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SACM Information Model
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Abstract

This document defines the Information Elements that are transported between SACM components and their interconnected relationships. The primary purpose of the Secure Automation and Continuous Monitoring (SACM) Information Model is to ensure the interoperability of corresponding SACM data models and addresses the use cases defined by SACM. The Information Elements and corresponding types are maintained as the IANA "SACM Information Elements" registry.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on September 14, 2017.

Table of Contents

1. Introduction

The SACM Information Model (IM) serves multiple purposes:

- to ensure interoperability between SACM data models that are used as transport encodings,
- to provide a standardized set of Information Elements - the SACM Vocabulary - to enable the exchange of content vital to automated security posture assessment, and
- to enable secure information sharing in a scalable and extensible fashion in order to support the tasks conducted by SACM components.

A complete set of requirements imposed on the IM can be found in [I-D.ietf-sacm-requirements]. The SACM IM is intended to be used for standardized data exchange between SACM components (data in motion). Nevertheless, the Information Elements (IE) and their relationships defined in this document can be leveraged to create and align corresponding data models for data at rest.

The information model expresses, for example, target endpoint (TE) attributes, guidance, and evaluation results. The corresponding Information Elements are consumed and produced by SACM components as they carry out tasks.

The primary tasks that this information model supports (on data, control, and management plane) are:

- TE Discovery
- TE Characterization
- TE Classification
- Collection
- Evaluation
- Information Sharing
- SACM Component Discovery
- SACM Component Authentication
- SACM Component Authorization

- SACM Component Registration

These tasks are defined in [I-D.ietf-sacm-terminology].

2. Conventions used in this document

2.1. Requirements Language

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 RFC 2119 [RFC2119].

2.2. Information Element Examples

The notation used to define the SACM Information Elements (IEs) is based on a customized version of the IPFIX information model syntax [RFC7012] which is described in Figure 2. However, there are several examples presented throughout the document that use a simplified pseudo-code to illustrate the basic structure. It should be noted that while they include actual names of subjects and attributes as well as values, they are not intended to influence how corresponding SACM IEs should be defined in Section 7. The examples are provided for demonstration purposes only.

3. Information Elements

The IEs defined in this document comprise the building blocks by which all SACM content is composed. They are consumed and provided by SACM components on the data plane. Every Information Element has a unique label: its name. Every type of IE defined by the SACM IM is registered as a type at the IANA registry. The Integer Index of the IANA SMI number tables can be used by SACM data models.

3.1. Context of Information Elements

The IEs in this information model represent information related to assets in the following areas (based on the use cases described in [RFC7632]):

- Endpoint Management
- Software Inventory Management
- Hardware Inventory Management
- Configuration Management
- Vulnerability Management

3.2. Extensibility of Information Elements

A SACM data model based on this information model MAY include additional information elements that are not defined here. The labels of additional Information Elements included in different SACM data models MUST NOT conflict with the labels of the Information Elements defined by this information model, and the names of additional Information Elements MUST NOT conflict with each other or across multiple data models. In order to avoid naming conflicts, the labels of additional IEs SHOULD be prefixed to avoid collisions across extensions. The prefix MUST include an organizational identifier and therefore, for example, MAY be an IANA enterprise number, a (partial) name space URI, or an organization name abbreviation.

4. Structure of Information Elements

There are two basic types of IEs:

- Attributes: Atomic information elements that are equivalent to name-value-pairs and can be components of Subjects.

- Subjects: Composite information elements that have a name and are made up of Attributes and/or other Subjects. Every IE that is part of a Subject can have a quantity associated with it (e.g. zero-one, none-unbounded). The content IEs of a Subject can be ordered or unordered.

```
Example Instance of an Attribute:
hostname = "arbutus"

Example Instance of a Subject:
coordinates = (
latitude = N27.99619,
longitude = E86.92761
)
```

Figure 1: Example instance of an attribute and subject.

In general, every piece of information that enables security posture assessment or further enriches the quality of the assessment process can be associated with metadata. In the SACM IM, metadata is represented by specific subjects and is bundled with other attributes or subjects to provide additional information about them. The IM explicitly defines two kinds of metadata:

- Metadata focusing on the data origin (the SACM component that provides the information to the SACM domain)

- o Metadata focusing on the data source (the target endpoint that is assessed)

Metadata can also include relationships that refer to other associated IEs (or SACM content in general) by using referencing labels that have to be included in the metadata of the associated IE.

Subjects can be nested and the SACM IM allows for circular or recursive nesting. The association of IEs via nesting results in a tree-like structure wherein subjects compose the root and intermediary nodes and attributes the leaves of the tree. This semantic structure does not impose a specific structure on SACM data models regarding data in motion or data repository schemata for data at rest.

The SACM IM provides two conceptual top-level subjects that are used to ensure a homogeneous structure for SACM content and its associated metadata: SACM statements and SACM content-elements. Every set of IEs that is provided by a SACM component must provide the information contained in these two subjects although it is up to the implementer whether or not the subjects are explicitly defined in a data model.

The notation the SACM IM is defined in is based on a modified version of the IP Information Flow Export (IPFIX) Information Model syntax described in Section 2.1 of [RFC7012]. The customized syntax used by the SACM IM is defined below in Figure 2.

elementId (required):	The numeric identifier of the Information Element. It is used for the compact identification of an Information Element. If this identifier is used without an enterpriseID, then the elementId must be unique, and the description of allowed values is administrated by IANA. The value "TBD" may be used during development of the information model until an elementId is assigned by IANA and filled in at publication time.
enterpriseId (optional):	Enterprises may wish to define Information Elements without registering them with IANA, for example, for enterprise-internal purposes. For such Information Elements, the elementId is

not sufficient when used outside the enterprise. If specifications of enterprise-specific Information Elements are made public and/or if enterprise-specific identifiers are used by SACM components outside the enterprise, then the enterprise-specific identifier MUST be made globally unique by combining it with an enterprise identifier. Valid values for the enterpriseId are defined by IANA as Structure of Management Information (SMI) network management private enterprise numbers.

name (required): A unique and meaningful name for the Information Element.

dataType (required): There are two kinds of datatypes: simple and structured. Attributes are defined using simple datatypes and subjects are defined using structured datatypes. The contents of the datatype field will be either a reference to one of the simple datatypes listed in Section 5.1, or the specification of structured datatype as defined in Section 5.2.

status (required): The status of the specification of the Information Element. Allowed values are "current" and "deprecated". All newly defined Information Elements have "current" status. The process for moving Information Elements to the "deprecated" status is TBD.

description (required): Describes the meaning of the Information Element, how it is derived, conditions for its use, etc.

structure (optional): A parsable property that provides details about the definition of

	structured Information Elements as described in Section 5.2.
references (optional):	Identifies other RFCs or documents outside the IETF which provide additional information or context about the Information Element.

Figure 2: Information Element Specification Template

4.1. Information Element Naming Convention

SACM Information Elements must adhere to the following naming conventions.

- Names SHOULD be descriptive
- Names MUST be unique within the SACM registry. Enterprise-specific names SHOULD be prefixed with a Private Enterprise Number [PEN].
- Names MUST start with lowercase letters unless it begins with a Private Enterprise Number
- Composed names MUST use capital letters for the first letter of each part

4.2. SACM Content Elements

Every piece of information that is provided by a SACM Component is always associated with a set of data source metadata (e.g. the timestamp when the information was collected, the target endpoint from which the this set of information is about, etc.) which is provided in the SACM Content Element Metadata. The SACM Content Element is the subject information element that associates the information with the SACM Content Element Metadata. The SACM Content Element Metadata may also include relationships that express associations with other SACM Content Elements.

```
content-element = (
  content-metadata = (
    collection-timestamp = 146193322,
    data-source = fb02e551-7101-4e68-8dec-1fde6bd10981
  ),
  hostname = "arbutus",
  coordinates = (
  latitude = N27.99619,
  longitude = E86.92761
  )
)
```

Figure 3: Example set of IEs associated with a timestamp and a target endpoint label.

4.3. SACM Statements

One or more SACM Content Elements are bundled in a SACM Statement. In contrast to SACM Content Element Metadata, SACM Statement Metadata focuses on the providing information about the SACM Component that provided it rather than the target endpoint that the content is about. The only content-specific metadata included in the SACM Statement is the statement-type IE. Therefore, multiple SACM Content Elements that share the same SACM Statement Metadata and are of the same statement-type can be included in a single SACM Statement. A SACM Statement functions similar to an envelope or a header and is the subject information element that associates SACM Statement Metadata with security automation information provided in its SACM Content Element(s). Its purpose is to enable the tracking of the origin of data inside a SACM domain and more importantly to enable the mitigation of conflicting information that may originate from different SACM Components. How a consuming SACM Component actually deals with conflicting information is out-of-scope of the SACM IM. Semantically, the term statement implies that the SACM content provided by a SACM Component might not be correct in every context, but, rather is the result of a best-effort to produce correct information.

```
sacm-statement = (
  statement-metadata = (
    publish-timestamp = 1461934031,
    data-origin = 24e67957-3d31-4878-8892-da2b35e121c2,
    statement-type = observation
  ),
  content-element = (
    content-metadata = (
      collection-timestamp = 146193322,
      data-source = fb02e551-7101-4e68-8dec-1fde6bd10981
    ),
    hostname = "arbutus"
  )
)
```

Figure 4: Example of a simple SACM statement including a single content-element.

```
sacm-statement = (
  statement-metadata = (
    publish-timestamp = 1461934031,
    data-origin = 24e67957-3d31-4878-8892-da2b35e121c2
    statement-type = observation
  ),
  content-element = (
    content-metadata = (
      collection-timestamp = 146193322,
      data-source = fb02e551-7101-4e68-8dec-1fde6bd10981
    ),
    coordinates = (
      latitude = N27.99619,
      longitude = E86.92761
    )
  )
)

sacm-statement = (
  statement-metadata = (
    publish-timestamp = 1461934744,
    data-origin = e42885a1-0270-44e9-bb5c-865cf6bd4800,
    statement-type = observation
  ),
  content-element = (
    content-metadata = (
      collection-timestamp = 146193821,
      te-label = fb02e551-7101-4e68-8dec-1fde6bd10981
    ),
    coordinates = (
      latitude = N16.67622,
      longitude = E141.55321
    )
  )
)
```

Figure 5: Example of conflicting information originating from different SACM components.

4.4. Relationships

An IE can be associated with another IE, e.g. a user-name attribute can be associated with a content-authorization subject. These references are expressed via the relationships subject, which can be included in a corresponding content-metadata subject. The relationships subject includes a list of one or more references. The SACM IM does not enforce a SACM domain to use unique identifiers as

references. Therefore, there are at least two ways to reference another

- The value of a reference represents a specific content-label that is unique in a SACM domain (and has to be included in the corresponding content-element metadata in order to be referenced), or
- The reference is a subject that includes an appropriate number of IEs in order to identify the referenced content-element by its actual content.

It is recommended to provide unique identifiers in a SACM domain and the SACM IM provides a corresponding naming-convention as a reference in Section 4.1. The alternative highlighted above summarizes a valid approach that does not require unique identifiers and is similar to the approach of referencing target endpoints via identifying attributes included in a characterization record.

```
content-element = (
  content-metadata = (
    collection-timestamp = 1461934031,
    te-label =
    fb02e551-7101-4e68-8dec-1fde6bd10981
    relationships = (
      associated-with-user-account =
      f3d70ef4-7e18-42af-a894-8955ba87c95d
    )
  ),
  hostname = "arbutus"
)

content-element = (
  content-metadata = (
    content-label = f3d70ef4-7e18-42af-a894-8955ba87c95d
  ),
  user-account = (
    username = romeo
    authentication = local
  )
)
```

Figure 6: Example instance of a content-element subject associated with another subject via its content metadata.

4.5. Event

Event subjects provide a structure to represent the change of IE values that was detected by a collection task at a specific point of time. It is mandatory to include the new values and the collection timestamp in an event subject and it is recommended to include the past values and a collection timestamp that were replaced by the new IE values. Every event can also be associated with a subject-specific event-timestamp and a lastseen-timestamp that might differ from the corresponding collection-timestamps. If these are omitted the collection-timestamp that is included in the content-metadata subject is used instead.

```
sacm-statement = (
  statement-metadata = (
    publish-timestamp = 1461934031,
    data-origin = 24e67957-3d31-4878-8892-da2b35e121c2,
    statement-type = event
  ),
  event = (
    event-attributes = (
      event-name = "host-name change",
      content-element = (
        content-metadata = (
        collection-timestamp = 146193322,
        data-source =
          fb02e551-7101-4e68-8dec-1fde6bd10981,
          event-component = past-state
       ),
       hostname = "arbutus"
      ),
      content-element = (
        content-metadata = (
          collection-timestamp = 146195723,
          data-source =
          fb02e551-7101-4e68-8dec-1fde6bd10981,
          event-component = current-state
        ),
        hostname = "lilac"
      )
    )
  )
```

Figure 7: Example of a SACM statement containing an event.

4.6. Categories

Categories are special IEs that enable to refer to multiple types of IE via just one name. Therefore, they are similar to a type-choice. A prominent example of a category is when identifying a target endpoint. In some cases, a target endpoint will be identified by a set of identifying attributes and in other cases a target endpoint will be identified by a target endpoint label which is unique within a SACM domain. If a subject includes the targetEndpoint information element as one of its components, any of the category members (targetEndpointIdentifier or targetEndpointLabel) are valid to be used in its place.

5. Abstract Data Types

This section describes the set of valid abstract data types that can be used for the specification of the SACM Information Elements in Section 7. SACM currently supports two classes of datatypes that can be used to define Information Elements.

- Simple: Datatypes that are atomic and are used to define the type of data represented by an attribute Information Element.
- Structured: Datatypes that can be used to define the type of data represented by a subject Information Element.

Note that further abstract data types may be specified by future extensions of the SACM information model.

5.1. Simple Datatypes

5.1.1. IPFIX Datatypes

To facilitate the use of existing work, SACM supports the following abstract data types defined in Section 3 of [RFC7012].

- unsigned8, unsigned16, unsigned32, unsigned64
- signed8, signed16, signed32, signed64
- float32, float64
- boolean
- macAddress
- octetArray

- string
- dateTimeSeconds, dateTimeMilliseconds, dateTimeMicroseconds, dateTimeNanoSeconds
- ipv4Address, ipv6Address

5.2. Structured Datatypes

5.2.1. List Datatypes

SACM defines the following abstract list data types that are used to represent the structured data associated with subjects.

- list: indicates that the Information Element order is not significant but MAY be preserved.
- orderedList: indicates that Information Element order is significant and MUST be preserved.

The notation for defining a SACM structured datatype is based on regular expressions, which are composed of the keywords "list" or "orderedList" and an Information Element expression. IE expressions use some of the regular expression syntax and operators, but the terms in the expression are the names of defined Information Elements instead of character classes. The syntax for defining list and orderedList datatypes is described below, using BNF:

```
<list-def> -> ("list"|"orderedList") "(" <ie-expression> ")"

<ie-expression> -> <ie-name> <cardinality>?
                    ( ("," | "|") <ie-name> <cardinality>?)*

<cardinality> -> "*" | "+" | "?" |
                 ( "(" <non-neg-int> ("," <non-neg-int>)? ")" )
```

Figure 8: Syntax for Defining List Datatypes

As seen above, multiple occurences of an Information Element may be present in a structured datatype. The cardinality of an Information Element within a structured Information Element definition is defined by the following operators:

```
* - zero or more occurrences

+ - one or more occurrences

? - zero or one occurrence

(m,n) - between m and n occurrences
```

Figure 9: Specifying Cardinality for Structured Datatypes

The absence of a cardinality operator implies one mandatory occurrence of the Information Element.

Below is an example of a structured Information Element definition.

```
personInfo = list(firstName, middleNames?, lastName)
firstName = string
middleNames = orderedList(middleName+)
middleName = string
lastName = string
```

As an example, consider the name "John Ronald Reuel Tolkien". Below are instances of this name, structured according to the personInfo definition.

```
personInfo = (firstName="John", middleNames(middleName="Ronald",
              middleName="Reuel"), lastName="Tolkien")

personInfo = (middleNames(middleName="Ronald", middleName=" Reuel"),
              lastName="Tolkien", firstName="John")
```

The instance below is not legal with respect to the definition of personInfo because the order in middleNames is not preserved.

```
personInfo = (firstName="John", middleNames(middleName=" Reuel",
              middleName="Ronald"), lastName="Tolkien")
```

Figure 10: Example of Defining a Structured List Datatype

5.2.2. Enumeration Datatype

SACM defines the following abstract enumeration datatype that is used to represent the restriction of an attribute value to a set of values.

```
name, hex-value, description
<enumeration-def> -> -> <name> ";" <hex-value> ";" <description>
<name> -> [0-9a-zA-Z]+
<hex-value> -> 0x[0-9a-fA-F]+
<description> -> [0-9a-zA-Z\.\,]+
```

Figure 11: Syntax for Defining an Enumeration Datatype

Below is an example of a structured Information Element definition for an enumeration.

```
Red    ; 0x1  ; The color is red.
Orange ; 0x2  ; The color is orange.
Yellow ; 0x3  ; The color is yellow.
Green  ; 0x4  ; The color is green.
...
```

Figure 12: Example of Defining a Structured Enumeration Datatype

5.2.3. Category Datatype

SACM defines the following abstract category datatype that is used to represent a type-choice between a set of information elements.

```
<category-def> -> "category(" <ie-expression> ")"
<ie-expression> -> <ie-name> ("|" <ie-name>)*
<name> -> [0-9a-zA-Z]+
```

Figure 13: Syntax for Defining an Category Datatype

Below is an example of a structured Information Element definition for a category.

```
targetEndpoint = category(targetEndpointIdentifier |
                          targetEndpointLabel)
```

Figure 14: Example of Defining a Structured Category Datatype

6. Information Model Assets

In order to represent the Information Elements related to the areas listed in Section 3.1, the information model defines the information needs (or metadata about those information needs) related to following types of assets which are defined in [I-D.ietf-sacm-terminology] (and included below for convenience) which are of interest to SACM. Specifically:

- Endpoint

- Software Component
- Hardware Component
- Identity
- Guidance
- Evaluation Results

The following figure shows the make up of an Endpoint asset which contains zero or more hardware components and zero or more software components each of which may have zero or more instances running an endpoint at any given time as well as zero or more identities that act on behalf of the endpoint when interfacing with other endpoints, tools, or services. An endpoint may also contain other endpoints in the case of a virtualized environment.

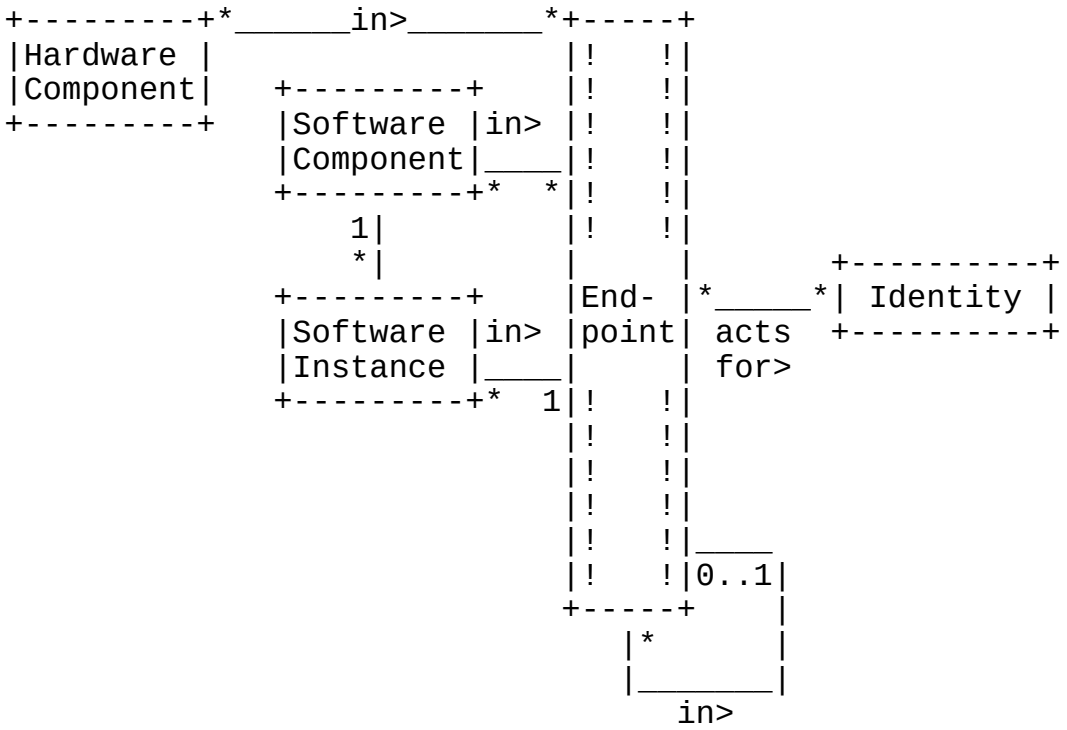

Figure 15: Model of an Endpoint

6.1. Asset

As defined in [RFC4949], an asset is a system resource that is (a) required to be protected by an information system's security policy,

(b) intended to be protected by a countermeasure, or (c) required for a system's mission.

In the scope of SACM, an asset can be composed of other assets. Examples of Assets include: Endpoints, Software, Guidance, or Identity. Furthermore, an asset is not necessarily owned by an organization.

6.2. Endpoint

From [RFC5209], an endpoint is any computing device that can be connected to a network. Such devices normally are associated with a particular link layer address before joining the network and potentially an IP address once on the network. This includes: laptops, desktops, servers, cell phones, or any device that may have an IP address.

To further clarify, an endpoint is any physical or virtual device that may have a network address. Note that, network infrastructure devices (e.g. switches, routers, firewalls), which fit the definition, are also considered to be endpoints within this document.

Physical endpoints are always composites that are composed of hardware components and software components. Virtual endpoints are composed entirely of software components and rely on software components that provide functions equivalent to hardware components.

The SACM architecture differentiates two essential categories of endpoints: Endpoints whose security posture is intended to be assessed (target endpoints) and endpoints that are specifically excluded from endpoint posture assessment (excluded endpoints).

6.3. Hardware Component

Hardware components are the distinguishable physical components that compose an endpoint. The composition of an endpoint can be changed over time by adding or removing hardware components. In essence, every physical endpoint is potentially a composite of multiple hardware components, typically resulting in a hierarchical composition of hardware components. The composition of hardware components is based on interconnects provided by specific hardware types (e.g. mainboard is a hardware type that provides local busses as an interconnect). In general, a hardware component can be distinguished by its serial number.

Examples of a hardware components include: motherboards, network interfaces, graphics cards, hard drives, etc.

6.4. Software Component

A software package installed on an endpoint (including the operating system) as well as a unique serial number if present (e.g. a text editor associated with a unique license key).

It should be noted that this includes both benign and harmful software packages. Examples of benign software components include: applications, patches, operating system kernel, boot loader, firmware, code embedded on a webpage, etc. Examples of malicious software components include: malware, trojans, viruses, etc.

6.4.1. Software Instance

A running instance of the software component (e.g. on a multi-user system, one logged-in user has one instance of a text editor running and another logged-in user has another instance of the same text editor running, or on a single-user system, a user could have multiple independent instances of the same text editor running).

6.5. Identity

Any mechanism that can be used to identify an asset during an authentication process. Examples include usernames, user and device certificates, etc. Note, that this is different than the identity of assets in the context of designation as described in Section 11.1.

6.6. Guidance

Guidance is input instructions to processes and tasks, such as collection or evaluation. Guidance influences the behavior of a SACM component and is considered content of the management plane. Guidance can be manually or automatically generated or provided. Typically, the tasks that provide guidance to SACM components have a low-frequency and tend to be sporadic. A prominent example of guidance are target endpoint profiles,but guidance can have many forms, including:

Configuration, e.g. a SACM component’s name, or a CMDB’s IPv6 address.

Profiles, e.g. a set of expected states for network behavior associated with target endpoints employed by specific users.

Policies, e.g. an interval to refresh the registration of a SACM component, or a list of required capabilities for SACM components in a specific location.

6.6.1. Collection Guidance

A collector may need guidance to govern what it collects and when. Collection Guidance provides instructions for a Collector that specifies which endpoint attributes to collect, when to collect them, and how to collect them. Collection Guidance is composed of Target Endpoint Attribute Guidance, Frequency Guidance, and Method Guidance.

- Target Endpoint Attribute Guidance: Set of endpoint attributes that are supposed to be collected from a target endpoint. The definition of the set of endpoint attributes is typically based on an endpoint characterization record.
- Frequency Guidance: Specifies when endpoint attributes are to be collected.
- Method Guidance: Indicates how endpoint attributes are to be collected.

6.6.2. Evaluation Guidance

An evaluator typically needs guidance to govern what it considers to be a good or bad security posture. Evaluation Guidance provides instructions for an Evaluator that specifies which endpoint attributes to evaluate, the desired state of those endpoint attributes, and any special requirements that enable an Evaluator to determine if the endpoint attributes can be used in the evaluation (e.g. freshness of data, how it was collected, etc.). Evaluation Guidance is composed of Target Endpoint Attribute Guidance, Expected Endpoint Attribute Value Guidance, and Frequency Guidance.

- Target Endpoint Attribute Guidance: Set of target endpoint attributes that are supposed to be used in an evaluation as well as any requirements on the endpoint attributes. The definition of the set of endpoint attributes is typically based on an endpoint characterization record.
- Expected Endpoint Attribute Value Guidance: The expected values of the endpoint attributes described in the Target Endpoint Attribute Guidance.
- Frequency Guidance: Specifies when endpoint attributes are to be evaluated.
- Method Guidance: Indicates how endpoint attributes are to be collected.

6.6.3. Classification Guidance

A SACM Component carrying out the Target Endpoint Classification Task may need guidance on how to classify an endpoint. Specifically, how to associate endpoint classes with a specific target endpoint characterization record. Target Endpoint Classes function as guidance for collection, evaluation, remediation and security posture assessment in general. Classification Guidance is composed of Target Endpoint Attribute Guidance and Class Guidance.

- Target Endpoint Attribute Guidance: Set of target endpoint attributes that are supposed to be used to identify the endpoint characterization record.

- Class Guidance: A list of target endpoint classes that are to be associated with the identified target endpoint characterization record.

6.6.4. Storage Guidance

An SACM Component typically needs guidance to govern what information it should store and where. Storage Guidance provides instructions for a SACM Component that specifies which security automation information should be stored, for how long, and on which endpoint. Storage Guidance is composed of Target Endpoint Attribute Guidance, Expected Security Automation Information Guidance, and Retention Guidance.

- Target Endpoint Attribute Guidance: Set of target endpoint attributes that are supposed to be used to identify the endpoint where the security automation information is to be stored.

- Expected Security Automation Information Guidance: The security automation information that is expected to be stored (guidance, collected posture attributes, results, etc.).

- Retention Guidance: Specifies how long the security automation information should be stored.

6.6.5. Evaluation Results

Evaluation Results are the output of comparing the actual state of an endpoint against the expected state of an endpoint. In addition to the actual results of the comparison, Evaluation Results should include the Evaluation Guidance and actual target endpoint attributes values used to perform the evaluation.

7. Information Model Elements

This section defines the specific Information Elements and relationships that will be implemented by data models and transported between SACM Components.

7.1. sacmStatement

```
elementId: TBD
name: sacmStatement
dataType: orderedList
status: current
description: Associates SACM Statement Metadata
which provides data origin information about
the providing SACM Component with one or more
SACM Content Elements that contain security
automation information.
structure: orderedList(sacmStatementMetadata,
                       sacmContentElement+)
```

7.2. sacmStatementMetadata

```
elementId: TBD
name: sacmStatementMetadata
dataType: orderedList
status: current
description: Contains IEs that provide
information about the data origin of the
providing SACM Component as well as the
information necessary for other SACM
Components to understand the type of
security automation information in the
SACM Statement's SACM Content Element(s).
structure: orderedList(publicationTimestamp,
                       dataOrigin, anyIE*)
```

7.3. sacmContentElement

```
elementId: TBD
name: sacmContentElement
dataType: list
status: current
description: Associates SACM Content Element
Metadata which provides information about the
data source and type of security automation
information with the actual security automation
information.
structure: TODO
```

7.4. sacmContentElementMetadata

```
elementId: TBD
name: sacmContentElementMetadata
dataType: orderedList
status: current
description: Contains IEs that provide
information about the data source and type of
security automation information such that other
SACM Components are able to parse and understand
the security automation information contained
within the SACM Statement's SACM Content Element(s).
structure: orderedList(collectionTimestamp,
                       targetEndpoint, anyIE*)
```

7.5. targetEndpoint

```
elementId: TBD
name: targetEndpoint
dataType: category
status: current
description: Information that identifies a target
            endpoint on the network. This may be a set of
attributes that can be used to identify an endpoint
on the network or a label that is unique to a SACM
domain.
            structure: category(targetEndpointIdentifier |
                               targetEndpointLabel)
```

7.6. targetEndpointIdentifier

```
elementId: TBD
name: targetEndpointIdentifier
dataType: list
status: current
description: A set of attributes that uniquely
             identify a target endpoint on the network.
structure: list(anyIE+)
```

7.7. targetEndpointLabel

```
elementId: TBD
name: targetEndpointLabel
dataType: string
status: current
description: A label that uniquely identifies
             a target endpoint on SACM domain.
```

7.8. anyIE

```
elementId: TBD
name: anyIE
dataType: category
status: current
description: This category is a placeholder
             for any information element defined within
             the SACM Information Model. Its purpose is
to provide an extension point in other
             information elements that enable them to
             support the specific needs of an enterprise,
             user, product, or service.
```

7.9. accessPrivilegeType

```
elementId: TBD
name: accessPrivilegeType
dataType: string
status: current
description: A set of types that represent access
privileges (read, write, none, etc.).
```

7.10. accountName

```
elementId: TBD
name: accountName
dataType: string
status: current
description: A label that uniquely identifies an account
that can require some form of (user) authentication to
access.
```

7.11. administrativeDomainType

```
elementId: TBD
name: administrativeDomainType
dataType: string
status: current
description: A label the is supposed to uniquely
identify an administrative domain.
```

7.12. addressAssociationType

```
elementId: TBD
name: addressAssociationType
dataType: string
status: current
description: A label the is supposed to uniquely
identify an administrative domain.
```

7.13. addressMaskValue

```
elementId: TBD
name: addressMaskValue
dataType: string
status: current
description: A value that expresses a generic address
subnetting bitmask.
```

7.14. addressType

```
elementId: TBD
name: addressType
dataType: string
status: current
description: A set of types that specifies the type
of address that is expressed in an address subject
(e.g. ethernet, modbus, zigbee).
```

7.15. addressValue

```
elementId: TBD
name: addressValue
dataType: string
status: current
description: A value that expresses a generic network
             address.
```

7.16. applicationComponent

```
elementId: TBD
name: applicationComponent
dataType: string
status: current
description: A label that references a "sub"-application
that is part of the application (e.g. an add-on, a
cipher-suite, a library).
```

7.17. applicationLabel

elementId: TBD
name: applicationLabel
dataType: string
status: current
description: A label that is supposed to uniquely reference an application.

7.18. applicationType

elementId: TBD
name: applicationType
dataType: string
status: current
description: A set of types (FIXME maybe a finite set is not realistic here - value not enumerator?) that identifies the type of (user-space) application (e.g. text-editor, policy-editor, service-client, service-server, calender, rouge-like RPG).

7.19. applicationManufacturer

elementId: TBD
name: applicationManufacturer
dataType: string
status: current
description: The name of the vendor that created the application.

7.20. authenticator

elementId: TBD
name: authenticator
dataType: string
status: current
description: A label that references a SACM component that can authenticate target endpoints (can be used in a target-endpoint subject to express that the target endpoint was authenticated by that SACM component.

7.21. authenticationType

```
elementId: TBD
name: authenticationType
dataType: string
status: current
description: A set of types that expresses which type
of authentication was used to enable a network
interaction/connection.
```

7.22. birthdate

```
elementId: TBD
name: birthdate
dataType: string
status: current
description: A label for the registered day of birth
of a natural person (e.g. the date of birth of a person
as an ISO date string).
references: http://rs.tdwg.org/ontology/voc/Person#birthdate
```

7.23. bytesReceived

```
elementId: TBD
name: bytesReceived
dataType: string
status: current
description: A value that represents a number of octets
received on a network interface.
```

7.24. bytesReceived

```
elementId: TBD
name: bytesReceived
dataType: string
status: current
description: A value that represents the number of
octets received on a network interface.
```

7.25. bytesSent

```
elementId: TBD
name: bytesSent
dataType: string
status: current
description: A value that represents the number of
octets sent on a network interface.
```

7.26. certificate

elementId: TBD
name: certificate
dataType: string
status: current
description: A value that expresses a certificate that can be collected from a target endpoint.

7.27. collectionTaskType

elementId: TBD
name: collectionTaskType
dataType: string
status: current
description: A set of types that defines how collected SACM content was acquired (e.g. network-observation, remote-acquisition, self-reported, derived, authority, verified).

7.28. confidence

elementId: TBD
name: confidence
dataType: string
status: current
description: A representation of the subjective probability that the assessed value is correct. If no confidence value is given, it is assumed that the confidence is 1. Acceptable values are between 0 and 1.

7.29. contentAction

elementId: TBD
name: contentAction
dataType: string
status: current
description: A set of types that express a type of action (e.g. add, delete, update). It can be associated, for instance, with an event subject or with a network observation.

7.30. countryCode

elementId: TBD
name: countryCode
dataType: string
status: current
description: A set of types according to ISO 3166-1.

7.31. dataOrigin

elementId: TBD
name: dataOrigin
dataType: string
status: current
description: A label that uniquely identifies a SACM component in and across SACM domains.

7.32. dataSource

elementId: TBD
name: dataSource
dataType: string
status: current
description: A label that is supposed to uniquely identify the data source (e.g. a target endpoint or sensor) that provided an initial endpoint attribute record.

7.33. default-depth

elementId: TBD
name: default-depth
dataType: string
status: current
description: A value that expresses how often a circular reference of subject is allowed to repeat, or how deep a recursive nesting may occur, respectively.

7.34. discoverer

elementId: TBD
name: discoverer
dataType: string
status: current
description: A label that refers to the SACM component that discovered a target endpoint (can be used in a target-endpoint subject to express, for example, that the target endpoint was authenticated by that SACM component).

7.35. emailAddress

elementId: TBD
name: emailAddress
dataType: string
status: current
description: A value that expresses an email-address.

7.36. eventType

elementId: TBD
name: eventType
dataType: string
status: current
description: a set of types that define the categories of an event (e.g. access-level-change, change-of-priviledge, change-of-authorization, environmental-event, or provisioning-event).

7.37. eventThreshold

elementId: TBD
name: eventThreshold
dataType: string
status: current
description: if applicable, a value that can be included in an event subject to indicate what numeric threshold value was crossed to trigger that event.

7.38. eventThresholdName

elementId: TBD
name: eventThresholdName
dataType: string
status: current
description: If an event is created due to a crossed threshold, the threshold might have a name associated with it that can be expressed via this value.

7.39. eventTrigger

elementId: TBD
name: eventTrigger
dataType: string
status: current
description: This value is used to express more complex trigger conditions that may cause the creation of an event.

7.40. firmwareId

```
elementId: TBD
name: firmwareId
dataType: string
status: current
description: A label that represents the BIOS or
firmware ID of a specific target endpoint.
```

7.41. hostName

```
elementId: TBD
name: hostName
dataType: string
status: current
description: A label typically associated with an
endpoint, but, not always intended to be unique given
scope.
```

7.42. interfaceLabel

```
elementId: TBD
name: interfaceLabel
dataType: string
status: current
description: A unique label that can be used to
             reference a network interface.
```

7.43. ipv6AddressSubnetMask

```
elementId: TBD
name: ipv6AddressSubnetMask
dataType: string
status: current
description: An IPv6 subnet bitmask.
```

7.44. ipv6AddressSubnetMaskCidrNotation

```
elementId: TBD
name: ipv6AddressSubnetMaskCidrNotation
dataType: string
status: current
description: An IPv6 subnet bitmask in CIDR notation.
```

7.45. ipv6AddressValue

```
elementId: TBD
name: ipv6AddressValue
dataType: ipv6Address
status: current
description: An IPv6 subnet bitmask in CIDR notation.
a network interface.
```

7.46. ipv4AddressSubnetMask

```
elementId: TBD
name: ipv4AddressSubnetMask
dataType: string
status: current
description: An IPv4 subnet bitmask.
```

7.47. ipv4AddressSubnetMaskCidrNotation

```
elementId: TBD
name: ipv4AddressSubnetMaskCidrNotation
dataType: string
status: current
description: An IPv4 subnet bitmask in CIDR notation.
```

7.48. ipv4AddressValue

```
elementId: TBD
name: ipv4AddressValue
dataType: ipv4Address
status: current
description: An IPv4 address value.
```

7.49. layer2InterfaceType

```
elementId: TBD
name: layer2InterfaceType
dataType: string
status: current
description: A set of types referenced by IANA ifType.
```

7.50. layer4PortAddress

```
elementId: TBD
name: layer4PortAddress
dataType: unsigned32
status: current
description: A layer 4 port address
typically associated with TCP and UDP
protocols.
```

7.51. layer4Protocol

```
elementId: TBD
name: layer4Protocol
dataType: string
status: current
description: A set of types that express a layer 4
protocol (e.g. UDP or TCP).
```

7.52. locationName

```
elementId: TBD
name: locationName
dataType: string
status: current
description: A value that represents a named region of
             physical space.
```

7.53. networkZoneLocation

```
elementId: TBD
name: networkZoneLocation
dataType: string
status: current
description: The zone location of an endpoint on the
             network (e.g. internet, enterprise DMZ,
             enterprise WAN, enclave DMZ, enclave).
```

7.54. layer2NetworkLocation

```
elementId: TBD
name: layer2NetworkLocation
dataType: string
status: current
description: The location of a layer-2 interface on
the network (e.g. link-layer neighborhood,
shared broadcast domain).
```

7.55. layer3NetworkLocation

elementId: TBD
name: layer3NetworkLocation
dataType: string
status: current
description: The location of a layer-3 interface on the network (e.g. next-hop routing neighbor).

7.56. macAddressValue

elementId: TBD
name: macAddressValue
dataType: string
status: current
description: A value that expresses an Ethernet address.

7.57. methodLabel

elementId: TBD
name: methodLabel
dataType: string
status: current
description: A label that references a specific method registered and used in a SACM domain (e.g. method to match and re-identify target endpoints via identifying attributes).

7.58. methodRepository

elementId: TBD
name: methodRepository
dataType: string
status: current
description: A label that references a SACM component methods can be registered at and that can provide guidance in the form of registered methods to other SACM components.

7.59. networkAccessLevelType

elementId: TBD
name: networkAccessLevelType
dataType: string
status: current
description: A set of types that expresses categories of network access-levels (e.g. block, quarantine, etc.).

7.60. networkId

```
elementId: TBD
name: networkId
dataType: string
status: current
description: Most networks such as AS, OSBF domains,
or VLANs can have an ID.
```

7.61. networkInterfaceName

```
elementId: TBD
name: networkInterfaceName
dataType: string
status: current
description: A label that uniquely identifies an interface
associated with a distinguishable endpoint.
```

7.62. networkLayer

```
elementId: TBD
name: networkLayer
dataType: string
status: current
description: A set of layers that expresses the specific
network layer an interface operates on.
```

7.63. networkName

```
elementId: TBD
name: networkName
dataType: string
status: current
description: A label that is associated with a network.
Some networks, for example, effective
layer2-broadcast-domains are difficult to "grasp" and
therefore quite difficult to name.
```

7.64. organizationId

```
elementId: TBD
name: organizationId
dataType: string
status: current
description: A label that uniquely identifies an
             organization via a PEN.
```

7.65. patchId

```
elementId: TBD
name: patchId
dataType: string
status: current
description: A label the uniquely identifies a specific
             software patch.
```

7.66. patchName

```
elementId: TBD
name: patchName
dataType: string
status: current
description: The vendor’s name of a software patch.
```

7.67. personFirstName

```
elementId: TBD
name: personFirstName
dataType: string
status: current
description: The first name of a natural person.
```

7.68. personLastName

```
elementId: TBD
name: personLastName
dataType: string
status: current
description: The last name of a natural person.
```

7.69. personMiddleName

```
elementId: TBD
name: personMiddleName
dataType: string
status: current
description: The middle name of a natural person.
```

7.70. phoneNumber

```
elementId: TBD
name: phoneNumber
dataType: string
status: current
description: A label that expresses the U.S. national
phone number (e.g. pattern value="((\d{3}) )?\d{3}-\d{4}").
```

7.71. phoneNumberType

```
elementId: TBD
name: phoneNumberType
dataType: string
status: current
description: A set of types that express the type of
a phone number (e.g. DSN, Fax, Home, Mobile, Pager,
Secure, Unsecure, Work, Other).
```

7.72. privilegeName

```
elementId: TBD
name: privilegeName
dataType: string
status: current
description: The attribute name of the privilege
represented as an AVP.
```

7.73. privilegeValue

```
elementId: TBD
name: privilegeValue
dataType: string
status: current
description: The value content of the privilege
represented as an AVP.
```

7.74. protocol

```
elementId: TBD
name: protocol
dataType: string
status: current
description: A set of types that defines specific
protocols above layer 4 (e.g. http, https, dns, ipp,
or unknown).
```

7.75. publicKey

```
elementId: TBD
name: publicKey
dataType: string
status: current
description: The value of a public key (regardless of its
method of creation, crypto-system, or signature scheme)
that can be collected from a target endpoint.
```

7.76. relationshipContentElementGuid

```
elementId: TBD
name: relationshipContentElementGuid
dataType: string
status: current
description: A reference to a specific content element
used in a relationship subject.
```

7.77. relationshipStatementElementGuid

```
elementId: TBD
name: relationshipStatementElementGuid
dataType: string
status: current
description: A reference to a specific SACM statement
used in a relationship subject.
```

7.78. relationshipObjectLabel

```
elementId: TBD
name: relationshipObjectLabel
dataType: string
status: current
description: A reference to a specific label used in
content (e.g. a te-label or a user-id). This
reference is typically used if matching content
attribute can be done efficiantly and can also be
included in addition to a relationship-content-element-guid
reference.
```

7.79. relationshipType

elementId: TBD
name: relationshipType
dataType: string
status: current
description: A set of types that is in every instance of a relationship subject to highlight what kind of relationship exists between the subject the relationship is included in (e.g. associated_with_user, applies_to_session, seen_on_interface, associated_with_flow, contains_virtual_device).

7.80. roleName

elementId: TBD
name: roleName
dataType: string
status: current
description: A label that references a collection of privileges assigned to a specific entity (identity? FIXME).

7.81. sessionStateType

elementId: TBD
name: sessionStateType
dataType: string
status: current
description: A set of types a discernible session (an ongoing network interaction) can be in (e.g. Authenticating, Authenticated, Postured, Started, Disconnected).

7.82. statementGuid

elementId: TBD
name: statementGuid
dataType: string
status: current
description: A label that expresses a global unique ID referencing a specific SACM statement that was produced by a SACM component.

7.83. statementType

```
elementId: TBD
name: statementType
dataType: string
status: current
description: A set of types that define the type of
content that is included in a SACM statement (e.g.
Observation, DirectoryContent, Correlation, Assessment,
Guidance, Event).
```

7.84. status

```
elementId: TBD
name: status
dataType: string
status: current
description: A set of types that defines possible
result values for a finding in general (e.g. true,
false, error, unknown, not applicable, not evaluated).
```

7.85. subAdministrativeDomain

```
elementId: TBD
name: subAdministrativeDomain
dataType: string
status: current
description: A label for related child domains an
administrative domain can be composed of (used in the
subject administrative-domain)
```

7.86. subInterfaceLabel

```
elementId: TBD
name: subInterfaceLabel
dataType: string
status: current
description: A unique label a sub network interface
(e.g. a tagged vlan on a trunk) can be referenced
with.
```

7.87. superAdministrativeDomain

```
elementId: TBD
name: superAdministrativeDomain
dataType: string
status: current
description: a label for related parent domains an
             administrative domain is part of (used
             in the subject s.administrative-domain).
```

7.88. superInterfaceLabel

elementId: TBD
name: superInterfaceLabel
dataType: string
status: current
description: a unique label a super network interface (e.g. a physical interface a tunnel interface terminates on) can be referenced with.

7.89. teAssessmentState

elementId: TBD
name: teAssessmentState
dataType: string
status: current
description: a set of types that defines the state of assessment of a target-endpoint (e.g. in-discovery, discovered, in-classification, classified, in-assessment, assessed).

7.90. teLabel

elementId: TBD
name: teLabel
dataType: string
status: current
description: an identifying label created from a set of identifying attributes used to reference a specific target endpoint.

7.91. teId

elementId: TBD
name: teId
dataType: string
status: current
description: an identifying label that is created randomly, is supposed to be unique, and used to reference a specific target endpoint.

7.92. timestampType

```
elementId: TBD
name: timestampType
dataType: string
status: current
description: a set of types that express what type of
             action or event happened at that point
             of time (e.g. discovered, classified,
             collected, published). Can be included in
             a generic s.timestamp subject.
```

7.93. unitsReceived

```
elementId: TBD
name: unitsReceived
dataType: string
status: current
description: a value that represents a number of units
             (e.g. frames, packets, cells or segments)
             received on a network interface.
```

7.94. unitsSent

```
elementId: TBD
name: unitsSent
dataType: string
status: current
description: a value that represents a number of units
             (e.g. frames, packets, cells or segments)
             sent on a network interface.
```

7.95. userDirectory

```
elementId: TBD
name: userDirectory
dataType: string
status: current
description: a label that identifies a specific type
of user-directory (e.g. ldap, active-directory,
local-user).
```

7.96. sacmUserId

```
elementId: TBD
name: sacmUserId
dataType: string
status: current
description: a label that references a specific user
known in a SACM domain.
```

7.97. webSite

```
elementId: TBD
name: webSite
dataType: string
status: current
description: a URI that references a web-site.
```

7.98. WGS84Longitude

```
elementId: TBD
name: WGS84Longitude
dataType: float64
status: current
description: a label that represents WGS 84 rev 2004
longitude.
```

7.99. WGS84Latitude

```
elementId: TBD
name: WGS84Latitude
dataType: float64
status: current
description: a label that represents WGS 84 rev 2004
latitude.
```

7.100. WGS84Altitude

```
elementId: TBD
name: WGS84Altitude
dataType: float64
status: current
description: a label that represents WGS 84 rev 2004
altitude.
```

7.101. hardwareSerialNumber

```
elementId: TBD
name: hardwareSerialNumber
dataType: string
status: current
description: A globally unique identifier for a particular
             piece of hardware assigned by the vendor.
```

7.102. interfaceName

```
elementId: TBD
name: interfaceName
dataType: string
status: current
description: A short name uniquely describing an interface,
             eg "Eth1/0". See [RFC2863] for the definition
             of the ifName object.
```

7.103. interfaceIndex

```
elementId: TBD
name: interfaceIndex
dataType: unsigned32
status: current
description: The index of an interface installed on an endpoint.
             The value matches the value of managed object
             'ifIndex' as defined in [RFC2863]. Note that ifIndex
             values are not assigned statically to an interface
             and that the interfaces may be renumbered every time
             the device's management system is re-initialized,
             as specified in [RFC2863].
```

7.104. interfaceMacAddress

```
elementId: TBD
name: interfaceMacAddress
dataType: macAddress
status: current
description: The IEEE 802 MAC address associated with a network
             interface on an endpoint.
```

7.105. interfaceType

```
elementId: TBD
name: interfaceType
dataType: unsigned32
status: current
description: The type of a network interface. The value matches
             the value of managed object 'ifType' as defined in
             [IANA registry ianaiftype-mib].
```

7.106. interfaceFlags

```
elementId: TBD
name: interfaceFlags
dataType: unsigned16
status: current
description: This information element specifies the flags
             associated with a network interface. Possible
             values include:
structure: Up                ; 0x1   ; Interface is up.
           Broadcast         ; 0x2   ; Broadcast address valid.
           Debug             ; 0x4   ; Turn on debugging.
           Loopback          ; 0x8   ; Is a loopback net.
           Point-to-point    ; 0x10  ; Interface is point-to-point link.
           No trailers       ; 0x20  ; Avoid use of trailers.
           Resources allocated ; 0x40  ; Resources allocated.
           No ARP            ; 0x80  ; No address resolution protocol.
           Receive all       ; 0x100 ; Receive all packets.
```

7.107. networkInterface

```
elementId: TBD
name: networkInterface
dataType: orderedList
status: current
description: Information about a network interface
             installed on an endpoint. The
             following high-level digram
             describes the structure of
             networkInterface information
             element.
structure: orderedList(interfaceName, interfaceIndex, macAddress,
                       interfaceType, flags)
```

7.108. softwareIdentifier

```
elementId: TBD
name: softwareIdentifier
dataType: string
status: current
description: A globally unique identifier for a particular
             software application.
```

7.109. softwareTitle

```
elementId: TBD
name: softwareTitle
dataType: string
status: current
description: The title of the software application.
```

7.110. softwareCreator

```
elementId: TBD
name: softwareCreator
dataType: string
status: current
description: The software developer (e.g., vendor or author).
```

7.111. simpleSoftwareVersion

```
elementId: TBD
name: simpleSoftwareVersion
dataType: string
status: current
description: The version string for a software application that
             conforms to the format of a list of hierarchical
             non-negative integers separated by a single character
             delimiter format.
```

7.112. rpmSoftwareVersion

```
elementId: TBD
name: rpmSoftwareVersion
dataType: string
status: current
description: The version string for a software application that
             conforms to the EPOCH:VERSION-RELEASE format.
```

7.113. ciscoTrainSoftwareVersion

```
elementId: TBD
name: ciscoTrainSoftwareVersion
dataType: string
status: current
description: The version string for a software application that
             conforms to the Cisco IOS Train string format.
```

7.114. softwareVersion

```
   elementId: TBD
   name: softwareVerison
   dataType: category
   status: current
   description: The version of the software application. Software
                applications may be versioned using a number of
                schemas. The following high-level digram describes
                the structure of the softwareVersion information
                element.
   structure: category(simpleSoftwareVersion | rpmSoftwareVersion |
                  ciscoTrainSoftwareVersion)
```

7.115. softwareLastUpdated

```
   elementId: TBD
   name: softwareLastUpdated
   dataType: dateTimeSeconds
   status: current
   description: The date and time when the software instance
                was last updated on the system (e.g., new
                version instlalled or patch applied)
```

7.116. softwareClass

```
            elementId: TBD
            name: softwareClass
            dataType: enumeration
            status: current
            description: The class of the software instance.
            structure:
            Unknown                ; 0x1 ; The class is not known.
            Other                  ; 0x2 ; The class is known, but, somethin
g
                                           other than a value listed in the
                                           enumeration.
            Driver                 ; 0x3 ; The class is a device driver.
            Configuration Software ; 0x4 ; The class is configuration softwa
re.
            Application Software   ; 0x5 ; The class is application software
.
            Instrumentation        ; 0x6 ; The class is instrumentation.
            Diagnostic Software    ; 0x8 ; The class is diagnostic software.
            Operating System       ; 0x9 ; The class is operating system.
            Middleware             ; 0xA ; The class is middleware.
            Firmware               ; 0xB ; The class is firmware.
            BIOS/FCode             ; 0xC ; The class is BIOS or FCode.
            Support/Service Pack   ; 0xD ; The class is a support or service
 pack.
            Software Bundle        ; 0xE ; The class is a software bundle.
            References: See Classifications of the DMTF CIM_SoftwareIdentity
                        schema.
```

7.117. softwareInstance

```
elementId: TBD
name: softwareInstance
dataType: orderedList
status: current
description: Information about an instance of software
             installed on an endpoint. The following
             high-level digram describes the structure of
             softwareInstance information element.
structure: orderedList(softwareIdentifier, softwareTitle,
                       softwareCreator, softwareVersion,
                                        softwareLastUpdated, softwareClas
s)
```

7.118. globallyUniqueIdentifier

```
elementId: TBD
name: globallyUniqueIdentifier
dataType: unsigned8
status: current
description: TODO.
```

7.119. creationTimestamp

```
elementId: TBD
name: creationTimestamp
dataType: dateTimeSeconds
status: current
description: The date and time when the posture
             information was created by a SACM Component.
```

7.120. collectionTimestamp

```
elementId: TBD
name: collectionTimestamp
dataType: dateTimeSeconds
status: current
description: The date and time when the posture
             information was collected or observed by a SACM
             Component.
```

7.121. publicationTimestamp

```
   elementId: TBD
   name: publicationTimestamp
   dataType: dateTimeSeconds
   status: current
   description: The date and time when the posture
                information was published.
```

7.122. relayTimestamp

```
   elementId: TBD
   name: relayTimestamp
   dataType: dateTimeSeconds
   status: current
   description: The date and time when the posture
                information was relayed to another SACM Component.
```

7.123. storageTimestamp

```
   elementId: TBD
   name: storageTimestamp
   dataType: dateTimeSeconds
   status: current
   description: The date and time when the posture
                information was stored in a Repository.
```

7.124. type

```
   elementId: TBD
   name: type
   dataType: enumeration
   status: current
   description: The type of data model use to represent
                some set of endpoint information. The following
                table lists the set of data models supported by SACM.
   structure: TBD
```

7.125. protocolIdentifier

```
elementId: TBD
name: protocolIdentifier
dataType: unsigned8
status: current
description: The value of the protocol number in the IP packet
             header. The protocol number identifies the IP packet
             payload type. Protocol numbers are defined in the
             IANA Protocol Numbers registry.

             In Internet Protocol version 4 (IPv4), this is
             carried in the Protocol field.  In Internet Protocol
             version 6 (IPv6), this is carried in the Next Header
             field in the last extension header of the packet.
```

7.126. sourceTransportPort

```
elementId: TBD
name: sourceTransportPort
dataType: unsigned16
status: current
description: The source port identifier in the transport header.
             For the transport protocols UDP, TCP, and SCTP, this
             is the source port number given in the respective
             header.  This field MAY also be used for future
             transport protocols that have 16-bit source port
             identifiers.
```

7.127. sourceIPv4PrefixLength

```
elementId: TBD
name: sourceIPv4PrefixLength
dataType: unsigned8
status: current
description: The number of contiguous bits that are relevant in
             the sourceIPv4Prefix Information Element.
```

7.128. ingressInterface

```
   elementId: TBD
   name: ingressInterface
   dataType: unsigned32
   status: current
   description: The index of the IP interface where packets of this
                Flow are being received.  The value matches the
                value of managed object 'ifIndex' as defined in
                [RFC2863]. Note that ifIndex values are not assigned
                statically to an interface and that the interfaces
                may be renumbered every time the device's management
                system is re-initialized, as specified in [RFC2863].
```

7.129. destinationTransportPort

```
   elementId: TBD
   name: destinationTransportPort
   dataType: unsigned16
   status: current
   description: The destination port identifier in the transport
                header. For the transport protocols UDP, TCP, and
                SCTP, this is the destination port number given in
                the respective header. This field MAY also be used
                for future transport protocols that have 16-bit
                destination port identifiers.
```

7.130. sourceIPv6PrefixLength

```
   elementId: TBD
   name: sourceIPv6PrefixLength
   dataType: unsigned8
   status: current
   description: The number of contiguous bits that are relevant in
                the sourceIPv6Prefix Information Element.
```

7.131. sourceIPv4Prefix

```
   elementId: TBD
   name: sourceIPv4Prefix
   dataType: ipv4Address
   status: current
   description: IPv4 source address prefix.
```

7.132. destinationIPv4Prefix

```
   elementId: TBD
   name: destinationIPv4Prefix
   dataType: ipv4Address
   status: current
   description: IPv4 destination address prefix.
```

7.133. sourceMacAddress

```
   elementId: TBD
   name: sourceMacAddress
   dataType: macAddress
   status: current
   description: The IEEE 802 source MAC address field.
```

7.134. ipVersion

```
   elementId: TBD
   name: ipVersion
   dataType: unsigned8
   status: current
   description: The IP version field in the IP packet header.
```

7.135. interfaceDescription

```
   elementId: TBD
   name: interfaceDescription
   dataType: string
   status: current
   description: The description of an interface, eg "FastEthernet
                1/0" or "ISP
   connection".
```

7.136. applicationDescription

```
   elementId: TBD
   name: applicationDescription
   dataType: string
   status: current
   description: Specifies the description of an application.
```

7.137. applicationId

```
   elementId: TBD
   name: applicationId
   dataType: octetArray
   status: current
   description: Specifies an Application ID per [RFC6759].
```

7.138. applicationName

```
elementId: TBD
name: applicationName
dataType: string
status: current
description: Specifies the name of an application.
```

7.139. exporterIPv4Address

```
elementId: TBD
name: exporterIPv4Address
dataType: ipv4Address
status: current
description: The IPv4 address used by the Exporting Process.
             This is used by the Collector to identify the
             Exporter in cases where the identity of the Exporter
             may have been obscured by the use of a proxy.
```

7.140. exporterIPv6Address

```
elementId: TBD
name: exporterIPv6Address
dataType: ipv6Address
status: current
description: The IPv6 address used by the Exporting Process.
             This is used by the Collector to identify the
             Exporter in cases where the identity of the
             Exporter may have been obscured by the use of a
             proxy.
```

7.141. portId

```
elementId: TBD
name: portId
dataType: unsigned32
status: current
description: An identifier of a line port that is unique per
             IPFIX Device hosting an Observation Point.
             Typically, this Information Element is used for
             limiting the scope of other Information Elements.
```

7.142. templateId

```
   elementId: TBD
   name: templateId
   dataType: unsigned16
   status: current
   description: An identifier of a Template that is locally unique
                within a combination of a Transport session and an
                Observation Domain.

                Template IDs 0-255 are reserved for Template Sets,
                Options Template Sets, and other reserved Sets yet
                to be created. Template IDs of Data Sets are
                numbered from 256 to 65535.

                Typically, this Information Element is used for
                limiting the scope of other Information Elements.
                Note that after a re-start of the Exporting Process
                Template identifiers may be re-assigned.
```

7.143. collectorIPv4Address

```
   elementId: TBD
   name: collectorIPv4Address
   dataType: ipv4Address
   status: current
   description: An IPv4 address to which the Exporting Process sends
                Flow information.
```

7.144. collectorIPv6Address

```
   elementId: TBD
   name: collectorIPv6Address
   dataType: ipv6Address
   status: current
   description: An IPv6 address to which the Exporting Process sends
                Flow information.
```

7.145. informationElementIndex

```
   elementId: TBD
   name: informationElementIndex
   dataType: unsigned16
   status: current
   description: A zero-based index of an Information Element
                referenced by informationElementId within a Template
                referenced by templateId; used to disambiguate
                scope for templates containing multiple identical
                Information Elements.
```

7.146. informationElementId

```
elementId: TBD
name: informationElementId
dataType: unsigned16
status: current
description: This Information Element contains the ID of another
             Information Element.
```

7.147. informationElementDataType

```
elementId: TBD
name: informationElementDataType
dataType: unsigned8
status: current
description: A description of the abstract data type of an IPFIX
             information element.These are taken from the
             abstract data types defined in section 3.1 of the
             IPFIX Information Model [RFC5102]; see that section
             for more information on the types described in the
             informationElementDataType sub-registry.

             These types are registered in the IANA IPFIX
             Information Element Data Type subregistry.  This
             subregistry is intended to assign numbers for type
             names, not to provide a mechanism for adding data
             types to the IPFIX Protocol, and as such requires a
             Standards Action [RFC5226] to modify.
```

7.148. informationElementDescription

```
elementId: TBD
name: informationElementDescription
dataType: string
status: current
description: A UTF-8 [RFC3629] encoded Unicode string containing
             a human-readable description of an Information
             Element.  The content of the
             informationElementDescription MAY be annotated with
             one or more language tags [RFC4646], encoded
             in-line [RFC2482] within the UTF-8 string, in order
             to specify the language in which the description is
             written.  Description text in multiple languages MAY
             tag each section with its own language tag; in this
             case, the description information in each language
             SHOULD have equivalent meaning.  In the absence of
             any language tag, the "i-default" [RFC2277] language
             SHOULD be assumed.  See the Security Considerations
             section for notes on string handling for Information
             Element type records.
```

7.149. informationElementName

```
elementId: TBD
name: informationElementName
dataType: string
status: current
description: A UTF-8 [RFC3629] encoded Unicode string containing
             the name of an Information Element, intended as a
             simple identifier.  See the Security Considerations
             section for notes on string handling for Information
             Element type records.
```

7.150. informationElementRangeBegin

```
elementId: TBD
name: informationElementRangeBegin
dataType: unsigned64
status: current
description: Contains the inclusive low end of the range of
             acceptable values for an Information Element.
```

7.151. informationElementRangeEnd

elementId: TBD
name: informationElementRangeEnd
dataType: unsigned64
status: current
description: Contains the inclusive high end of the range of acceptable values for an Information Element.

7.152. informationElementSemantics

elementId: TBD
name: informationElementSemantics
dataType: unsigned8
status: current
description: A description of the semantics of an IPFIX Information Element. These are taken from the data type semantics defined in section 3.2 of the IPFIX Information Model [RFC5102]; see that section for more information on the types defined in the informationElementSemantics sub-registry. This field may take the values in Table ; the special value 0x00 (default) is used to note that no semantics apply to the field; it cannot be manipulated by a Collecting Process or File Reader that does not understand it a priori.

These semantics are registered in the IANA IPFIX Information Element Semantics subregistry. This subregistry is intended to assign numbers for semantics names, not to provide a mechanism for adding semantics to the IPFIX Protocol, and as such requires a Standards Action [RFC5226] to modify.

7.153. informationElementUnits

```
   elementId: TBD
   name: informationElementUnits
   dataType: unsigned16
   status: current
   description: A description of the units of an IPFIX Information
                Element.  These correspond to the units implicitly
                defined in the Information Element definitions in
                section 5 of the IPFIX Information Model [RFC5102];
                see that section for more information on the types
                described in the informationElementsUnits
                sub-registry. This field may take the values in
                Table 3 below; the special value 0x00 (none) is
                used to note that the field is unitless.

                These types are registered in the IANA IPFIX
                Information Element Units subregistry; new types
                may be added on a First Come First Served [RFC5226]
                basis.
```

7.154. applicationCategoryName

```
   elementId: TBD
   name: applicationCategoryName
   dataType: string
   status: current
   description: An attribute that provides a first level
                categorization for each Application ID.
```

7.155. mibObjectValueInteger

```
   elementId: TBD
   name: mibObjectValueInteger
   dataType: signed64
   status: current
   description: An IPFIX Information Element which denotes that the
                integer value of a MIB object will be exported.
                The MIB Object Identifier ("mibObjectIdentifier")
                for this field MUST be exported in a MIB Field
                Option or via another means.  This Information
                Element is used for MIB objects with the Base
                Syntax of Integer32 and INTEGER with IPFIX Reduced
                Size Encoding used as required. The value is
                encoded as per the standard IPFIX Abstract Data Type
                of signed64.
```

7.156. mibObjectValueOctetString

```
elementId: TBD
name: mibObjectValueOctetString
dataType: octetArray
status: current
description: An IPFIX Information Element which denotes that an
             Octet String or Opaque value of a MIB object will
             be exported. The MIB Object Identifier
             ("mibObjectIdentifier") for this field MUST be
             exported in a MIB Field Option or via another means.
             This Information Element is used for MIB objects
             with the Base Syntax of OCTET STRING and Opaque. The
             value is encoded as per the standard IPFIX Abstract
             Data Type of octetArray.
```

7.157. mibObjectValueOID

```
elementId: TBD
name: mibObjectValueOID
dataType: octetArray
status: current
description: An IPFIX Information Element which denotes that an
             Object Identifier or OID value of a MIB object will
             be exported. The MIB Object Identifier
             ("mibObjectIdentifier") for this field MUST be
             exported in a MIB Field Option or via another means.
             This Information Element is used for MIB objects
             with the Base Syntax of OBJECT IDENTIFIER.  Note -
             In this case the "mibObjectIdentifier" will define
             which MIB object is being exported while the value
             contained in this Information Element will be an
             OID as a value.  The mibObjectValueOID Information
             Element is encoded as ASN.1/BER [BER] in an
             octetArray.
```

7.158. mibObjectValueBits

```
   elementId: TBD
   name: mibObjectValueBits
   dataType: octetArray
   status: current
   description: An IPFIX Information Element which denotes that a
                set of Enumerated flags or bits from a MIB object
                will be exported. The MIB Object Identifier
                ("mibObjectIdentifier") for this field MUST be
                exported in a MIB Field Option or via another means.
                This Information Element is used for MIB objects
                with the Base Syntax of BITS.  The flags or bits are
                encoded as per the standard IPFIX Abstract Data Type
                of octetArray, with sufficient length to accommodate
                the required number of bits.  If the number of bits
                is not an integer multiple of octets then the most
                significant bits at end of the octetArray MUST be
                set to zero.
```

7.159. mibObjectValueIPAddress

```
   elementId: TBD
   name: mibObjectValueIPAddress
   dataType: ipv4Address
   status: current
   description: An IPFIX Information Element which denotes that the
                IPv4 Address of a MIB object will be exported.  The
                MIB Object Identifier ("mibObjectIdentifier") for
                this field MUST be exported in a MIB Field Option
                or via another means.  This Information Element is
                used for MIB objects with the Base Syntax of
                IPaddress. The value is encoded as per the standard
                IPFIX Abstract Data Type of ipv4Address.
```

7.160. mibObjectValueCounter

```
   elementId: TBD
   name: mibObjectValueCounter
   dataType: unsigned64
   status: current
   description: An IPFIX Information Element which denotes that the
                counter value of a MIB object will be exported.
                The MIB Object Identifier ("mibObjectIdentifier")
                for this field MUST be exported in a MIB Field
                Option or via another means.  This Information
                Element is used for MIB objects with the Base
                Syntax of Counter32 or Counter64 with IPFIX Reduced
                Size Encoding used as required. The value is encoded
                as per the standard IPFIX Abstract Data Type
                of unsigned64.
```

7.161. mibObjectValueGauge

```
   elementId: TBD
   name: mibObjectValueGauge
   dataType: unsigned32
   status: current
   description: An IPFIX Information Element which denotes that the
                Gauge value of a MIB object will be exported.  The
                MIB Object Identifier ("mibObjectIdentifier") for
                this field MUST be exported in a MIB Field Option
                or via another means.  This Information Element is
                used for MIB objects with the Base Syntax of Gauge32.
                The value is encoded as per the standard IPFIX
                Abstract Data Type of unsigned64.  This value will
                represent a non-negative integer, which may increase
                or decrease, but shall never exceed a maximum
                value, nor fall below a minimum value.
```

7.162. mibObjectValueTimeTicks

```
   elementId: TBD
   name: mibObjectValueTimeTicks
   dataType: unsigned32
   status: current
   description: An IPFIX Information Element which denotes that the
                TimeTicks value of a MIB object will be exported.
                The MIB Object Identifier ("mibObjectIdentifier")
                for this field MUST be exported in a MIB Field
                Option or via another means.  This Information
                Element is used for MIB objects with the Base
                Syntax of TimeTicks. The value is encoded as per
                the standard IPFIX Abstract Data Type of unsigned32.
```

7.163. mibObjectValueUnsigned

elementId: TBD
name: mibObjectValueUnsigned
dataType: unsigned64
status: current
description: An IPFIX Information Element which denotes that an unsigned integer value of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of unsigned64 with IPFIX Reduced Size Encoding used as required. The value is encoded as per the standard IPFIX Abstract Data Type of unsigned64.

7.164. mibObjectValueTable

elementId: TBD
name: mibObjectValueTable
dataType: orderedList
status: current
description: An IPFIX Information Element which denotes that a complete or partial conceptual table will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with a SYNTAX of SEQUENCE. This is encoded as a subTemplateList of mibObjectValue Information Elements. The template specified in the subTemplateList MUST be an Options Template and MUST include all the Objects listed in the INDEX clause as Scope Fields.
structure: orderedList(mibObjectValueRow+)

7.165. mibObjectValueRow

```
   elementId: TBD
   name: mibObjectValueRow
   dataType: orderedList
   status: current
   description: An IPFIX Information Element which denotes that a
                single row of a conceptual table will be exported.
                The MIB Object Identifier ("mibObjectIdentifier")
                for this field MUST be exported in a MIB Field
                Option or via another means.  This Information
                Element is used for MIB objects with a SYNTAX of
                SEQUENCE.  This is encoded as a subTemplateList of
                mibObjectValue Information Elements.  The
                subTemplateList exported MUST contain exactly one
                row (i.e., one instance of the subtemplate).  The
                template specified in the subTemplateList MUST be
                an Options Template and MUST include all the
                Objects listed in the INDEX clause as Scope Fields.
   structure:   orderedList(mibObjectValue+)
```

7.166. mibObjectIdentifier

```
   elementId: TBD
   name: mibObjectIdentifier
   dataType: octetArray
   status: current
   description: An IPFIX Information Element which denotes that a
                MIB Object Identifier (MIB OID) is exported in the
                (Options) Template Record.  The mibObjectIdentifier
                Information Element contains the OID assigned to
                the MIB Object Type Definition encoded as
                ASN.1/BER [BER].
```

7.167. mibSubIdentifier

```
   elementId: TBD
   name: mibSubIdentifier
   dataType: unsigned32
   status: current
   description: A non-negative sub-identifier of an Object
                Identifier (OID).
```

7.168. mibIndexIndicator

```
elementId: TBD
name: mibIndexIndicator
dataType: unsigned64
status: current
description: This set of bit fields is used for marking the
             Information Elements of a Data Record that serve as
             INDEX MIB objects for an indexed Columnar MIB
             object.  Each bit represents an Information Element
             in the Data Record with the n-th bit representing
             the n-th Information Element.  A bit set to value 1
             indicates that the corresponding Information Element
             is an index of the Columnar Object represented by
             the mibFieldValue.  A bit set to value 0 indicates
             that this is not the case.

             If the Data Record contains more than 64
             Information Elements, the corresponding Template
             SHOULD be designed such that all INDEX
             Fields are among the first 64 Information Elements,
             because the mibIndexIndicator only contains 64 bits.
             If the Data Record contains less than 64
             Information Elements, then the extra bits in the
             mibIndexIndicator for which no corresponding
             Information Element exists MUST have the value 0,
             and must be disregarded by the Collector.  This
             Information Element may be exported with
             IPFIX Reduced Size Encoding.
```

7.169. mibCaptureTimeSemantics

elementId: TBD
name: mibCaptureTimeSemantics
dataType: unsigned8
status: current
description: Indicates when in the lifetime of the flow the MIB value was retrieved from the MIB for a mibObjectIdentifier. This is used to indicate if the value exported was collected from the MIB closer to flow creation or flow export time and will refer to the Timestamp fields included in the same record. This field SHOULD be used when exporting a mibObjectValue that specifies counters or statistics.

If the MIB value was sampled by SNMP prior to the IPFIX Metering Process or Exporting Process retrieving the value (i.e., the data is already stale) and it’s important to know the exact sampling time, then an additional observationTime* element should be paired with the OID using structured data. Similarly, if different mibCaptureTimeSemantics apply to different mibObject elements within the Data Record, then individual mibCaptureTimeSemantics should be paired with each OID using structured data.

Values:
0. undefined
1. begin - The value for the MIB object is captured from the MIB when the Flow is first observed
2. end - The value for the MIB object is captured from the MIB when the Flow ends
3. export - The value for the MIB object is captured from the MIB at export time
4. average - The value for the MIB object is an average of multiple captures from the MIB over the observed life of the Flow

7.170. mibContextEngineID

elementId: TBD
name: mibContextEngineID
dataType: octetArray
status: current
description: A mibContextEngineID that specifies the SNMP engine ID for a MIB field being exported over IPFIX. Definition as per [RFC3411] section 3.3.

7.171. mibContextName

```
elementId: TBD
name: mibContextName
dataType: string
status: current
description: This Information Element denotes that a MIB Context
             Name is specified for a MIB field being exported
             over IPFIX. Reference [RFC3411] section 3.3.
```

7.172. mibObjectName

```
elementId: TBD
name: mibObjectName
dataType: string
status: current
description: The name (called a descriptor in [RFC2578]
             of an object type definition.
```

7.173. mibObjectDescription

```
elementId: TBD
name: mibObjectDescription
dataType: string
status: current
description: The value of the DESCRIPTION clause of an MIB object
             type definition.
```

7.174. mibObjectSyntax

```
elementId: TBD
name: mibObjectSyntax
dataType: string
status: current
description: The value of the SYNTAX clause of an MIB object type
             definition, which may include a Textual Convention
             or Subtyping. See [RFC2578].
```

7.175. mibModuleName

```
elementId: TBD
name: mibModuleName
dataType: string
status: current
description: The textual name of the MIB module that defines a MIB
             Object.
```

7.176. interface

elementId: TBD
name: interface
dataType: list
structure: list (interfaceName, hwAddress, inetAddr, netmask)
status: current
description: Represents an interface and its configuration options.

7.177. iflisteners

elementId: TBD
name: iflisteners
dataType: list
structure: list (interfaceName, physicalProtocol, hwAddress, programName, pid, userId)
status: current
description: Stores the results of checking for applications that are bound to an ethernet interface on the system.

7.178. physicalProtocol

elementId: TBD
name: physicalProtocol
dataType: enumeration
structure:
ETH_P_LOOP ; 0x1 ; Ethernet loopback packet.
ETH_P_PUP ; 0x2 ; Xerox PUP packet.
ETH_P_PUPAT ; 0x3 ; Xerox PUP Address Transport packet.
ETH_P_IP ; 0x4 ; Internet protocol packet.
ETH_P_X25 ; 0x5 ; CCITT X.25 packet.
ETH_P_ARP ; 0x6 ; Address resolution packet.
ETH_P_BPQ ; 0x7 ; G8BPQ AX.25 ethernet packet.
ETH_P_IEEEPUP ; 0x8 ; Xerox IEEE802.3 PUP packet.
ETH_P_IEEEPUPAT ; 0x9 ; Xerox IEEE802.3 PUP address transport packet.
ETH_P_DEC ; 0xA ; DEC assigned protocol.
ETH_P_DNA_DL ; 0xB ; DEC DNA Dump/Load.
ETH_P_DNA_RC ; 0xC ; DEC DNA Remote Console.
ETH_P_DNA_RT ; 0xD ; DEC DNA Routing.
ETH_P_LAT ; 0xE ; DEC LAT.
ETH_P_DIAG ; 0xF ; DEC Diagnostics.
ETH_P_CUST ; 0x10 ; DEC Customer use.
ETH_P_SCA ; 0x11 ; DEC Systems Comms Arch.
ETH_P_RARP ; 0x12 ; Reverse address resolution packet.
ETH_P_ATALK ; 0x13 ; Appletalk DDP.
ETH_P_AARP ; 0x14 ; Appletalk AARP.

```
   ETH_P_8021Q ; 0x15 ; 802.1Q VLAN Extended Header.
   ETH_P_IPX ; 0x16 ; IPX over DIX.
   ETH_P_IPV6 ; 0x17 ; IPv6 over bluebook.
   ETH_P_SLOW ; 0x18 ; Slow Protocol. See 802.3ad 43B.
   ETH_P_WCCP ; 0x19 ; Web-cache coordination protocol.
   ETH_P_PPP_DISC ; 0x1A ; PPPoE discovery messages.
   ETH_P_PPP_SES ; 0x1B ; PPPoE session messages.
   ETH_P_MPLS_UC ; 0x1C ; MPLS Unicast traffic.
   ETH_P_MPLS_MC ; 0x1D ; MPLS Multicast traffic.
   ETH_P_ATMMPOA ; 0x1E ; MultiProtocol Over ATM.
   ETH_P_ATMFATE ; 0x1F ; Frame-based ATM Transport over Ethernet.
   ETH_P_AOE ; 0x20 ; ATA over Ethernet.
   ETH_P_TIPC ; 0x21 ; TIPC.
   ETH_P_802_3 ; 0x22 ; Dummy type for 802.3 frames.
   ETH_P_AX25 ; 0x23 ; Dummy protocol id for AX.25.
   ETH_P_ALL ; 0x24 ; Every packet.
   ETH_P_802_2 ; 0x25 ; 802.2 frames.
   ETH_P_SNAP ; 0x26 ; Internal only.
   ETH_P_DDCMP ; 0x27 ; DEC DDCMP: Internal only
   ETH_P_WAN_PPP ; 0x28 ; Dummy type for WAN PPP frames.
   ETH_P_PPP_MP ; 0x29 ; Dummy type for PPP MP frames.
   ETH_P_PPPTALK ; 0x2A ; Dummy type for Atalk over PPP.
   ETH_P_LOCALTALK ; 0x2B ; Localtalk pseudo type.
   ETH_P_TR_802_2 ; 0x2C ; 802.2 frames.
   ETH_P_MOBITEX ; 0x2D ; Mobitex.
   ETH_P_CONTROL ; 0x2E ; Card specific control frames.
   ETH_P_IRDA ; 0x2F ; Linux-IrDA.
   ETH_P_ECONET ; 0x30 ; Acorn Econet.
   ETH_P_HDLC ; 0x31 ; HDLC frames.
   ETH_P_ARCNET ; 0x32 ; 1A for ArcNet.
                ; 0x33 ; The empty string value is permitted here
                to allow for detailed error reporting.
   status: current
   description: The physical layer protocol used by the AF_PACKET
   socket.
```

7.179. hwAddress

```
   elementId: TBD
   name: hwAddress
   dataType: string
   status: current
   description: The hardware address associated
         with the interface.
```

7.180. programName

elementId: TBD
name: programName
dataType: string
status: current
description: The name of the communicating
program.

7.181. userId

elementId: TBD
name: userId
dataType: unsigned32
status: current
description: The numeric user id.

7.182. inetlisteningserver

elementId: TBD
name: inetlisteningserver
dataType: list
structure: list (transportProtocol, localAddress,
localPort, localFullAddress, programName, foreignAddress,
foreignPort, foreignFullAddress, pid, userId)
status: current
description: Stores the results of checking for network servers
currently active on a system. It holds information pertaining to
a specific protocol-address-port combination.

7.183. transportProtocol

elementId: TBD
name: transportProtocol
dataType: string
status: current
description: The transport-layer
protocol (tcp or udp).

7.184. localAddress

elementId: TBD
name: localAddress
dataType: ipAddress
status: current
description: This is the IP address being listened to. Note that
the IP address can be IPv4 or IPv6.

7.185. localPort

elementId: TBD
name: localPort
dataType: unsigned32
status: current
description: This is the TCP or UDP port
being listened to.

7.186. localFullAddress

elementId: TBD
name: localFullAddress
dataType: string
status: current
description: The IP address and network port on which the program listens, including the local address and the local port. Note that the IP address can be IPv4 or IPv6.

7.187. foreignAddress

elementId: TBD
name: foreignAddress
dataType: ipAddress
status: current
description: The IP address with which the program is communicating, or with which it will communicate. Note that the IP address can be IPv4 or IPv6.

7.188. foreignFullAddress

elementId: TBD
name: foreignFullAddress
dataType: ipAddress
status: current
description: The IP address and network port to which the program is communicating or will accept communications from, including the foreign address and foreign port. Note that the IP address can be IPv4 or IPv6.

7.189. selinuxboolean

```
   elementId: TBD
   name: selinuxboolean
   dataType: list
   structure: list (selinuxName, currentStatus,
         pendingStatus)
   status: current
   description: Describes the current and pending status of a
   SELinux boolean.
```

7.190. selinuxName

```
   elementId: TBD
   name: selinuxName
   dataType: string
   status: current
   description: The name of the SELinux
         boolean.
```

7.191. currentStatus

```
   elementId: TBD
   name: currentStatus
   dataType: boolean
   status: current
   description: Indicates current state of
         the specified SELinux boolean.
```

7.192. pendingStatus

```
   elementId: TBD
   name: pendingStatus
   dataType: boolean
   status: current
   description: Indicates the pending
         state of the specified SELinux boolean.
```

7.193. selinuxsecuritycontext

```
   elementId: TBD
   name: selinuxsecuritycontext
   dataType: list
   structure: list (filepath, path, filename, pid,
         username, role, domainType, lowSensitivity, lowCategory,
         highSensitivity, highCategory, rawlowSensitivity,
         rawlowCategory, rawhighSensitivity, rawhighCategory)
   status: current
   description: Describes the SELinux security
         context of a file or process on the local system.
```

7.194. filepath

```
elementId: TBD
name: filepath
dataType: string
status: current
description: Specifies the absolute path for a file on the
machine. A directory cannot be specified as a filepath.
```

7.195. path

```
elementId: TBD
name: path
dataType: string
status: current
description: Specifies the directory component of
      the absolute path to a file on the machine.
```

7.196. filename

```
elementId: TBD
name: filename
dataType: string
status: current
description: The name of the file.
```

7.197. pid

```
elementId: TBD
name: pid
dataType: unsigned32
status: current
description: The process ID of the
      process.
```

7.198. role

```
elementId: TBD
name: role
dataType: string
status: current
description: Specifies the types that a process
      may transition to (domain transitions).
```

7.199. domainType

elementId: TBD
name: domainType
dataType: string
status: current
description: Specifies the domain in which the file is accessible or the domain in which a process executes.

7.200. lowSensitivity

elementId: TBD
name: lowSensitivity
dataType: string
status: current
description: Specifies the current sensitivity of a file or process.

7.201. lowCategory

elementId: TBD
name: lowCategory
dataType: string
status: current
description: Specifies the set of
categories associated with the low sensitivity.

7.202. highSensitivity

elementId: TBD
name: highSensitivity
dataType: string
status: current
description: Specifies the maximum
range for a file or the clearance for a process.

7.203. highCategory

elementId: TBD
name: highCategory
dataType: string
status: current
description: Specifies the set of
categories associated with the high sensitivity.

7.204. rawlowSensitivity

elementId: TBD
name: rawlowSensitivity
dataType: string
status: current
description: Specifies the current sensitivity of a file or process but in its raw context.

7.205. rawlowCategory

elementId: TBD
name: rawlowCategory
dataType: string
status: current
description: Specifies the set of categories associated with the low sensitivity but in its raw context.

7.206. rawhighSensitivity

elementId: TBD
name: rawhighSensitivity
dataType: string
status: current
description: Specifies the maximum range for a file or the clearance for a process but in its raw context.

7.207. rawhighCategory

elementId: TBD
name: rawhighCategory
dataType: string
status: current
description: Specifies the set of categories associated with the high sensitivity but in its raw context.

7.208. systemdunitdependency

elementId: TBD
name: systemdunitdependency
dataType: list
structure: list (unit, dependency)
status: current

description: Stores the dependencies of the systemd unit.

7.209. unit

elementId: TBD
name: unit
dataType: string
status: current
description: Refers to the full systemd unit name, which has a form of "$name.$type". For example "cupsd.service". This name is usually also the filename of the unit configuration file.

7.210. dependency

elementId: TBD
name: dependency
dataType: string
status: current
description: Refers to the name of a unit that was confirmed to be a dependency of the given unit.

7.211. systemdunitproperty

elementId: TBD
name: systemdunitproperty
dataType: list
structure: list (unit, property, systemdunitValue)

status: current
description: Stores the properties and values of a systemd unit.

7.212. property

elementId: TBD
name: property
dataType: string
status: current
description: The property associated with a
systemd unit.

7.213. systemdunitValue

elementId: TBD
name: systemdunitValue
dataType: string
status: current
description: The value of the property associated with a systemd unit. Exactly one value shall be used for all property types except dbus arrays - each array element shall be represented by one value.

7.214. file

elementId: TBD
name: file
dataType: list
structure: list (filepath, path, filename, fileType, userId, aTime, cTime, mTime, size)
status: current
description: The metadata associated with a file on the endpoint.

7.215. fileType

elementId: TBD
name: fileType
dataType: string
status: current
description: The file’s type (e.g., regular file (regular), directory, named pipe (fifo), symbolic link, socket or block special.)

7.216. groupId

elementId: TBD
name: groupId
dataType: unsigned32
status: current
description: The group owner of the file, by group number.

7.217. aTime

elementId: TBD
name: aTime
dataType: dateTimeSeconds
status: current
description: The time that the file was last accessed.

7.218. cTime

elementId: TBD
name: cTime
dataType: dateTimeSeconds
status: current
description: The time of the last change to the file’s inode.

7.219. mTime

elementId: TBD
name: mTime
dataType: dateTimeSeconds
status: current
description: The time of the last change to the file’s contents.

7.220. size

elementId: TBD
name: size
dataType: unsigned32
status: current
description: This is the size of the file in bytes.

7.221. suid

elementId: TBD
name: suid
dataType: boolean
status: current
description: Indicates whether the program runs with the uid (thus privileges) of the file’s owner, rather than the calling user.

7.222. sgid

elementId: TBD
name: sgid
dataType: boolean
status: current
description: Indicates whether the program runs with the gid (thus privileges) of the file’s group owner, rather than the calling user’s group.

7.223. sticky

elementId: TBD
name: sticky
dataType: boolean
status: current
description: Indicates whether users can delete each other’s files in this directory, when said directory is writable by those users.

7.224. hasExtendedAcl

elementId: TBD
name: hasExtendedAcl
dataType: boolean
status: current
description: Indicates whether the file or directory hasACL permissions applied to it. If a system supports ACLs and the file or directory doesn’t have an ACL, or it matches the standard UNIX permissions, the entity will have a status of ’exists’ and a value of ’false’. If the system supports ACLs and the file or directory has an ACL, the entity will have a status of ’exists’ and a value of ’true’. Lastly, if a system doesn’t support ACLs, the entity will have a status of ’does not exist’.

7.225. inetd

elementId: TBD
name: inetd
dataType: list
structure: list (serviceProtocol, serviceName, serverProgram, serverArguments, endpointType, execAsUser, waitStatus)
status: current
description: Holds information associated with different Internet services.

7.226. serverProgram

elementId: TBD
name: serverProgram
dataType: string
status: current
description: Either the pathname of a server program to be invoked by inetd to perform the requested service, or the value internal if inetd itself provides the service.

7.227. endpointType

```
elementId: TBD
name: endpointType
dataType: enumeration
structure:
stream ; 0x1 ; The stream value is used to describe a stream
socket.
dgram ; 0x2 ; The dgram value is used to describe a datagram
socket.
raw ; 0x3 ; The raw value is used to describe a raw socket.
seqpacket ; 0x4 ; The seqpacket value is used to describe a
sequenced packet socket.
tli ; 0x5 ; The tli value is used to describe all TLI endpoints.
sunrpc_tcp ; 0x6 ; The sunrpc_tcp value is used to describe all
SUNRPC TCP endpoints.
sunrpc_udp ; 0x7 ; The sunrpc_udp value is used to describe all
SUNRPC UDP endpoints.
 ; 0x8 ; The empty string value is permitted here to allow for
detailed error reporting.
status: current
description: The endpoint type (aka, socket type) associated with
the service.
```

7.228. execAsUser

```
elementId: TBD
name: execAsUser
dataType: string
status: current
description: The user id of the user the
      server program should run under.
```

7.229. waitStatus

elementId: TBD
name: waitStatus
dataType: enumeration
structure: wait ; 0x1 ; The value of ’wait’ specifies that the server that is invoked by inetd will take over the listening socket associated with the service, and once launched, inetd will wait for that server to exit, if ever, before it resumes listening for new service requests.

nowait ; 0x2 ; The value of ’nowait’ specifies that the server that is invoked by inetd will not wait for any existing server to finish before taking over the listening socket associated with the service.

; 0x3 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Specifies whether the server that is invoked by inetd will take over the listening socket associated with the service, and whether once launched, inetd will wait for that server to exit, if ever, before it resumes listening for new service requests. The legal values are "wait" or "nowait".

7.230. inetAddr

elementId: TBD
name: inetAddr
dataType: ipAddress
status: current
description: The IP address of the specific interface. Note that the IP address can be IPv4 or IPv6.

7.231. netmask

elementId: TBD
name: netmask
dataType: ipAddress
status: current
description: The bitmask used to calculate
the interface’s IP network.

7.232. passwordInfo

```
   elementId: TBD
   name: passwordInfo
   dataType: list
   structure: list (username, password, userId, groupId, gcos,
         homeDir, loginShell, lastLogin)
   status: current
   description: Describes user account information for a
         system.
```

7.233. username

```
   elementId: TBD
   name: username
   dataType: string
   status: current
   description: The name of the user.
```

7.234. password

```
   elementId: TBD
   name: password
   dataType: string
   status: current
   description: The encrypted version of the
         user's password.
```

7.235. gcos

```
   elementId: TBD
   name: gcos
   dataType: string
   status: current
   description:
```

7.236. homeDir

```
   elementId: TBD
   name: homeDir
   dataType: string
   status: current
   description: The user's home
         directory.
```

7.237. loginShell

elementId: TBD
name: loginShell
dataType: string
status: current
description: The user’s shell
program.

7.238. lastLogin

elementId: TBD
name: lastLogin
dataType: unsigned32
status: current
description: The date and time when the
last login occurred.

7.239. process

elementId: TBD
name: process
dataType: list
structure: list (commandLine, pid, ppid, priority, startTime)

status: current
description: Information about a process running on an endpoint.

7.240. commandLine

elementId: TBD
name: commandLine
dataType: string
status: current
description: The string used to start the
process. This includes any parameters that are part of the
command line.

7.241. ppid

elementId: TBD
name: ppid
dataType: unsigned32
status: current
description: The process ID of the process’s
parent process.

7.242. priority

```
elementId: TBD
name: priority
dataType: unsigned32
status: current
description: The scheduling priority with
      which the process runs.
```

7.243. startTime

```
elementId: TBD
name: startTime
dataType: string
status: current
description: The time of day the process
      started.
```

7.244. routingtable

```
elementId: TBD
name: routingtable
dataType: list
structure: list (destination, gateway, flags,
      interfaceName)
status: current
description: Holds information about an individual routing table
entry found in a system’s primary routing table.
```

7.245. destination

```
elementId: TBD
name: destination
dataType: ipAddress
status: current
description: The destination IP address
      prefix of the routing table entry.
```

7.246. gateway

```
elementId: TBD
name: gateway
dataType: ipAddress
status: current
description: The gateway of the specified
      routing table entry.
```

7.247. runlevelInfo

```
elementId: TBD
name: runlevelInfo
dataType: list
structure: list (serviceName, runlevel, start, kill)

status: current
description: Information about the start or kill state of a
specified service at a given runlevel.
```

7.248. runlevel

```
elementId: TBD
name: runlevel
dataType: string
status: current
description: Specifies the system runlevel
      associated with a service.
```

7.249. start

```
elementId: TBD
name: start
dataType: boolean
status: current
description: Specifies whether the service is
      scheduled to start at the runlevel.
```

7.250. kill

```
elementId: TBD
name: kill
dataType: boolean
status: current
description: Specifies whether the service is
      scheduled to be killed at the runlevel.
```

7.251. shadowItem

```
elementId: TBD
name: shadowItem
dataType: list
structure: list (username, password, chgLst, chgAllow,
      chgReq, expWarn, expInact, expDate, flags, encryptMethod)
status: current
description:
```

7.252. chgLst

```
elementId: TBD
name: chgLst
dataType: dateTimeSeconds
status: current
description: The date of the last password
      change.
```

7.253. chgAllow

```
elementId: TBD
name: chgAllow
dataType: unsigned32
status: current
description: Specifies how often in days a
      user may change their password. It can also be thought of
      as the minimum age of a password.
```

7.254. chgReq

```
elementId: TBD
name: chgReq
dataType: unsigned32
status: current
description: Describes how long a user can
      keep a password before the system forces her to change it.
```

7.255. expWarn

```
elementId: TBD
name: expWarn
dataType: unsigned32
status: current
description: Describes how long before
      password expiration the system begins warning the user.
```

7.256. expInact

```
elementId: TBD
name: expInact
dataType: unsigned32
status: current
description: Describes how many days of
      account inactivity the system will wait after a password
      expires before locking the account.
```

7.257. expDate

elementId: TBD
name: expDate
dataType: dateTimeSeconds
status: current
description: Specifies when will the
account’s password expire.

7.258. encryptMethod

elementId: TBD
name: encryptMethod
dataType: enumeration
structure: DES ; 0x1 ; The DES method corresponds to the (none)
prefix.
BSDi ; 0x2 ; The BSDi method corresponds to BSDi modified
DES or the ’_’ prefix.
MD5 ; 0x3 ; The MD5 method corresponds to MD5 for Linux/BSD
or the 1 prefix.
Blowfish ; 0x4 ; The Blowfish method corresponds to Blowfish
(OpenBSD) or the 2 or $2a$ prefixes.
Sun MD5 ; 0x5 ; The Sun MD5 method corresponds to the $md5$
prefix.
SHA-256 ; 0x6 ; The SHA-256 method corresponds to the 5
prefix.
SHA-512 ; 0x7 ; The SHA-512 method corresponds to the 6
prefix. ; 0x8 ; The empty string value is permitted here to
allow for empty elements associated with variable references.
status: current
description: Describes method that is used for hashing
passwords.

7.259. symlink

elementId: TBD
name: symlink
dataType: list
structure: list (symlinkFilepath, canonicalPath)
status: current

description: Identifies the result generated for a symlink.

7.260. symlinkFilepath

```
   elementId: TBD
   name: symlinkFilepath
   dataType: string
   status: current
   description: Specifies the filepath to
         the subject symbolic link file.
```

7.261. canonicalPath

```
   elementId: TBD
   name: canonicalPath
   dataType: string
   status: current
   description: Specifies the canonical
         path for the target of the symbolic link file specified by
         the filepath.
```

7.262. sysctl

```
   elementId: TBD
   name: sysctl
   dataType: list
   structure: list (kernelParameterName, kernelParameterValue+,
         uname, machineClass, nodeName, osName, osRelease,
         osVersion, processorType)
   status: current
   description: Stores
         information retrieved from the local system about a kernel
         parameter and its respective value(s).
```

7.263. kernelParameterName

```
   elementId: TBD
   name: kernelParameterName
   dataType: string
   status: current
   description: The name of a kernel
         parameter that was collected from the local system.
```

7.264. kernelParameterValue

```
   elementId: TBD
   name: kernelParameterValue
   dataType: string
   status: current
   description: The current value(s)
         for the specified kernel parameter on the local system.
```

7.265. uname

```
elementId: TBD
name: uname
dataType: list
structure: list (machineClass, nodeName, osName, osRelease,
      osVersion, processorType)
status: current
description: Information about the hardware the machine is running
      on.
```

7.266. machineClass

```
elementId: TBD
name: machineClass
dataType: string
status: current
description: Specifies the machine
      hardware name.
```

7.267. nodeName

```
elementId: TBD
name: nodeName
dataType: string
status: current
description: Specifies the host
      name.
```

7.268. osName

```
elementId: TBD
name: osName
dataType: string
status: current
description: Specifies the operating system
      name.
```

7.269. osRelease

```
elementId: TBD
name: osRelease
dataType: string
status: current
description: Specifies the build
      version.
```

7.270. processorType

```
elementId: TBD
name: processorType
dataType: string
status: current
description: Specifies the processor
      type.
```

7.271. internetService

```
elementId: TBD
name: internetService
dataType: list
structure: list (serviceProtocol, serviceName, flags,
      noAccess, onlyFrom, port, server, serverArguments,
      socketType, registeredServiceType, user, wait, disabled)

status: current
description: Holds information associated with Internet services.
```

7.272. serviceProtocol

```
elementId: TBD
name: serviceProtocol
dataType: string
status: current
description: Specifies the protocol
      that is used by the service.
```

7.273. serviceName

```
elementId: TBD
name: serviceName
dataType: string
status: current
description: Specifies the name of the
      service.
```

7.274. flags

```
elementId: TBD
name: flags
dataType: string
status: current
description: Specifies miscellaneous settings
      associated with the service with executing a program.
```

7.275. noAccess

```
elementId: TBD
name: noAccess
dataType: string
status: current
description: Specifies the remote hosts to
      which the service is unavailable.
```

7.276. onlyFrom

```
elementId: TBD
name: onlyFrom
dataType: ipAddress
status: current
description: Specifies the remote hosts to
      which the service is available.
```

7.277. port

```
elementId: TBD
name: port
dataType: unsigned32
status: current
description: The port entity specifies the port
      used by the service.
```

7.278. server

```
elementId: TBD
name: server
dataType: string
status: current
description: Specifies the executable that is
      used to launch the service.
```

7.279. serverArguments

```
elementId: TBD
name: serverArguments
dataType: string
status: current
description: Specifies the arguments
      that are passed to the executable when launching the service.
```

7.280. socketType

elementId: TBD
name: socketType
dataType: string
status: current
description: Specifies the type of socket
that is used by the service. Possible values include: stream,
dgram, raw, or seqpacket.

7.281. registeredServiceType

elementId: TBD
name: registeredServiceType
dataType: enumeration
structure: INTERNAL ; 0x1 ; The INTERNAL type is used to describe
services like echo, chargen, and others whose functionality is
supplied by xinetd itself.
RPC ; 0x2 ; The RPC type is used to describe services that
use remote procedure call ala NFS.
UNLISTED ; 0x3 ; The UNLISTED type is used to describe
services that aren't listed in /etc/protocols or /etc/rpc.
TCPMUX ; 0x4 ; The TCPMUX type is used to describe services
that conform to RFC 1078. This type indiciates that the service
is responsible for handling the protocol handshake.
TCPMUXPLUS ; 0x5 ; The TCPMUXPLUS type is used to describe
services that conform to RFC 1078. This type indicates that
xinetd is responsible for handling the protocol
handshake.
; 0x6 ; The empty string value is permitted here to allow
for detailed error reporting.
status: current

description: Specifies the type of internet service.

7.282. wait

elementId: TBD
name: wait
dataType: boolean
status: current
description: Specifies whether or not the service is single-threaded
or multi-threaded and whether or not xinetd accepts the connection
or the service accepts the connection. A value of 'true' indicates
that the service is single-threaded and the service will accept the
connection. A value of 'false' indicates that the service is multi-
threaded and xinetd will accept the connection.

7.283. disabled

elementId: TBD
name: disabled
dataType: boolean
status: current
description: Specifies whether or not the service is disabled. A value of ’true’ indicates that the service is disabled and will not start. A value of ’false’ indicates that the service is not disabled.

7.284. windowsView

elementId: TBD
name: windowsView
dataType: enumeration
structure: 32_bit ; 0x1 ; Indicates the 32_bit windows view.
64_bit ; 0x2 ; Indicates the 64_bit windows view.
; 0x3 ; The empty string value is permitted here to allow for empty elements associated with error conditions.
status: current
description: Indicates from which view (32-bit or 64-bit), the information was collected. A value of ’32_bit’ indicates the Item was collected from the 32-bit view. A value of ’64-bit’ indicates the Item was collected from the 64-bit view.

7.285. fileauditedpermissions

elementId: TBD
name: fileauditedpermissions
dataType: list
structure: list (filepath, path, filename, trusteeSid, trusteeName, auditStandardDelete, auditStandardReadControl, auditStandardWriteDac, auditStandardWriteOwner, auditStandardSynchronize, auditAccessSystemSecurity, auditGenericRead, auditGenericWrite, auditGenericExecute, auditGenericAll, auditFileReadData, auditFileWriteData, auditFileAppendData, auditFileReadEa, auditFileWriteEa, auditFileExecute, auditFileDeleteChild, auditFileReadAttributes, auditFileWriteAttributes, windowsView)
status: current
description: Stores the audited access rights of a file that a system access control list (SACL) structure grants to a specified trustee. The trustee’s audited access rights are determined checking all access control entries (ACEs) in the SACL.

7.286. trusteeName

elementId: TBD
name: trusteeName
dataType: string
status: current
description: Specifies the trustee name. A
trustee can be a user, group, or program (such as a Windows
service).

7.287. auditStandardDelete

elementId: TBD
name: auditStandardDelete
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is
used to perform audits on all unsuccessful occurrences of
specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel
all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to
perform audits on all successful occurrences of the specified
events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE
is used to perform audits on all successful and unsuccessful
occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for
detailed error reporting.
status: current
description: The right to delete the object.

7.288. auditStandardReadControl

elementId: TBD
name: auditStandardReadControl
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: The right to read the information in the object’s security descriptor, not including the information in the SACL.

7.289. auditStandardWriteDac

elementId: TBD
name: auditStandardWriteDac
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: The right to modify the DACL in the object’s security descriptor.

7.290. auditStandardWriteOwner

elementId: TBD
name: auditStandardWriteOwner
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: The right to change the owner in the object’s security descriptor.

7.291. auditStandardSynchronize

elementId: TBD
name: auditStandardSynchronize
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: The right to use the object for synchronization. This enables a thread to wait until the object is in the signaled state. Some object types do not support this access right.

7.292. auditAccessSystemSecurity

elementId: TBD
name: auditAccessSystemSecurity
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Indicates access to a system access control list (SACL).

7.293. auditGenericRead

elementId: TBD
name: auditGenericRead
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Read access.

7.294. auditGenericWrite

elementId: TBD
name: auditGenericWrite
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Write access.

7.295. auditGenericExecute

elementId: TBD
name: auditGenericExecute
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Execute access.

7.296. auditGenericAll

elementId: TBD
name: auditGenericAll
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Read, write, and execute access.

7.297. auditFileReadData

elementId: TBD
name: auditFileReadData
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Grants the right to read data from the file.

7.298. auditFileWriteData

elementId: TBD
name: auditFileWriteData
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Grants the right to write data to the file.

7.299. auditFileAppendData

elementId: TBD
name: auditFileAppendData
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Grants the right to append data to the file.

7.300. auditFileReadEa

elementId: TBD
name: auditFileReadEa
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Grants the right to read extended attributes.

7.301. auditFileWriteEa

elementId: TBD
name: auditFileWriteEa
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Grants the right to write extended attributes.

7.302. auditFileExecute

elementId: TBD
name: auditFileExecute
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Grants the right to execute a file.

7.303. auditFileDeleteChild

elementId: TBD
name: auditFileDeleteChild
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Right to delete a directory and all the files it contains (its children), even if the files are read-only.

7.304. auditFileReadAttributes

elementId: TBD
name: auditFileReadAttributes
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Grants the right to read file attributes.

7.305. auditFileWriteAttributes

elementId: TBD
name: auditFileWriteAttributes
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description: Grants the right to change file attributes.

7.306. fileeffectiverights

```
   elementId: TBD
   name: fileeffectiverights
   dataType: list
   structure: list (filepath, path, filename,
         trusteeSid, trusteeName, standardDelete, standardReadControl,
         standardWriteDac, standardWriteOwner,
         standardSynchronize, accessSystemSecurity, genericRead,
         genericWrite, genericExecute, genericAll, fileReadData,
         fileWriteData, fileAppendData, fileReadEa, fileWriteEa,
         fileExecute, fileDeleteChild, fileReadAttributes,
         fileWriteAttributes, windowsView)
   status: current
   description: Stores the effective rights of a file that a
         discretionary access control list (DACL) structure grants
         to a specified trustee. The trustee's effective rights
         are determined checking all access-allowed and access-denied
         access control entries (ACEs) in the DACL.
```

7.307. standardDelete

```
   elementId: TBD
   name: standardDelete
   dataType: boolean
   status: current
   description: The right to delete the
         object.
```

7.308. standardReadControl

```
   elementId: TBD
   name: standardReadControl
   dataType: boolean
   status: current
   description: The right to read
         the information in the object's security descriptor, not
         including the information in the SACL.
```

7.309. standardWriteDac

```
   elementId: TBD
   name: standardWriteDac
   dataType: boolean
   status: current
   description: The right to modify the
         DACL in the object's security descriptor.
```

7.310. standardWriteOwner

elementId: TBD
name: standardWriteOwner
dataType: boolean
status: current
description: The right to change
the owner in the object’s security descriptor.

7.311. standardSynchronize

elementId: TBD
name: standardSynchronize
dataType: boolean
status: current
description: The right to use the
object for synchronization. This enables a thread to wait
until the object is in the signaled state. Some object
types do not support this access right.

7.312. accessSystemSecurity

elementId: TBD
name: accessSystemSecurity
dataType: boolean
status: current
description: Indicates access to
a system access control list (SACL).

7.313. genericRead

elementId: TBD
name: genericRead
dataType: boolean
status: current
description: Read access.

7.314. genericWrite

elementId: TBD
name: genericWrite
dataType: boolean
status: current
description: Write access.

7.315. genericExecute

```
elementId: TBD
name: genericExecute
dataType: boolean
status: current
description: Execute access.
```

7.316. genericAll

```
elementId: TBD
name: genericAll
dataType: boolean
status: current
description: Read, write, and execute
      access.
```

7.317. fileReadData

```
elementId: TBD
name: fileReadData
dataType: boolean
status: current
description: Grants the right to read
      data from the file
```

7.318. fileWriteData

```
elementId: TBD
name: fileWriteData
dataType: boolean
status: current
description: Grants the right to write
      data to the file.
```

7.319. fileAppendData

```
elementId: TBD
name: fileAppendData
dataType: boolean
status: current
description: Grants the right to
      append data to the file.
```

7.320. fileReadEa

```
elementId: TBD
name: fileReadEa
dataType: boolean
status: current
description: Grants the right to read
      extended attributes.
```

7.321. fileWriteEa

```
elementId: TBD
name: fileWriteEa
dataType: boolean
status: current
description: Grants the right to write
      extended attributes.
```

7.322. fileExecute

```
elementId: TBD
name: fileExecute
dataType: boolean
status: current
description: Grants the right to execute
      a file.
```

7.323. fileDeleteChild

```
elementId: TBD
name: fileDeleteChild
dataType: boolean
status: current
description: Right to delete a
      directory and all the files it contains (its children),
      even if the files are read-only.
```

7.324. fileReadAttributes

```
elementId: TBD
name: fileReadAttributes
dataType: boolean
status: current
description: Grants the right to
      read file attributes.
```

7.325. fileWriteAttributes

elementId: TBD
name: fileWriteAttributes
dataType: boolean
status: current
description: Grants the right to
change file attributes.

7.326. groupInfo

elementId: TBD
name: groupInfo
dataType: list
structure: list (group, username, subgroup)
status: current
description: Specifies the different users and subgroups, that
directly belong to specific groups.

7.327. group

elementId: TBD
name: group
dataType: string
status: current
description: Represents the name of a particular
group.

7.328. subgroup

elementId: TBD
name: subgroup
dataType: string
status: current
description: Represents the name of a
particular subgroup in the specified group.

7.329. groupSidInfo

elementId: TBD
name: groupSidInfo
dataType: list
structure: list (groupSid, userSid, subgroupSid)
status: current
description: Specifies the different users and subgroups, that
directly belong to specific groups
(identified by SID).

7.330. userSidInfo

elementId: TBD
name: userSidInfo
dataType: list
structure: list (userSid, enabled, groupSid, lastLogon)

status: current
description: Specifies the different groups (identified by SID) that a user belongs to.

7.331. userSid

elementId: TBD
name: userSid
dataType: string
status: current
description: Represents the SID of a particular user.

7.332. subgroupSid

elementId: TBD
name: subgroupSid
dataType: string
status: current
description: Represents the SID of a particular subgroup.

7.333. lockoutpolicy

elementId: TBD
name: lockoutpolicy
dataType: list
structure: list (forceLogoff, lockoutDuration, lockoutObservationWindow, lockoutThreshold)
status: current
description: Specifies various attributes associated with lockout information for users and global groups in the security database.

7.334. forceLogoff

```
   elementId: TBD
   name: forceLogoff
   dataType: unsigned32
   status: current
   description: Specifies, in seconds, the
         amount of time between the end of the valid logon time and
         the time when the user is forced to log off the
         network.
```

7.335. lockoutDuration

```
   elementId: TBD
   name: lockoutDuration
   dataType: unsigned32
   status: current
   description: Specifies, in seconds,
         how long a locked account remains locked before it is
         automatically unlocked.
```

7.336. lockoutObservationWindow

```
   elementId: TBD
   name: lockoutObservationWindow
   dataType: unsigned32
   status: current
   description: Specifies the
         maximum time, in seconds, that can elapse between any two
         failed logon attempts before lockout occurs.
```

7.337. lockoutThreshold

```
   elementId: TBD
   name: lockoutThreshold
   dataType: unsigned32
   status: current
   description: Specifies the number of
         invalid password authentications that can occur before an
         account is marked "locked out."
```

7.338. passwordpolicy

```
   elementId: TBD
   name: passwordpolicy
   dataType: list
   structure: list (maxPasswdAge, minPasswdAge,
         minPasswdLen, passwordHistLen, passwordComplexity,
         reversibleEncryption)
   status: current
   description: Specifies
         policy information associated with passwords.
```

7.339. maxPasswdAge

```
   elementId: TBD
   name: maxPasswdAge
   dataType: unsigned32
   status: current
   description: Specifies, in seconds (from
         a DWORD), the maximum allowable password age. A value of
         TIMEQ_FOREVER (max DWORD value, 4294967295) indicates
         that the password never expires. The minimum valid value
         for this element is ONE_DAY (86400). See the
         USER_MODALS_INFO_0 structure returned by a call to
         NetUserModalsGet().
```

7.340. minPasswdAge

```
   elementId: TBD
   name: minPasswdAge
   dataType: unsigned32
   status: current
   description: Specifies the minimum
         number of seconds that can elapse between the time a password
         changes and when it can be changed again. A value of
         zero indicates that no delay is required between password
         updates.
```

7.341. minPasswdLen

```
   elementId: TBD
   name: minPasswdLen
   dataType: unsigned32
   status: current
   description: Specifies the minimum
         allowable password length. Valid values for this element are
         zero through PWLEN.
```

7.342. passwordHistLen

```
elementId: TBD
name: passwordHistLen
dataType: unsigned32
status: current
description: Specifies the length of
      password history maintained. A new password cannot match any
      of the previous usrmod0_password_hist_len passwords.
      Valid values for this element are zero through DEF_MAX_PWHIST.
```

7.343. passwordComplexity

```
elementId: TBD
name: passwordComplexity
dataType: boolean
status: current
description: Indicates whether
      passwords must meet the complexity requirements put forth
      by the operating system.
```

7.344. reversibleEncryption

```
elementId: TBD
name: reversibleEncryption
dataType: boolean
status: current
description: Indicates whether
      or not passwords are stored using reversible encryption.
```

7.345. portInfo

```
elementId: TBD
name: portInfo
dataType: list
structure: list (localAddress, localPort, transportProtocol,
      pid, foreignAddress, foreignPort)
status: current
description: Information about open listening ports.
```

7.346. foreignPort

```
elementId: TBD
name: foreignPort
dataType: string
status: current
description: The TCP or UDP port to which
      the program communicates.
```

7.347. printereffectiverights

```
elementId: TBD
name: printereffectiverights
dataType: list
structure: list (printerName, trusteeSid,
      standardDelete, standardReadControl, standardWriteDac,
      standardWriteOwner, standardSynchronize,
      accessSystemSecurity, genericRead, genericWrite,
      genericExecute, genericAll, printerAccessAdminister,
      printerAccessUse, jobAccessAdminister, jobAccessRead)
status: current
description: Stores the effective rights of a printer that a
discretionary access control list (DACL) structure grants to a
specified trustee. The trustee’s effective rights are determined
checking all access-allowed and access-denied access control
entries (ACEs) in the DACL.
```

7.348. printerName

```
elementId: TBD
name: printerName
dataType: string
status: current
description: Specifies the name of the
      printer.
```

7.349. printerAccessAdminister

```
elementId: TBD
name: printerAccessAdminister
dataType: boolean
status: current
description:
```

7.350. printerAccessUse

```
elementId: TBD
name: printerAccessUse
dataType: boolean
status: current
description:
```

7.351. jobAccessAdminister

```
   elementId: TBD
   name: jobAccessAdminister
   dataType: boolean
   status: current
   description:
```

7.352. jobAccessRead

```
   elementId: TBD
   name: jobAccessRead
   dataType: boolean
   status: current
   description:
```

7.353. registry

```
   elementId: TBD
   name: registry
   dataType: list
   structure: list (registryHive, registryKey, registryKeyName,
                    lastWriteTime, registryKeyType, registryKeyValue,
                    windowsView)
   status: current
   description: Specifies information that can be
         collected about a particular registry key.
```

7.354. registryHive

```
   elementId: TBD
   name: registryHive
   dataType: enumeration
   structure: HKEY_CLASSES_ROOT ; 0x1 ; This registry subtree
         contains information that associates file types with programs
         and configuration data for automation (e.g. COM
         objects and Visual Basic Programs).
         HKEY_CURRENT_CONFIG ; 0x2 ; This registry subtree contains
         configuration data for the current hardware profile.
         HKEY_CURRENT_USER ; 0x3 ; This registry subtree contains the
         user profile of the user that is currently logged into the
         system.
         HKEY_LOCAL_MACHINE ; 0x4 ; This registry subtree contains
         information about the local system.
         HKEY_USERS ; 0x5 ; This registry subtree contains user-specific
         data.
         ; 0x6 ; The empty string value is permitted here to allow
         for detailed error reporting.
   status: current
   description: The
         hive that the registry key belongs to.
```

7.355. registryKey

```
   elementId: TBD
   name: registryKey
   dataType: string
   status: current
   description: Describes the registry key.
         Note that the hive portion of the string should not be
         included, as this data can be found under the hive
         element.
```

7.356. registryKeyName

```
   elementId: TBD
   name: registryKeyName
   dataType: string
   status: current
   description: Describes the name of a
         registry key.
```

7.357. lastWriteTime

elementId: TBD
name: lastWriteTime
dataType: unsigned64
status: current
description: The last time that the key or any of its value entries were modified. The value of this entity represents the FILETIME structure which is a 64-bit value representing the number of 100-nanosecond intervals since January 1, 1601 (UTC). Last write time can be queried on any key, with hives being classified as a type of key. When collecting only information about a registry hive or key the last write time will be the time the key or any of its entries were modified. When collecting only information about a registry name the last write time will be the time the containing key was modified. Thus when collecting information about a registry name, the last write time does not correlate directly to the specified name. See the RegQueryInfoKey function lpftLastWriteTime.

7.358. registryKeyType

elementId: TBD
name: registryKeyType
dataType: enumeration
structure: reg_binary ; 0x1 ; The reg_binary type is used by registry keys that specify binary data in any form.
reg_dword ; 0x2 ; The reg_dword type is used by registry keys that specify an unsigned 32-bit integer.
reg_dword_little_endian ; 0x3 ; The reg_dword_little_endian type is used by registry keys that specify an unsigned 32-bit little-endian integer. It is designed to run on little-endian computer architectures.
reg_dword_big_endian ; 0x4 ; The reg_dword_big_endian type is used by registry keys that specify an unsigned 32-bit big-endian integer. It is designed to run on big-endian computer architectures.
reg_expand_sz ; 0x5 ; The reg_expand_sz type is used by registry keys to specify a null-terminated string that contains unexpanded references to environment variables (for example, "%PATH%").
reg_link ; 0x6 ; The reg_link type is used by the registry keys for null-terminated unicode strings. It is related to target path of a symbolic link created by the RegCreateKeyEx function.
reg_multi_sz ; 0x7 ; The reg_multi_sz type is used by registry keys that specify an array of null-terminated strings, terminated by two null characters.

reg_none; 0x8 ;
The reg_none type is used by registry keys that have no defined value type.
reg_qword; 0x9 ; The reg_qword type is used by registry keys that specify an unsigned 64-bit integer.
reg_qword_little_endian; 0xA ; The reg_qword_little_endian type is used by registry keys that specify an unsigned 64-bit integer in little-endian computer architectures.
reg_sz; 0xB ; The reg_sz type is used by registry keys that specify a single null-terminated string.
reg_resource_list; 0xC ; The reg_resource_list type is used by registry keys that specify a resource list.
reg_full_resource_descriptor; 0xD ; The reg_full_resource_descriptor type is used by registry keys that specify a full resource descriptor.
reg_resource_requirements_list; 0xE ; The reg_resource_requirements_list type is used by registry keys that specify a resource requirements list.
; 0xF ; The empty string value is permitted here to allow for detailed error reporting.

status: current

description:

Specifies the type of data stored by the registry key.

7.359. registryKeyValue

elementId: TBD
name: registryKeyValue
dataType: string
status: current
description: Holds the actual value
of the specified registry key. The representation of the value as well as the associated datatype attribute depends on type of data stored in the registry key. If the value being tested is of type REG_BINARY, then the datatype attribute should be set to ’binary’ and the data represented by the value entity should follow the xsd:hexBinary form. (each binary octet is encoded as two hex digits) If the value being tested is of type REG_DWORD, REG_QWORD, REG_DWORD_LITTLE_ENDIAN, REG_DWORD_BIG_ENDIAN, or REG_QWORD_LITTLE_ENDIAN then the datatype attribute should be set to ’int’ and the value entity should represent the data as an unsigned integer. DWORD and QWORD values represnt unsigned 32-bit and 64-bit integers, respectively. If the value being tested is of type REG_EXPAND_SZ, then the datatype attribute should be set to ’string’ and the pre-expanded string should be represented by the value entity. If the value being tested is of type REG_MULTI_SZ, then only a single string (one of the multiple strings) should be tested using the value entity with the datatype attribute set to ’string’. In order to test multiple values, multiple OVAL registry tests should be used. If the specified registry key is of type REG_SZ, then the datatype should be ’string’ and the value entity should be a copy of the string. If the value being tested is of type REG_LINK, then the datatype attribute should be set to ’string’ and the null-terminated Unicode string should be represented by the value entity.

7.360. regkeyauditedpermissions

elementId: TBD
name: regkeyauditedpermissions
dataType: list
structure: list (registryKey, trusteeSid, trusteeName,
standardDelete, standardReadControl, standardWriteDac,
standardWriteOwner, standardSynchronize,
accessSystemSecurity, genericRead, genericWrite,
genericExecute, genericAll, keyQueryValue, keySetValue,
keyCreateSubKey, keyEnumerateSubKeys, keyNotify,
keyCreateLink, keyWow6464Key, keyWow6432Key, keyWow64Res,
windowsView)
status: current
description: Stores the audited access rights of a registry key
that a system access control list (SACL) structure grants to a
specified trustee. The trustee’s audited access rights are
determined checking all access control entries (ACEs) in the SACL.

7.361. auditKeyQueryValue

elementId: TBD
name: auditKeyQueryValue
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is
used to perform audits on all unsuccessful occurrences of
specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel
all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to
perform audits on all successful occurrences of the specified
events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE
is used to perform audits on all successful and unsuccessful
occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for
detailed error reporting.
status: current
description:

7.362. auditKeySetValue

elementId: TBD
name: auditKeySetValue
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description:

7.363. auditKeyCreateSubKey

elementId: TBD
name: auditKeyCreateSubKey
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description:

7.364. auditKeyEnumerateSubKeys

elementId: TBD
name: auditKeyEnumerateSubKeys
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description:

7.365. auditKeyNotify

elementId: TBD
name: auditKeyNotify
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description:

7.366. auditKeyCreateLink

elementId: TBD
name: auditKeyCreateLink
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description:

7.367. auditKeyWow6464Key

elementId: TBD
name: auditKeyWow6464Key
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description:

7.368. auditKeyWow6432Key

elementId: TBD
name: auditKeyWow6432Key
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description:

7.369. auditKeyWow64Res

elementId: TBD
name: auditKeyWow64Res
dataType: enumeration
structure: AUDIT_FAILURE ; 0x1 ; The audit type AUDIT_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.
AUDIT_NONE ; 0x2 ; The audit type AUDIT_NONE is used to cancel all auditing options for the specified events.
AUDIT_SUCCESS ; 0x3 ; The audit type AUDIT_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.
AUDIT_SUCCESS_FAILURE ; 0x4 ; The audit type AUDIT_SUCCESS_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.
status: current
description:

7.370. regkeyeffectiverights

```
elementId: TBD
name: regkeyeffectiverights
dataType: list
structure: list (registryHive, registryKey, trusteeSid,
      trusteeName, standardDelete, standardReadControl,
      standardWriteDac, standardWriteOwner, standardSynchronize,
      accessSystemSecurity, genericRead, genericWrite,
      genericExecute, genericAll, keyQueryValue, keySetValue,
      keyCreateSubKey, keyEnumerateSubKeys, keyNotify,
      keyCreateLink, keyWow6464Key, keyWow6432Key, keyWow64Res,
      windowsView)
status: current
description: Stores the effective rights of a registry key that a
discretionary access control list (DACL) structure grants to a
specified trustee. The trustee's effective rights are determined
checking all access-allowed and access-denied access control
entries (ACEs) in the DACL.
```

7.371. keyQueryValue

```
elementId: TBD
name: keyQueryValue
dataType: boolean
status: current
description: Specifies whether or not
      permission is granted to query the key's value.
```

7.372. keySetValue

```
elementId: TBD
name: keySetValue
dataType: boolean
status: current
description: Specifies whether or not
      permission is granted to set the key's value.
```

7.373. keyCreateSubKey

```
elementId: TBD
name: keyCreateSubKey
dataType: boolean
status: current
description: Specifies whether or not
      permission is granted to create a subkey.
```

7.374. keyEnumerateSubKeys

elementId: TBD
name: keyEnumerateSubKeys
dataType: boolean
status: current
description: Specifies whether or not permission is granted to list the subkeys associated with key.

7.375. keyNotify

elementId: TBD
name: keyNotify
dataType: boolean
status: current
description:

7.376. keyCreateLink

elementId: TBD
name: keyCreateLink
dataType: boolean
status: current
description:

7.377. keyWow6464Key

elementId: TBD
name: keyWow6464Key
dataType: boolean
status: current
description:

7.378. keyWow6432Key

elementId: TBD
name: keyWow6432Key
dataType: boolean
status: current
description:

7.379. keyWow64Res

```
   elementId: TBD
   name: keyWow64Res
   dataType: boolean
   status: current
   description:
```

7.380. service

```
   elementId: TBD
   name: service
   dataType: list
   structure: list (serviceName, displayName, description,
         serviceType, startType, currentState, controlsAccepted,
         startName, path, pid, serviceFlag, dependencies)
   status: current
   description: Stores information about Windows services that are
   present on the system.
```

7.381. displayName

```
   elementId: TBD
   name: displayName
   dataType: string
   status: current
   description: Specifies the name of the
         service as specified in administrative tools.
```

7.382. description

```
   elementId: TBD
   name: description
   dataType: string
   status: current
   description: Specifies the description of
         the service.
```

7.383. serviceType

```
   elementId: TBD
   name: serviceType
   dataType: enumeration
   structure: SERVICE_FILE_SYSTEM_DRIVER ; 0x1 ; The
         SERVICE_FILE_SYSTEM_DRIVER type means that the service is
         a file system driver. The DWORD value that this
         corresponds to is 0x00000002.
         SERVICE_KERNEL_DRIVER ; 0x2 ; The SERVICE_KERNEL_DRIVER type
         means that the service is a driver. The DWORD value that
         this corresponds to is 0x00000001.
         SERVICE_WIN32_OWN_PROCESS ; 0x3 ; The SERVICE_WIN32_OWN_PROCESS
         type means that the service runs in its own process. The DWORD
         value that this corresponds to is 0x00000010.
         SERVICE_WIN32_SHARE_PROCESS ; 0x4 ; The
         SERVICE_WIN32_SHARE_PROCESS type means that the service runs
         in a process with other services. The DWORD value that this
         corresponds to is 0x00000020.
         SERVICE_INTERACTIVE_PROCESS ; 0x5 ; The
         SERVICE_WIN32_SHARE_PROCESS type means that the service runs
         in a process with other services. The DWORD value that this
         corresponds to is 0x00000100.
         ; 0x6 ; The empty string value is permitted here to allow for
         empty elements associated with error conditions.
   status: current
   description:
         Specifies the type of the service.
```

7.384. startType

```
   elementId: TBD
   name: startType
   dataType: enumeration
   structure: SERVICE_AUTO_START ; 0x1 ; The SERVICE_AUTO_START type
         means that the service is started automatically by the Service
         Control Manager (SCM) during startup. The DWORD value that
         this corresponds to is 0x00000002.
         SERVICE_BOOT_START ; 0x2 ; The SERVICE_BOOT_START type means
         that the driver service is started by the system loader. The
         DWORD value that this corresponds to is 0x00000000.
         SERVICE_DEMAND_START ; 0x3 ; The SERVICE_DEMAND_START type
         means that the service is started by the Service Control
         Manager (SCM) when StartService() is called. The DWORD value
         that this corresponds to is 0x00000003.
         SERVICE_DISABLED ; 0x4 ; The SERVICE_DISABLED type means
         that the service cannot be started. The DWORD value that
         this corresponds to is 0x00000004.
         SERVICE_SYSTEM_START ; 0x5 ; The SERVICE_SYSTEM_START type
         means that the service is a device driver started by
         IoInitSystem(). The DWORD value that this corresponds to is
         0x00000001.
         ; 0x6 ; The empty string value is permitted here to allow
         for empty elements associated with error conditions.
   status: current
   description: Specifies when the service should be started.
```

7.385. currentState

```
   elementId: TBD
   name: currentState
   dataType: enumeration
   structure: SERVICE_CONTINUE_PENDING ; 0x1 ; The
         SERVICE_CONTINUE_PENDING type means that the service has been
         sent a command to continue, however, the command has
         not yet been executed. The DWORD value that this corresponds
         to is 0x00000005. SERVICE_PAUSE_PENDING ; 0x2 ; The
         SERVICE_PAUSE_PENDING type means that the service has been
         sent a command to pause, however, the command has not
         yet been executed. The DWORD value that this corresponds to
         is 0x00000006.
         SERVICE_PAUSED ; 0x3 ; The SERVICE_PAUSED type means that
         the service is paused. The DWORD value that this corresponds
         to is 0x00000007.
         SERVICE_RUNNING ; 0x4 ; The SERVICE_RUNNING type means that
         the service is running. The DWORD value that this
         corresponds to is 0x00000004.
         SERVICE_START_PENDING ; 0x5 ; The SERVICE_START_PENDING type
         means that the service has been sent a command to start,
         however, the command has not yet been executed. The DWORD
         value that this corresponds to is 0x00000002.
         SERVICE_STOP_PENDING ; 0x6 ; The SERVICE_STOP_PENDING type
         means that the service
         has been sent a command to stop, however, the command has
         not yet been executed. The DWORD value that this
         corresponds to is 0x00000003.
         SERVICE_STOPPED ; 0x7 ; The SERVICE_STOPPED type means that
         the service is stopped. The DWORD value that this corresponds
         to is 0x00000001.
         ; 0x8 ; The empty string value is permitted here to allow
         for empty elements associated with error conditions.
   status: current
   description: Specifies the current state of
         the service.
```

7.386. controlsAccepted

```
 elementId: TBD
 name: controlsAccepted
 dataType: enumeration
 structure: SERVICE_ACCEPT_NETBINDCHANGE ; 0x1 ;
       The SERVICE_ACCEPT_NETBINDCHANGE type means that the
       service is a network component and can accept changes in its
       binding without being stopped or restarted. The DWORD value
       that this corresponds to is 0x00000010.
       SERVICE_ACCEPT_PARAMCHANGE ; 0x2 ; The SERVICE_ACCEPT_PARAMCHANGE
       type means that the service can re-read its
```

```
      startup parameters without being stopped or restarted. The
      DWORD value that this corresponds to is 0x00000008.
      SERVICE_ACCEPT_PAUSE_CONTINUE ; 0x3 ; The
      SERVICE_ACCEPT_PAUSE_CONTINUE type means that the service
      can be paused or continued. The DWORD value that this
      corresponds to is 0x00000002.
      SERVICE_ACCEPT_PRESHUTDOWN ; 0x4 ; The
      SERVICE_ACCEPT_PRESHUTDOWN type means that the service can
      receive pre-shutdown notifications. The DWORD value
      that this corresponds to is 0x00000100.
      SERVICE_ACCEPT_SHUTDOWN ; 0x5 ; The SERVICE_ACCEPT_SHUTDOWN
      type means that the service can receive shutdown notifications.
      The DWORD value that this corresponds to is 0x00000004.
      SERVICE_ACCEPT_STOP ; 0x6 ; The SERVICE_ACCEPT_STOP type
      means that the service can be stopped. The DWORD value
      that this corresponds to is 0x00000001.
      SERVICE_ACCEPT_HARDWAREPROFILECHANGE ; 0x7 ; The
      SERVICE_ACCEPT_HARDWAREPROFILECHANGE type means that the
      service can receive notifications when the system's
      hardware profile changes. The DWORD value that this
      corresponds to is 0x00000020.
      SERVICE_ACCEPT_POWEREVENT ; 0x8 ; The SERVICE_ACCEPT_POWEREVENT
      type means that the service can receive notifications when the
      system's power status has changed. The DWORD value that this
      corresponds to is 0x00000040.
      SERVICE_ACCEPT_SESSIONCHANGE ; 0x9 ; The
      SERVICE_ACCEPT_SESSIONCHANGE type means that the service can
      receive notifications when the system's session
      status has changed. The DWORD value that this corresponds
      to is 0x00000080.
      SERVICE_ACCEPT_TIMECHANGE ; 0xA ; The SERVICE_ACCEPT_TIMECHANGE
      type means that the service can receive notifications when
      the system time changes. The DWORD value that this corresponds
      to is 0x00000200.
      SERVICE_ACCEPT_TRIGGEREVENT ; 0xB ; The
      SERVICE_ACCEPT_TRIGGEREVENT type means that the service can
      receive notifications when an event that the service
      has registered for occurs on the system. The DWORD value that
      this corresponds to is 0x00000400.
      ; 0xC ; The empty string value is permitted here to allow
      for empty elements associated with error conditions.
 status: current

 description: Specifies the control codes that a service will
              accept and process.
```

7.387. startName

elementId: TBD
name: startName
dataType: string
status: current
description: Specifies the account under which the process should run.

7.388. serviceFlag

elementId: TBD
name: serviceFlag
dataType: boolean
status: current
description: Specifies whether the service is in a system process that must always run (true) or if the service is in a non-system process or is not running (false).

7.389. dependencies

elementId: TBD
name: dependencies
dataType: string
status: current
description: Specifies the dependencies of this service on other services.

7.390. serviceeffectiverights

elementId: TBD
name: serviceeffectiverights
dataType: list
structure: list (serviceName, trusteeSid, standardDelete, standardReadControl, standardWriteDac, standardWriteOwner, genericRead, genericWrite, genericExecute, serviceQueryConf, serviceChangeConf, serviceQueryStat, serviceEnumDependents, serviceStart, serviceStop, servicePause, serviceInterrogate, serviceUserDefined)
status: current
description: Stores the effective rights of a service that a discretionary access control list (DACL) structure grants to a specified trustee. The trustee’s effective rights are determined by checking all access-allowed and access-denied access control entries (ACEs) in the DACL.

7.391. trusteeSid

elementId: TBD
name: trusteeSid
dataType: string
status: current
description: Specifies the SID that is
associated with a user, group, system, or program (such as a
Windows service).

7.392. serviceQueryConf

elementId: TBD
name: serviceQueryConf
dataType: boolean
status: current
description: Specifies whether or
not permission is granted to query the service configuration.

7.393. serviceChangeConf

elementId: TBD
name: serviceChangeConf
dataType: boolean
status: current
description: Specifies whether or
not permission is granted to change service configuration.

7.394. serviceQueryStat

elementId: TBD
name: serviceQueryStat
dataType: boolean
status: current
description: Specifies whether or
not permission is granted to query the service control
manager about the status of the service.

7.395. serviceEnumDependents

elementId: TBD
name: serviceEnumDependents
dataType: boolean
status: current
description: Specifies whether
or not permission is granted to query for an enumeration of
all the services dependent on the service.

7.396. serviceStart

```
elementId: TBD
name: serviceStart
dataType: boolean
status: current
description: Specifies whether or not
      permission is granted to start the service.
```

7.397. serviceStop

```
elementId: TBD
name: serviceStop
dataType: boolean
status: current
description: Specifies whether or not
      permission is granted to stop the service.
```

7.398. servicePause

```
elementId: TBD
name: servicePause
dataType: boolean
status: current
description: Specifies whether or not
      permission is granted to pause or continue the service.
```

7.399. serviceInterrogate

```
elementId: TBD
name: serviceInterrogate
dataType: boolean
status: current
description: Specifies whether or not permission is granted to
            request the service to report its status immediately.
```

7.400. serviceUserDefined

```
elementId: TBD
name: serviceUserDefined
dataType: boolean
status: current
description: Specifies whether or
      not permission is granted to specify a user-defined
      control code.
```

7.401. sharedresourceauditedpermissions

```
elementId: TBD
name: sharedresourceauditedpermissions
dataType: list
structure: list (netname, trusteeSid,
      standardDelete, standardReadControl, standardWriteDac,
      standardWriteOwner, standardSynchronize,
      accessSystemSecurity, genericRead, genericWrite,
      genericExecute, genericAll)
status: current
description: Stores
      the audited access rights of a shared resource that a system
      access control list (SACL) structure grants to a
      specified trustee. The trustee’s audited access rights are
      determined checking all access control entries (ACEs)
      in the SACL.
```

7.402. netname

```
elementId: TBD
name: netname
dataType: string
status: current
description: Specifies the name associated
      with a particular shared resource.
```

7.403. sharedresourceeffectiverights

```
elementId: TBD
name: sharedresourceeffectiverights
dataType: list
structure: list (netname, trusteeSid,
      standardDelete, standardReadControl, standardWriteDac,
      standardWriteOwner, standardSynchronize,
      accessSystemSecurity, genericRead, genericWrite,
      genericExecute, genericAll)
status: current
description: Stores
      the effective rights of a shared resource that a
      discretionary access control list (DACL) structure grants
      to a specified trustee. The trustee’s effective rights are
      determined checking all access-allowed and access-denied
      access control entries (ACEs) in the DACL.
```

7.404. user

```
elementId: TBD
name: user
dataType: list
structure: list (username, enabled, group, lastLogon)
status: current
description: Specifies the groups to which a user belongs.
```

7.405. enabled

```
elementId: TBD
name: enabled
dataType: boolean
status: current
description: Represents whether the
      particular user is enabled or not.
```

7.406. lastLogon

```
elementId: TBD
name: lastLogon
dataType: unsigned32
status: current
description: The date and time when the
      last logon occurred.
```

7.407. groupSid

```
elementId: TBD
name: groupSid
dataType: string
status: current
description: Represents the SID of a
      particular group. If the specified user belongs to more than
      one group, then multiple groupSid elements are
      applicable. If the specified user is not a member of a single
      group, then a single groupSid element should be
      incldued with a status of 'does not exist'. If there is an
      error determining the groups that the user belongs to,
      then a single groupSid element should be included with a
      status of 'error'.
```

8. Acknowledgements

Many of the specifications in this document have been developed in a public-private partnership with vendors and end-users. The hard work

of the SCAP community is appreciated in advancing these efforts to their current level of adoption.

Over the course of developing the initial draft, Brant Cheikes, Matt Hansbury, Daniel Haynes, Scott Pope, Charles Schmidt, and Steve Venema have contributed text to many sections of this document.

9. IANA Considerations

This document specifies an initial set of Information Elements for SACM in Section 7. An Internet Assigned Numbers Authority (IANA) registry will be created and populated with the Information Elements in Section 7. New assignments for SACM Information Elements will be administered by IANA through Expert Review [RFC2434]. The designated experts MUST check the requested Information Elements for completeness and accuracy of the submission with respect to the template and requirements expressed in Section 4 and Section 4.1. Requests for Information Elements that duplicate the functionality of existing Information Elements SHOULD be declined. The smallest available Information Element identifier SHOULD be assigned to a new Information Element. The definition of new Information Elements MUST be published using a well-established and persistent publication medium.

10. Security Considerations

Posture Assessments need to be performed in a safe and secure manner. In that regard, there are multiple aspects of security that apply to the communications between components as well as the capabilities themselves. This information model only contains an initial listing of items that need to be considered with respect to security and will need to be augmented as the model continues to be developed.

Security considerations include:

Authentication: Every SACM Component and asset needs to be able to identify itself and verify the identity of other SACM Components and assets.

Confidentiality: Communications between SACM Components need to be protected from eavesdropping or unauthorized collection. Some communications between SACM Components and assets may need to be protected as well.

Integrity: The information exchanged between SACM Components needs to be protected from modification. Some exchanges between assets and SACM Components will also have this requirement.

Restricted Access: Access to the information collected, evaluated, reported, and stored should only be viewable and consumable to authenticated and authorized entities.

Considerations with respect to the operational aspects of collection, evaluation, and storage security automation information can be found in Section 11.

Considerations concerning the privacy of security automation information can be found in Section 12.

11. Operational Considerations

The following sections outline a series of operational considerations for SACM deployments within an organization. This section may be expanded to include other considerations as the WG gains additional operational experience with SACM deployments and extending the information model.

11.1. Endpoint Designation

In order to successfully carry out endpoint posture assessment, it is necessary to be able to identify the endpoints on a network and track the changes to them over time. Specifically, enabling SACM Components to:

- Tell whether two endpoint attribute assertions concern the same endpoint
- Respond to compliance measurements, for example by reporting, remediating, and quarantining (SACM does not specify these responses, but SACM exists to enable them).

Ideally, every endpoint would be identified by a unique identifier present on the endpoint, but, this is complicated due to different factors such as the variety of endpoints on a network, the ability of tools to reliably access such an identifer, and the ability of tools to correlate disparate identifiers. As a result, it is necessary for an endpoint to be identified by a set of attributes that uniquely identify it on a network. The set of attributes that uniquely identify an endpoint on a network will likely vary by organization; however, there are a number of properties to consider when selecting identifying attributes as some are better suited for identification purposes than others.

Multiplicity: Is the attribute typically associated with a single endpoint or with multiple endpoints? If the attribute is

associated with a single endpoint, it is better for identifying an endpoint on a network.

Persistence: How likely is the attribute to change? Does it never change? Does it only change when the endpoint is reprovisioned? Does it only change due to an event? Does it change on an ad-hoc and often unpredictable basis? Does it constantly change? The less likely it is for an attribute to change over time, the better it is for identifying an endpoint on a network.

Immutability: How difficult is it to change the attribute? Is the attribute hardware rooted and never changes? Can the attribute be changed by a user/process with the appropriate access? Can the attribute be changed without controlled access. The less likely an attribute is to change over time, the better chance it will be usable to identify an endpoint over time.

Verifiable: Can the attribute be corroborated? Can the attribute be externally verified with source authentication? Can the attribute be externally verified without source authentication? Is it impossible to externally verify the attribute. Attributes that can be externally verified are more likely to be accurate and are better for identifying endpoints on a network.

With that said, requiring SACM Components and end users to constantly refer to a set of attributes to identify an endpoint, is particularly burdensome. As a result, SACM supports the concept of a target endpoint label which associates an identifier (unique to a SACM domain) with the set of attributes used by an organization to identify endpoints on a network. Once defined for an endpoint, the target endpoint label can be used in place of the set of identifying attributes.

11.2. Timestamp Accuracy

An organization will likely have different collectors deployed across the network that will be configured to collect posture attributes on varying frequencies (periodic, ad-hoc, event-driven, on endpoint, off endpoint, etc.). Some collectors will detect changes as soon as they occur whereas others will detect them at a later point during a periodic scan or when an event has triggered the collection of posture attributes. Furthermore, some changes will be detected on the endpoint and others will be observed off of the endpoint. As a result of these differences, the accuracy of the timestamp associated with the collected information will vary. For example, if a

collector is only running once every 12 hours, the change probably happened at some point in time prior to the scan and the timestamp is likely not accurate. Due to this, it is important for system administrators to determine if the accuracy of a timestamp is good enough for their intended purposes.

12. Privacy Considerations

In the IETF, there are privacy concerns with respect to endpoint identity and monitoring. This is especially true when the activity on an endpoint can be linked to a particular person. For example, by correlating endpoint attributes such as usernames, certificates, etc. with browser activity, it may be possible to gain insight in to user behavior and trends beyond what is required to carry out endpoint posture assessments. In the hands of the wrong person, this information could be used to negatively influence a user's behavior or to plan attacks against the organization's infrastructure.

As a result, SACM data models should incorporate a mechanism by which an organization can designate which endpoint attributes are considered sensitive with respect to privacy. This will allow SACM Components to handle endpoint attributes in a manner consistent with the organization's privacy policies. Furthermore, organization's should put the proper mechanism in place to ensure endpoint attributes are protected when transmitted, stored, and accessed to ensure only authorized parties are granted access.

It should also be noted that some of this is often mitigated by organizational policies that require a user of an organization's network to consent to some level of monitoring in return for access to the network and other resources. The information that is monitored and collected will vary by organization and further highlights the need for a mechanism by which an organization can specify what constitutes privacy sensitive information for them.

13. References

13.1. Normative References

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Appendix A. Change Log

A.1. Changes in Revision 01

Added some proposed normative text.

For provenance:

- Added a class "Method"
- Added the produced-using relationship between an AVP and a method
- Added the produced-by relationship between a Guidance and a SACM Component
- Added the hosted-by relationship between a SACM Component and an Endpoint

asserted-by and summarized-by have been renamed to produced-by.

"User" is now "Account". If a user has different credentials, SACM cannot know that they belong to the same user. But, per Kim W, many organizations do have accounts that associate credentials.

The multiplicity of the based-on relationships has been corrected.

More relationships now have labels, per UML convention.

The diagram no longer has causal arrow. They had become redundant and were nonstandard and clutter.

Renamed "credential" to "identity", following industry usage. A credential includes proof, such as a key or password. A username or a distinguished name is called an "identity".

Removed Session, because an endpoint’s network activity is not SACM’s initial focus

Removed Authorization, for the same reason

Added many-to-many relationship between Hardware Component and Endpoint, for clarity

Added many-to-many relationship between Software Component and Endpoint, for clarity

Added "contains" relationship between Network Interface and Network Interface

Removed relationship between Network Interface and Account. The endpoint knows the identity it used to gain network access. The PDP also knows that. But they probably do not know the account.

Added relationship between Network Interface and Identity. The endpoint and the PDP will typically know the identity.

Made identity-to-account a many-to-one relationship.

A.2. Changes in Revision 02

Added Section Identifying Attributes.

Split the figure into Figure Model of Endpoint and Figure Information Elements.

Added Figure Information Elements Take 2, proposing a triple-store model.

Some editorial cleanup

A.3. Changes in Revision 03

Moved Appendix A.1, Appendix A.2, and Mapping to SACM Use Cases into the Appendix. Added a reference to it in Section 1

Added the Section 4 section. Provided notes for the type of information we need to add in this section.

Added the Section 6 section. Moved sections on Endpoint, Hardware Component, Software Component, Hardware Instance, and Software Instance there. Provided notes for the type of information we need to add in this section.

Removed the Provenance of Information Section. SACM is not going to solve provenance rather give organizations enough information to figure it out.

Updated references to the Endpoint Security Posture Assessment: Enterprise Use Cases document to reflect that it was published as an RFC.

Fixed the formatting of a few figures.

Included references to [RFC3580] where RADIUS is mentioned.

A.4. Changes in Revision 04

Integrated the IPFIX [RFC7012] syntax into Section 4.

Converted many of the existing SACM Information Elements to the IPFIX syntax.

Included existing IPFIX Information Elements and datatypes that could likely be reused for SACM in Section 7 and Section 4 respectively.

Removed the sections related to reports as described in https://github.com/sacmwg/draft-ietf-sacm-information-model/issues/30.

Cleaned up other text throughout the document.

A.5. Changes in Revision 05

Merged proposed changes from the I-D IM into the WG IM (https://github.com/sacmwg/draft-ietf-sacm-information-model/issues/41).

Fixed some formatting warnings.

Removed a duplicate IE and added a few IE datatypes that were missing.

A.6. Changes in Revision 06

Clarified that the SACM statement and content-element subjects are conceptual and that they do not need to be explicitly defined in a data model as long as the necessary information is provided.

Updated the IPFIX syntax used to define Information Elements. There are still a couple of open issues that need to be resolved.

Updated some of the Information Elements contained in Section 7 to use the revised IPFIX syntax. The rest of the Information Elements will be converted in a later revision.

Performed various clean-up and refactoring in Sections 6 and 7. Still need to go through Section 8.

Removed appendices that were not referenced in the body of the draft. The text from them is still available in previous revisions of this document if needed.

A.7. Changes in Revision 07

Made various changes to the IPFIX syntax based on discussions at the IETF 96 Meeting. Changes included the addition of a structure property to the IE specification template, the creation of an enumeration datatype, and the specification of an IE naming convention.

Provided text to define Collection Guidance, Evaluation Guidance, Classification Guidance, Storage Guidance, and Evaluation Results.

Included additional IEs related to software, configuration, and the vulnerability assessment scenario.

Added text for the IANA considerations, security considerations, operational considerations, and privacy considerations sections.

Performed various other editorial changes and clean-up.

A.8. Changes in Revision 08

Clarified text that describes subjects and attributes.

Clarified text that describes SACM Statements and Content Elements.

Removed stray metadata property fields from the definitions of several IEs.

Specified a syntax for defining category IEs.

Added an anyCategory IE that represents any IE in the IM.

Fixed several errors reported by the Travis-CI continuous integration service.

Performed various other editorial changes and clean-up.

A.9. Changes in Revision 09

Added "derived", "authority", and "verified" to the collectionTaskType IE (https://github.com/sacmwg/draft-ietf-sacm-information-model/issues/18).

Updated IE examples that use content-type to use statement-type (https://github.com/sacmwg/draft-ietf-sacm-information-model/issues/56).

Added "networkZoneLocation", "layer2NetworkLocation", and "layer3NetworkLocation" IEs (https://github.com/sacmwg/draft-ietf-sacm-information-model/issues/9).

Created a softwareClass attribute IE and added it to the softwareInstance subject IE. Also, removed the os* attribute IEs (https://github.com/sacmwg/draft-ietf-sacm-information-model/issues/10).

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