OS/2 boot manager partition.

PARTITION_FAT32	Indicates a FAT32 partition.
PARTITION_FAT32_XINT13	Indicates a FAT32 Extended-INT13 equivalent partition to the FAT32 partition.
PARTITION_XINT13	Indicates an XINT13 partition.
PARTITION_XINT13_EXTENDED	Indicates an extended XINT13 partition.
PARTITION_PREP	Indicates a PReP (Power PC Reference Platform) partition.
PARTITION_LDM	Indicates an LDM partition.
PARTITION_UNIX	Indicates a UNIX partition.
VALID_NTFT	Specifies a valid NTFT partition. The high bit of a partition type code indicates that a partition is part of an NTFT mirror or striped array.
PARTITION_NTFT	Specifies an NTFT partition.
UNKNOWN	Refers to an unknown partition or a partition other than those listed.

4 Conformance

Implementations have discretion over which parts (components, properties, extensions, controlled vocabularies, etc.) of CybOX they implement (e.g., Observable/Object).

[1] Conformant implementations must conform to all normative structural specifications of the UML model or additional normative statements within this document that apply to the portions of CybOX they implement (e.g., implementers of the entire Observable class must conform to all normative structural specifications of the UML model regarding the Observable class or additional normative statements contained in the document that describes the Observable class).

[2] Conformant implementations are free to ignore normative structural specifications of the UML model or additional normative statements within this document that do not apply to the portions of CybOX they implement (e.g., non-implementers of any particular properties of the Observable class are free to ignore all normative structural specifications of the UML model regarding those properties of the Observable class or additional normative statements contained in the document that describes the Observable class).

The conformance section of this document is intentionally broad and attempts to reiterate what already exists in this document.

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- James Cabral

Emmanuelle Vargas-Gonzalez
John Wunder

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Scott Algeier
Denise Anderson
Josh Poster

NEC Corporation
Takahiro Kakumaru

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David Darnell

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Bernd Grobauer

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John Anderson
Aishwarya Asok Kumar
Peter Ayasse
Jeff Beekman
Michael Butt
Cynthia Camacho
Aharon Chernin
Mark Clancy
Brady Cotton
Trey Darley
Mark Davidson
Paul Dion
Daniel Dye
Robert Hutto
Raymond Keckler
Ali Khan
Chris Kiehl
Clayton Long

National Security Agency
Mike Boyle
Jessica Fitzgerald-McKay

New Context Services, Inc.
John-Mark Gurney
Christian Hunt
James Moler
Daniel Riedel
Andrew Storms

OASIS
James Bryce Clark
Robin Cover
Chet Ensign

Open Identity Exchange
Don Thibeau

PhishMe Inc.
Josh Larkins

Raytheon Company-SAS
Daniel Wyschogrod

Retail Cyber Intelligence Sharing Center (R-CISC)
Brian Engle

Semper Fortis Solutions
Joseph Brand

Splunk Inc.
Cedric LeRoux
Brian Luger
Kathy Wang

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Greg Reaume
Alan Steer

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Tyron Miller
Andrew van der Stock

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Cole Iliff
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Ben Schmoker
Jason Spies

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Chris Roblee

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Appendix B. Revision History

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