[MS-UPSCDS]:

User Profile Synchronization (UPS): Configuration Data Structure

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Revision Summary

Date	Revision History	Revision Class	Comments
8/14/2009	0.1	Major	First Release.
9/25/2009	0.2	Minor	Updated the technical content.
11/6/2009	0.2.1	Editorial	Revised and edited the technical content.
12/18/2009	1.0	Major	Updated and revised the technical content.
1/29/2010	1.0.1	Editorial	Revised and edited the technical content.
3/12/2010	1.0.2	Editorial	Revised and edited the technical content.
4/23/2010	1.0.3	Editorial	Revised and edited the technical content.
6/4/2010	1.0.4	Editorial	Revised and edited the technical content.
7/16/2010	1.0.4	No change	No changes to the meaning, language, or formatting of the technical content.
8/27/2010	2.0	Major	Significantly changed the technical content.
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7/30/2013	4.1	Minor	Clarified the meaning of the technical content.
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4/30/2014	4.4	Minor	Clarified the meaning of the technical content.
7/31/2014	4.5	Minor	Clarified the meaning of the technical content.
8/24/2015	5.0	Major	Significantly changed the technical content.

Table of Contents

1 Introduction

The User Profile Synchronization (UPS): Configuration Data Structure specifies the data structures used to configure the User Profile Synchronization service.

Sections 1.7 and 2 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in [RFC2119]. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are specific to this document:

Active Directory Domain Services (AD DS): A directory service (DS) implemented by a domain controller (DC). The DS provides a data store for objects that is distributed across multiple DCs. The DCs interoperate as peers to ensure that a local change to an object replicates correctly across DCs. For more information, see [MS-AUTHSOD] section 1.1.1.5.2 and [MS-ADTS]. For information about product versions, see [MS-ADTS] section 1. See also Active Directory.

Active Directory Lightweight Directory Services (AD LDS): A directory service (DS) implemented by a domain controller (DC). The most significant difference between **AD LDS** and **Active Directory Domain Services (AD DS)** is that **AD LDS** does not host **domain naming contexts (domain NCs)**. A server can host multiple **AD LDS** DCs. Each DC is an independent **AD LDS** instance, with its own independent state. **AD LDS** can be run as an operating system DS or as a directory service provided by a standalone application (Active Directory Application Mode (ADAM)). For more information, see [MS-ADTS]. See also Active Directory.

anchor: A set of qualifiers and quantifiers that specifies the location of an element or object within a document. These values are typically relative to another element or known location in the document, such as the edge of a page or margin.

attribute: A characteristic of some object or entity, typically encoded as a name-value pair.

code page: An ordered set of characters of a specific script in which a numerical index (code-point value) is associated with each character. Code pages are a means of providing support for character sets (1) and keyboard layouts used in different countries. Devices such as the display and keyboard can be configured to use a specific code page and to switch from one code page (such as the United States) to another (such as Portugal) at the user's request.

connector space: A staging area that contains representations of the objects from a connected data source.

Coordinated Universal Time (UTC): A high-precision atomic time standard that approximately tracks Universal Time (UT). It is the basis for legal, civil time all over the Earth. Time zones around the world are expressed as positive and negative offsets from UTC. In this role, it is also referred to as Zulu time (Z) and Greenwich Mean Time (GMT). In these specifications, all references to UTC refer to the time at UTC-0 (or GMT).

delta import: A step in the staging process that reads in only the changes that have occurred in a connected data source since the last import.

delta synchronization: A staging step that processes only those objects that have pending imports.

disconnector object: A **staging object** that is not linked to an object in the **metaverse**.

distinguished name (DN): A name that uniquely identifies an object by using the relative distinguished name (RDN) for the object, and the names of container objects and domains that contain the object. The distinguished name (DN) identifies the object and its location in a tree.

domain: A set of users and computers sharing a common namespace and management infrastructure. At least one computer member of the set must act as a domain controller (DC) and host a member list that identifies all members of the domain, as well as optionally hosting the Active Directory service. The domain controller provides authentication (2) of members, creating a unit of trust for its members. Each domain has an identifier that is shared among its members. For more information, see [MS-AUTHSOD] section 1.1.1.5 and [MS-ADTS].

domain naming context (domain NC): A partition of the directory that contains information about the domain and is replicated with other domain controllers (DCs) in the same domain.

explicit connector object: A staging object that will not transition from a connector object to a disconnector object even if a change to that object makes it satisfy the conditions of the connector filter.

explicit disconnector object: A staging object that will not transition from a disconnector object to a connector object even if a change to that object makes it satisfy the conditions of the connector filter.

export attribute flow: The process of updating the **metaverse** attribute values of the current metaverse object during an export operation.

flow: The direction in which text in a cell is rendered.

globally unique identifier (GUID): A term used interchangeably with **universally unique identifier (UUID)** in Microsoft protocol technical documents (TDs). Interchanging the usage of these terms does not imply or require a specific algorithm or mechanism to generate the value. Specifically, the use of this term does not imply or require that the algorithms described in [RFC4122] or [C706] must be used for generating the **GUID**. See also **universally unique identifier (UUID)**.

import attribute flow: The process of updating the **metaverse** attribute values of the current metaverse object during an import operation.

management agent: A component that consists of properties, rules, and rules extensions that determine how an object is processed in the metadirectory. A single management agent can have one or more run profiles that determine the management agent's behavior, such as how or when the management agent runs.

metaverse: A storage area that contains the aggregated information from multiple connected data sources, providing a single global, integrated view of all combined objects.

placeholder: A character or symbol that is used in place of an actual value, text, or object. The actual value that the placeholder represents is unknown or unavailable at the current time, or is not displayed for security reasons.

provisioned: A condition of an object that was created and deployed successfully.

rule: A condition or action, or a set of conditions or actions, that performs tasks automatically based on events and values.

rules extension: A .NET assembly that is located on the server in the synchronization engine's "extensions" folder and implements the IMASynchronization interface.

Security Account Manager (SAM): A centrally managed service, such as Active Directory Domain Services (AD DS), that enables a server to establish a trust relationship with other authorized servers. The SAM also maintains information about domains and security principals (2), and provides client-to-server information by using several available standards for access control lists (ACLs).

staging object: A block of data that represents an instance of an object type as defined in the connected data source.

synchronization engine: A code module that creates an integrated view of objects that are stored in multiple, connected data sources, and manages information in those data sources.

Unicode: A character encoding standard developed by the Unicode Consortium that represents almost all of the written languages of the world. The **Unicode** standard [UNICODE5.0.0/2007] provides three forms (UTF-8, UTF-16, and UTF-32) and seven schemes (UTF-8, UTF-16, UTF-16 BE, UTF-16 LE, UTF-32, UTF-32 LE, and UTF-32 BE).

Uniform Resource Identifier (URI): A string that identifies a resource. The URI is an addressing mechanism defined in Internet Engineering Task Force (IETF) Uniform Resource Identifier (URI): Generic Syntax [RFC3986].

universally unique identifier (UUID): A 128-bit value. UUIDs can be used for multiple purposes, from tagging objects with an extremely short lifetime, to reliably identifying very persistent objects in cross-process communication such as client and server interfaces, manager entry-point vectors, and RPC objects. UUIDs are highly likely to be unique. UUIDs are also known as **globally unique identifiers (GUIDs)** and these terms are used interchangeably in the Microsoft protocol technical documents (TDs). Interchanging the usage of these terms does not imply or require a specific algorithm or mechanism to generate the UUID. Specifically, the use of this term does not imply or require that the algorithms described in [RFC4122] or [C706] must be used for generating the UUID.

XML element: An XML structure that typically consists of a start tag, an end tag, and the information between those tags. Elements can have **attributes** and can contain other elements.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as defined in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.

[DSML] Tauber, J., Hay, T., Beauvais, T., et al., "Directory Services Markup Language (DSML)", December 1999, http://www.dsmltools.org/dsml.org/dsml.html

[MS-ADA3] Microsoft Corporation, "Active Directory Schema Attributes N-Z".

[MS-UPSCP] Microsoft Corporation, "User Profile Synchronization (UPS): Configuration Protocol Extensions".

[MSDN-SQLCollation] Microsoft Corporation, "Selecting a SQL Server Collation", http://msdn.microsoft.com/en-us/library/ms144250.aspx

[RFC1964] Linn, J., "The Kerberos Version 5 GSS-API Mechanism", RFC 1964, June 1996, http://www.rfc-editor.org/rfc/rfc1964.txt

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

[RFC2251] Wahl, M., Howes, T., and Kille, S., "Lightweight Directory Access Protocol (v3)", RFC 2251, December 1997, http://www.ietf.org/rfc/rfc2251.txt

[RFC4122] Leach, P., Mealling, M., and Salz, R., "A Universally Unique Identifier (UUID) URN Namespace", RFC 4122, July 2005, http://www.ietf.org/rfc/rfc4122.txt

[XPATH] Clark, J., and DeRose, S., "XML Path Language (XPath), Version 1.0", W3C Recommendation, November 1999, http://www.w3.org/TR/xpath/

1.2.2 Informative References

[MS-WSTIM] Microsoft Corporation, "WS-Transfer: Identity Management Operations for Directory Access Extensions".

1.3 Overview

The **synchronization engine** creates an integrated view of objects that are stored in multiple, connected data sources, and manages information in those data sources. This integrated view is determined by the information retrieved from connected data sources and a set of **rules** that determine how to process the information.

The synchronization engine processes information from different connected data sources. The synchronization engine encapsulates interaction with a connected data source through an abstraction of a component termed a **management agent**. Each management agent translates an operation requested by the synchronization engine into the format that the connected data source understands.

Each management agent exchanges information with a connected data source. A management agent can be configured to allow data to flow from the connected data source to the synchronization engine, from the synchronization engine to the connected data source, or in both directions, although only imports or exports can occur at any one time for a given management agent.

The synchronization engine database contains two tables that store the information. The tables contain 1) the **connector spaces** and 2) the **metaverse**, both of which are defined later. The synchronization engine maintains a distinct connector space as a staging area for each management agent; that is, each row in the connector-space table indicates which management agent's configuration defines the synchronization engine's behavior for importing, synchronizing, and exporting that connector space object. Although, physically, all the connector space objects are stored in the same table, logically, this table is partitioned and referred to as if they were distinct and separate connector spaces. Where this document describes a characteristic of a connector space, it refers to the logical partition, and not the table that stores the physical union of all logical connector spaces.

Each connector space is a staging area that contains representations of the objects from a connected data source. The synchronization engine uses the connector space to determine what has changed in the connected data source and to stage incoming changes. The synchronization engine also uses the connector space to stage outgoing changes for export to the connected data source.

The metaverse is a storage area that contains the aggregated information from multiple connected data sources, providing a single global, integrated view of all combined objects. Metaverse objects are created based on the information that is retrieved from the connected data sources and a set of rules.

When the synchronization engine communicates with a connected data source, it reads the information in the connected data source and uses that information to create a representation of the object in the connector space. Each object in a connector space has at least two connector space **attributes**:

- A **GUID**
- A **distinguished name (DN)**

Objects in the connector space can also have an **anchor** attribute if the connected data source assigns a unique attribute to the object. The anchor attribute uniquely identifies an object in the connected data source. The synchronization engine uses the anchor to locate the corresponding representation of this object in the connected data source. The synchronization engine assumes that the anchor of an object never changes over the lifetime of the object.

One or more of the management agents can be configured to use a unique identifier to generate an anchor automatically for each object when it is imported. For connected data sources that do not provide a unique identifier, an anchor generation rule can be specified as part of the management agent configuration.

Connector space objects fit into one of the following categories:

- A **staging object**
- A **placeholder** object

A staging object represents an instance of an object type as defined in the connected data source. In addition to the GUID and the DN, a staging object always has an attribute with a value that indicates the object type. Staging objects that have been imported always have a value for the anchor attribute. Staging objects that have been newly **provisioned** by the synchronization engine and are in the process of being created in the connected data source do not have a value for the anchor attribute.

Staging objects carry current values of attributes and operational information needed by the synchronization engine. Operational information flags indicate the types of updates that are staged on the staging object. If a staging object is updated with new information from the connected data source that has not yet been processed by the synchronization engine, the object is marked as pending import. If a staging object has any new information that has not yet been exported to the connected data source, the staging object is marked as pending export.

A staging object can be pending import, pending export, or both. The synchronization engine creates a pending import by using object information received from the connected data source. When the synchronization engine receives information about the existence of a new object that matches one of the object types selected in the management agent, the synchronization engine creates a pending import in the connector space as a representation of the object in the connected data source.

The synchronization engine creates a pending export by using object information in the metaverse. Pending exports are exported by the management agent to the connected data source during the next communication session. Pending exports do not yet exist in the connected data source. Therefore, the anchor attribute for a pending export is not available in connector space. After the connected data source receives the object from the synchronization engine, the connected data source creates a unique value for the anchor attribute of the object.

The synchronization engine confirms the export of the pending export by importing the object from the connected data source. Pending exports become pending imports as soon as the synchronization engine receives them during the next import from that connected data source.

To preserve the naming hierarchy of the connected data source, the synchronization engine creates placeholder objects in the connector space that are parents of other objects. Each parent placeholder object represents an object in the connected data source that has not been imported into the synchronization engine, but whose name is a component of a child connected-data-source object's hierarchical name that is being imported into the synchronization engine. The parent object's name is the first part of the child object's hierarchical name. Placeholder objects fill gaps created by references in the connected data source to objects that are not staging objects in the connector space. Placeholder objects are stored in the connector space but are never further processed by the

synchronization engine. The synchronization engine also uses placeholder objects to store referenced objects that have not been imported.

A metaverse object contains the aggregated view that the synchronization engine has of all the staging objects in all the connector spaces. The synchronization engine creates metaverse objects by using the information in staging objects. Multiple staging objects can be linked to a single metaverse object, but a particular staging object cannot be linked to more than one metaverse object.

To map objects within a connected data source to a corresponding object type within the metaverse, the synchronization engine provides an extensible schema with a predefined set of object types and associated attributes. Attributes can be single-valued properties or multi-valued properties, and the attribute-value syntaxes can be indexable-string, text, reference, indexable-binary, image, numeric, or Boolean values. The term "indexable" in this context means that the synchronization engine provides an index for attribute values when the syntax is an indexable type. The reason for indexing is to improve performance during operations that require finding metaverse objects that match specific values, either during a join search or from **rules extension** code.

A staging object that is linked to a metaverse object is called a connector object. A staging object that is not linked to a metaverse object is called a **disconnector object**. Placeholder objects are never linked to a metaverse object.

When a staging object becomes a connector object during synchronization, attributes and their values can **flow** between the staging object and the metaverse object. Attribute flow can be configured in either direction, or in both directions, and is configured by using **import attribute flow** rules and **export attribute flow** rules.

A single staging object can be linked to only one metaverse object. However, each metaverse object can be linked to multiple staging objects in the same or in different connector spaces. The linked relationship between the staging object and a metaverse object is persistent and can be removed only by management agent rules.

A disconnector object is a staging object that is not linked to any metaverse object. The connector space attribute values of a disconnector object are not processed any further within the metaverse. This means that the attribute values of the corresponding object in the connected data source are not updated by the synchronization engine.

An object with pending imports is initially created as a disconnector object. The synchronization engine's connector filter prevents an object from changing from a disconnector object to a connector object. The connector filter can also cause a connector object to change to a disconnector object if the object meets the conditions specified in the rule.

However, an object can be marked as an **explicit connector object**. When an object is an explicit connector object, the object will not transition from a connector object to a disconnector object even if a change to that object makes it satisfy the conditions of the connector filter. Connector objects are also known as normal connector objects to distinguish them from explicit connector objects.

To prevent the changing of an object from a disconnector object to a connector object, an object can be marked as an **explicit disconnector object**. Disconnector objects are also known as normal disconnector objects to distinguish them from explicit disconnector objects. When an object is an explicit disconnector object, the synchronization engine continues to store information about the staging object, but it does not process the object until the object is converted to a normal disconnector object.

Synchronization occurs in three processes, applied to a single management agent at a specific time:

- Staging process
- Synchronization process
- Export process

During the staging process, the synchronization engine evaluates updates to information. The synchronization engine compares the information received from the connected data source with the information about a staging object and determines whether the staging object requires updates. If it is necessary to update the staging object with new data, the staging object is marked as pending import. The staging process is triggered by a run profile with an import step. The import step can be either **delta import**, which imports only the changes that have occurred in a connected data source since the last import, or full import, which imports the current state of all objects from a connected data source.

For each object that is imported by the management agent, the synchronization engine first tries to locate a representation of the object in the connector space of the management agent by finding a staging object that has anchor attributes with values equal to the same attribute values being read from the connected data source. If no existing staging object has matching anchor attribute values, the synchronization engine tries to find a corresponding staging object with the same DN. When the synchronization engine finds a staging object that matches by DN but not by anchor, the following behavior occurs:

- If the object located in the connector space has no anchor, then the synchronization engine removes this object from the connector space and marks the metaverse object it is linked to as metaverse retry.
- If the object located in the connector space has an anchor, then the synchronization engine assumes that this object has either been renamed or deleted in the connected data source. It assigns a temporary, new DN for the connector space object so that it can stage the incoming object. The old object then moves to a transient state, waiting for the management agent to import the renamed or deleted object to resolve the situation.

Once the synchronization engine locates a staging object that corresponds to the object imported by the management agent, the synchronization engine determines what changes to apply. A staging object in the connector space has one of the following types of pending import:

- **None:** No changes to any of the connector space attributes of the staging object are available.
- **Add:** The staging object is a new import object in the connector space. The synchronization engine marks this as pending import for additional processing in the metaverse.
- **Update:** The synchronization engine finds a corresponding staging object in the connector space and marks this as pending import so that updates to the attributes can be processed in the metaverse. Any renamed objects imported by the management agent are processed as updates.
- **Delete:** The synchronization engine finds a corresponding staging object in the connector space and marks this as pending import so that the connector object can be deleted.
- **Delete-add:** The synchronization engine finds a corresponding staging object in the connector space, but the object types do not match. In this case, a delete-add modification is staged. A delete-add modification indicates to the synchronization engine that a complete resynchronization of this object will likely cause different sets of rules to apply to this object, and the resulting object will require a full resynchronization of the object.

After all objects imported by the management agent have been processed, the synchronization engine deletes the objects in the connector space that were not imported. This procedure of deleting objects is known as obsoletion. During obsoletion, any object that is not updated with a pending import type in the preceding list is marked with a pending import type of delete. Obsoletion happens only at the end of a full import if there were no errors during the import process.

The synchronization process is triggered by a run profile with a synchronization step. The synchronization step can be either **delta synchronization**, which process only those objects that have pending imports, or a full synchronization, which process all objects within the connector space associated with the management agent that executed the run profile.

The synchronization process consists of two additional processes:

- Inbound synchronization process: The content of the metaverse is updated by using the data in the connector space.
- Outbound synchronization process: The content of the connector space is updated by using data in the metaverse.

The inbound synchronization process creates the integrated view in the metaverse from the data that is received from the connected data sources. The inbound synchronization process includes the following actions:

- Projection
- Join
- Import attribute flow

Projection is the only action that creates objects in the metaverse. Projection uses normal disconnector objects as its source. For projection, the synchronization engine creates a metaverse object and establishes a link between the two objects.

The join action also establishes a link between staging objects and a metaverse object. A difference between join and projection is that join requires that the staging object be linked to an existing metaverse object. In a join action, the synchronization engine tries to link a staging object to a metaverse object by using criteria that is specified in the management agent configuration.

During a projection action, as well as during a join action, the synchronization engine links a disconnector object to a metaverse object, changing the disconnector object to a connector object. After these actions are completed, the synchronization engine updates the metaverse attribute values of the linked metaverse object. This action is called import attribute flow. Import attribute flow occurs on all staging objects that are linked to a metaverse object.

Outbound synchronization updates staging objects when a metaverse object changes but is not deleted. The objective of outbound synchronization is to evaluate whether changes to metaverse objects require updates to staging objects in the connector spaces. Staging objects that are changed are marked as pending export. These objects are subsequently exported out to the connected data source.

The Outbound synchronization process includes the following actions:

- Provisioning
- Deprovisioning
- Export attribute flow

Provisioning is triggered when changes are applied to objects in the metaverse. When changes are made to metaverse objects, the synchronization engine can perform any of the following tasks as part of the provisioning action:

- Create connector objects, and then link them to the metaverse object.
- Rename connector objects; that is, change their DNs.
- Remove links between a metaverse object and staging objects, thereby creating disconnector objects.

When the synchronization engine creates a new staging object, the staging object to which the metaverse object is linked is always marked as pending export, because the object will not yet exist in the connected data source.

When the synchronization engine removes the link to a connector object, thereby creating a disconnector object, deprovisioning is triggered. The deprovisioning action determines how the synchronization engine processes the disconnector object. The synchronization engine can keep the staging object as a normal or explicit disconnector object in the connector space, or it can stage a delete for export.

Export attribute flow also occurs during the outbound synchronization process, with the same source-to-destination attribute mapping with which import attribute flow occurs during inbound synchronization. Export attribute flow occurs only between metaverse objects and linked staging objects.

During the export process, the synchronization engine examines all pending exports in the connector space, and then exports the updates to the connected data source.

The synchronization engine stores export and import status information about each staging object in the connector space. If values of the connector space attributes have changed since the most recent export, the stored import and export status information is used by the synchronization engine. The synchronization engine compares the imported and exported information to determine whether the export was successful, or if the export was not successful and needs to be repeated.

1.4 Relationship to Protocols and Other Structures

The data structures described in this document are used in the User Profile Synchronization (UPS): Configuration Protocol Extensions [MS-UPSCP]. A client can request that certain operations be performed by a server on identity objects that contain identity attributes that correspond to these data structures. These operations, which are listed as follows, are defined in [MS-UPSCP].

- The Create operation is performed when the client requests adding an object.
- The Delete operation is performed when the client requests deleting an entire object.
- The Get operation is performed when the client requests reading an object.
- The Put operation is performed when the caller requests an update of an object.

As described in [MS-WSTIM] section 3.2.4.2.2.2, within a **Put** operation, a client can request one or more changes to one or more of the identity attributes of an object. These changes have the following effects on the child **XML elements** of the top level XML element of the object:

- **Replace:** If the identity object is of object type ma-data, mv-data, person, set, or managementPolicyRule, this change will set the value of a single-valued identity attribute to the value specified in the change.
- **Add:** if an identity attribute is defined as multi-valued, and a child XML element did not exist in the target object prior to the operation, this change will insert the specified value.
- **Delete:** if an identity attribute is defined as multi-valued, a value of the identity attribute is specified for deletion from the identity object.

As specified in [MS-UPSCP], if, in a Create or Put operation request body, the client does not supply one or more elements of an identity object specified in section 2, the server will respond with a fault as defined in [MS-UPSCP].

1.5 Applicability Statement

The data structures in this document describe the payload provided by a client and a server when performing operations defined in the User Profile Synchronization (UPS): Configuration Protocol Extensions [MS-UPSCP].

1.6 Versioning and Localization

None.

1.7 Vendor-Extensible Fields

None.

2 Structures

This section defines the data structures for management agent, metaverse, person, set, and managementPolicyRule configuration data.

The terms "structure", "empty", and "server" are defined as follows:

- The term "structure" refers to an XML element.
- The term "empty", when describing an XML element, indicates that either the empty-element is used as in the example "<rm:SyncConfig-schema/>, or an XML element is used in which a start-tag MUST be present and immediately followed by an end-tag, as in the example "<rm:SyncConfig-schema></rm:SyncConfig-schema>".
- The term "server" refers to the recipient of the messages for the protocol defined in [MS-UPSCP].

The management agent, metaverse, person, set, and managementPolicyRule configuration data are modeled as identity objects. Each object contains one or more identity attributes. Each identity attribute is an XML element containing one or more values.

The following constraints are placed on XML elements and XML attributes defined in this document:

- The namespace used for all XML elements defined as identity attributes is as specified in [MS-UPSCP]. All other XML elements defined in this document that are not defined as identity attributes, and all XML attributes defined in this document, are not in any namespace.
- Unless otherwise stated in a section defining an XML element as an identity attribute, the XML element being described MUST be supplied by the client for Create.
- Unless otherwise stated in a section defining an XML element as an identity attribute, if a client intends to change the XML element's value, the XML element MUST be supplied in a Put operation.
- Unless otherwise stated, if, in an identity attribute, the client supplies a value for an XML element or XML attribute that violates the constraints specified in this document, the client will receive a response indicating a fault, as specified in [MS-UPSCP] section 2.2.2.
- Unless otherwise stated, the value of any XML element or XML attribute whose syntax is defined in this document as containing a date and a time is transferred as a string containing a date and time formatted according to the pattern "YYYY-MM-DD HH:MM:SS.TTT", in which a space separates the date from the time, and the specification of time requires three decimal places of thousandths of a second.
- Unless otherwise stated, where a "0" or a "1" is used for a value of an option represented by an XML element or an XML attribute, "0" means the option is disabled, and "1" means the option is enabled.
- Unless otherwise stated, globally unique identifier (GUID) values of XML elements and XML attributes are represented using the characters "0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "A","B", "C", "D", "E", "F", "-", "{", and "}", as in the following example: "{000A7AC0-4916-4D97-AE5F-F8B2FE50D54D}".
- Unless otherwise stated, **universally unique identifier (UUID)** attributes are represented as specified in [RFC4122].
- Unless otherwise stated, the value of any XML element, XML attribute, or identity attribute that represents the name of any identity object, object type, or naming attribute is represented as a name string of at least 1 character in length.

A name string MUST NOT contain characters from **code pages** other than ASCII, MUST NOT contain unprintable ASCII characters, and MUST NOT contain any of the following characters:

```
~
`
!
@
#
$
%
^
&
*
(
)
+
=
{
}
[
]
|
\
:
;
"
'
<
>
?
/
```

A name string MUST NOT be any of the following:

```
"."
".."
"CON"
"PRN"
"AUX"
"CLOCK$"
"NUL"
"COM1"
"COM2"
"COM3"
"COM4"
"COM5"
"COM6"
"COM7"
"COM8"
"COM9"
"LPT1"
"LPT2"
"LPT3"
"LPT4"
"LPT5"
"LPT6"
"LPT7"
"LPT8"
"LPT9"
```

The sections that follow describe the structure of the contents of messages sent as specified in [MS-UPSCP] for the purpose of configuring user profile synchronization.

The following identity object types and the identity attributes permitted to be present in objects of the listed type are defined each in its own heading under section 2:

- ma-data in section 2.2

- mv-data in section 2.3
- person in section 2.4
- set in section 2.5
- managementPolicyRule in section 2.6

Section 2.1 defines the identity attributes that are permitted to be in objects of any of the five object types in the preceding list.

Each of the sections immediately following section 2.1, section 2.2, section 2.3, section 2.4, section 2.5, and section 2.6 of this specification defines an identity attribute for data that is transferred between a client and a server in the protocol defined in [MS-UPSCP].

Unless otherwise stated, the values of XML elements, XML attributes, and identity attributes MUST have one of the following data types:

- Indexable Binary: a byte array with a maximum length of 896 bytes, defined as indexable by a server
- Indexable String: a **Unicode** string in UTF-16 form with no Byte Order Mark with a maximum length of 448 characters, defined as indexable by a server, referred to as string or "short" string
- Text: a Unicode string of arbitrary length, defined as not indexable by a server
- Boolean: a string with either the literal string value "true" or the literal string value "false"
- Integer: a signed long integer
- Image: a byte array of arbitrary length
- Reference: a UUID as specified in [RFC4122]
- DateTime: a string containing a date and time formatted according to the pattern "YYYY-MM-DD HH:MM:SS.TTT", in which a space separates the date from the time, and the specification of time requires three decimal places of thousandths of a second

The following table indicates, for each identity attribute of each object type, the data type of an identity attribute value, whether the identity attribute is defined as a multi-valued property, and whether the identity attribute is required to be present in identity objects of that object type.

Object Type Name	Identity Attribute Name	Data Type	Multi-valued	Required
ma-data	CreatedTime	DateTime	FALSE	TRUE
ma-data	Creator	Reference	FALSE	FALSE
ma-data	DisplayName	Indexable string	FALSE	FALSE
ma-data	ObjectID	Reference	FALSE	FALSE
ma-data	ObjectType	Indexable string	FALSE	TRUE
ma-data	SyncConfig-attribute-inclusion	Text	FALSE	FALSE
ma-data	SyncConfig-capabilities-mask	Integer	FALSE	FALSE
ma-data	SyncConfig-category	Indexable	FALSE	FALSE

Object Type Name	Identity Attribute Name	Data Type	Multi-valued	Required
		string		
ma-data	SyncConfig-component-mappings	_	_	_
ma-data	SyncConfig-controller-configuration	Text	FALSE	FALSE
ma-data	SyncConfig-creation-time	Indexable string	FALSE	FALSE
ma-data	SyncConfig-dn-construction	Indexable string	FALSE	FALSE
ma-data	SyncConfig-encrypted-attributes	Text	FALSE	FALSE
ma-data	SyncConfig-export-attribute-flow	Text	FALSE	FALSE
ma-data	SyncConfig-export-type	Integer	FALSE	FALSE
ma-data	SyncConfig-extension	Text	FALSE	FALSE
ma-data	SyncConfig-format-version	Integer	FALSE	FALSE
ma-data	SyncConfig-id	Indexable string	FALSE	TRUE
ma-data	SyncConfig-internal-version	Integer	FALSE	FALSE
ma-data	SyncConfig-join	Text	FALSE	FALSE
ma-data	SyncConfig-last-modification-time	Indexable string	FALSE	FALSE
ma-data	SyncConfig-ma-companyname	Indexable string	FALSE	FALSE
ma-data	SyncConfig-ma-listname	Indexable string	FALSE	FALSE
ma-data	SyncConfig-ma-partition-data	Text	TRUE	FALSE
ma-data	SyncConfig-ma-run-data	Text	TRUE	FALSE
ma-data	SyncConfig-ma-ui-settings	Text	FALSE	FALSE
ma-data	SyncConfig-password-sync	Indexable string	FALSE	FALSE
ma-data	SyncConfig-password-sync-allowed	Integer	FALSE	FALSE
ma-data	SyncConfig-private-configuration	Text	FALSE	FALSE
ma-data	SyncConfig-projection	Text	FALSE	FALSE
ma-data	SyncConfig-provisioning-cleanup	Text	FALSE	FALSE
ma-data	SyncConfig-provisioning-cleanup-type	Indexable string	FALSE	FALSE
ma-data	SyncConfig-refresh-schema	Integer	FALSE	FALSE
ma-data	SyncConfig-schema	Text	FALSE	FALSE

Object Type Name	Identity Attribute Name	Data Type	Multi-valued	Required
ma-data	SyncConfig-stay-disconnector	Text	FALSE	FALSE
ma-data	SyncConfig-subtype	Text	FALSE	FALSE
ma-data	SyncConfig-version	Integer	FALSE	FALSE
ManagementPolicyRule	ActionParameter	Indexable string	TRUE	FALSE
ManagementPolicyRule	ActionType	Indexable string	TRUE	TRUE
ManagementPolicyRule	CreatedTime	DateTime	FALSE	TRUE
ManagementPolicyRule	Description	Indexable string	FALSE	FALSE
ManagementPolicyRule	DisplayName	Indexable string	FALSE	FALSE
ManagementPolicyRule	GrantRight	Boolean	FALSE	TRUE
ManagementPolicyRule	ObjectID	Reference	FALSE	FALSE
ManagementPolicyRule	ObjectType	Indexable string	FALSE	TRUE
ManagementPolicyRule	PrincipalSet	Reference	FALSE	FALSE
ManagementPolicyRule	ResourceCurrentSet	Reference	FALSE	FALSE
ManagementPolicyRule	ResourceFinalSet	Reference	FALSE	FALSE
mv-data	CreatedTime	DateTime	FALSE	TRUE
mv-data	Creator	Reference	FALSE	FALSE
mv-data	DisplayName	Indexable string	FALSE	FALSE
mv-data	ObjectID	Reference	FALSE	FALSE
mv-data	ObjectType	Indexable string	FALSE	TRUE
mv-data	SyncConfig-extension	Text	FALSE	FALSE
mv-data	SyncConfig-format-version	Integer	FALSE	FALSE
mv-data	SyncConfig-import-attribute-flow	Text	FALSE	FALSE
mv-data	SyncConfig-mv-deletion	Text	FALSE	FALSE
mv-data	SyncConfig-password-change-history-size	Integer	FALSE	FALSE
mv-data	SyncConfig-password-sync	Indexable string	FALSE	FALSE
mv-data	SyncConfig-provisioning-type	Indexable string	FALSE	FALSE

Object Type Name	Identity Attribute Name	Data Type	Multi-valued	Required
mv-data	SyncConfig-schema	Text	FALSE	FALSE
mv-data	SyncConfig-version	Integer	FALSE	FALSE
Person	AccountName	Indexable string	FALSE	FALSE
Person	CreatedTime	DateTime	FALSE	TRUE
Person	Creator	Reference	FALSE	FALSE
Person	Description	Indexable string	FALSE	FALSE
Person	DisplayName	Indexable string	FALSE	FALSE
Person	Domain	Indexable string	FALSE	FALSE
Person	ObjectID	Reference	FALSE	FALSE
Person	ObjectSID	Indexable binary	FALSE	FALSE
Person	ObjectType	Indexable string	FALSE	TRUE
Set	CreatedTime	DateTime	FALSE	TRUE
Set	Creator	Reference	FALSE	FALSE
Set	Description	Indexable string	FALSE	FALSE
Set	DisplayName	Indexable string	FALSE	FALSE
Set	ExplicitMember	Reference	TRUE	FALSE
Set	Filter	Text	FALSE	FALSE
Set	ObjectID	Reference	FALSE	FALSE
Set	ObjectType	Indexable string	FALSE	TRUE

2.1 Common Structures

The following XML elements pertain to objects of all object types transferred in the User Profile Synchronization (UPS): Configuration Protocol Extensions [MS-UPSCP].

2.1.1 ObjectID

This XML element is an identity attribute which contains the universally unique identifier (UUID) assigned by the server for the object when the object was created. The syntax for the value of this identity attribute is as defined in [RFC4122].

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:simpleType name="ReferenceType">
    <xs:restriction base="xs:string">
      <xs:pattern value="urn:uuid:([0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-
F]{4}-[0-9a-fA-F]{12})" />
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="ObjectID" type="rm:ReferenceType" />
</xs:schema>
```

This XML element is provided by the server in a body of a response for informational purposes. A value of this identity attribute of an object obtained by a client in a response from the server corresponds to the value of an object's resource reference property defined in [MS-UPSCP].

An example of a SOAP body, prior to encryption, of a message sent by a server in a **Pull** operation which contains the **ObjectID** identity attribute of an object of object type **ma-data** is:

```
<s:Body xmlns:s="http://www.w3.org/2003/05/soap-envelope"
<PullResponse xmlns="http://schemas.xmlsoap.org/ws/2004/09/enumeration">
  <Items>
    <rm:ma-data xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement">
      <rm:ObjectType>ma-data</rm:ObjectType>
      <rm:ObjectID>urn:uuid:f2cc710f-99e1-45a2-8f9f-d6a5d1a3cac4</rm:ObjectID>
    </rm:ma-data>
  </Items>
<EndOfSequence></EndOfSequence>
</PullResponse>
</s:Body>
```

2.1.2 ObjectType

This XML element is an identity attribute which specifies the object type of the identity object. The XML element value MUST be one of the following literal strings:

Value	Object Type
ma-data	Management agent structure
mv-data	Metaverse data structure
Person	Person structure
Set	Set structure
managementPolicyRule	Management Policy Rule structure

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="ObjectType">
```

```
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

2.1.3 DisplayName

This XML element is an identity attribute. The value of this XML element is a name string which contains a human readable name of the object.

The value of this XML element is a string of at least 1 character in length that provides the human-readable name for the object. When provided in an identity object with an **ObjectType** of **ma-data**, this string MUST be unique on the server across all values of **DisplayName** of all identity objects with an **ObjectType** of **ma-data**. The server MUST reject the value by sending a fault in a response to a **Put** or **Create** operation if the value is not unique.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="DisplayName">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

An example of a SOAP body, prior to encryption, of a message sent by a client in a **Put** operation which modifies the value of a **DisplayName** identity attribute is:

```
<s:Body xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:da="http://schemas.microsoft.com/2006/11/IdentityManagement/DirectoryAccess"
xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement">

  <da:ModifyRequest Dialect="
http://schemas.microsoft.com/2006/11/ResourceManagement/Dialect/IdentityAttributeType-
20080602">
    <da:Change Operation="replace">
      <da:AttributeType>DisplayName</da:AttributeType>
      <da:AttributeValue>
        <rm:DisplayName>AD Management Agent</rm:DisplayName>
      </da:AttributeValue>
    </da:Change>
  </da:ModifyRequest>
</s:Body>
```

2.1.4 Description

This XML element is an identity attribute. The value of this XML element is a string which contains the description of the object.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="Description">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

2.1.5 CreatedTime

This XML element is an identity attribute. The value of this XML element is the date and time (in **UTC**) when the object was created on the server. It can be returned by the server, if requested, in a Get, Enumerate or Pull operation response, for informational purposes.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="CreatedTime" type="xs:dateTime" />
</xs:schema>
```

This XML element MUST NOT be supplied by a client for any operation.

2.1.6 Creator

This XML element is an identity attribute. The value of this XML element is the UUID of the person object that represents the security principal of the service account used by the synchronization engine. It can be returned by the server, if requested, in a Get, Enumerate or Pull operation response, for informational purposes.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:simpleType name="ReferenceType">
    <xs:restriction base="xs:string">
      <xs:pattern value="urn:uuid:([0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-
F]{4}-[0-9a-fA-F]{12})" />
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="Creator" type="rm:ReferenceType" />
</xs:schema>
```

This XML element MUST NOT be supplied by a client for any operation.

2.2 Management Agent Data Structure

This section defines the **ma-data** structure, which represents management agent configuration. Each of the sub-sections of this section defines an identity attribute of objects whose object type is **ma-data**.

Objects of this object type can have the attributes defined in sub-sections of this section, in addition to the identity attributes defined in sub-sections of section 2.1.

The XML schema of an identity object of this object type when transferred as an enumeration item, and the identity attributes ObjectID, ObjectType, DisplayName, Description, CreatedTime, Creator, SyncConfig-id, **SyncConfig-format-version**, **SyncConfig-category**, SyncConfig-subtype, **SyncConfig-version**, SyncConfig-ma-listname, SyncConfig-ma-companyname, SyncConfig-creation-time, SyncConfig-last-modification-time, SyncConfig-internal-version, **SyncConfig-schema**, SyncConfig-refresh-schema, SyncConfig-attribute-inclusion, SyncConfig-stay-disconnector, SyncConfig-join, SyncConfig-projection ,SyncConfig-export-attribute-flow, SyncConfig-provisioning-cleanup-type, SyncConfig-provisioning-cleanup, **SyncConfig-extension**, SyncConfig-controller-configuration, SyncConfig-password-sync-allowed, SyncConfig-password-sync, SyncConfig-ma-ui-settings, **SyncConfig-private-configuration**, SyncConfig-capabilities-mask, SyncConfig-export-type, SyncConfig-dn-construction, **SyncConfig-ma-partition-data** and SyncConfig-ma-run-data are requested by the client, is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="ma-data">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="rm:ObjectID" minOccurs="0" />
        <xs:element ref="rm:ObjectType" minOccurs="0" />
        <xs:element ref="rm:DisplayName" minOccurs="0" />
        <xs:element ref="rm:Description" minOccurs="0" />
        <xs:element ref="rm:CreatedTime" minOccurs="0" />
        <xs:element ref="rm:Creator" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-id" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-format-version" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-category" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-subtype" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-version" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-ma-listname" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-ma-companyname" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-creation-time" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-last-modification-time" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-internal-version" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-schema" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-refresh-schema" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-attribute-inclusion" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-stay-disconnector" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-join" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-projection" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-export-attribute-flow" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-provisioning-cleanup-type" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-provisioning-cleanup" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-extension" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-controller-configuration" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-password-sync-allowed" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-password-sync" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-ma-ui-settings" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-private-configuration" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-capabilities-mask" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-export-type" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-dn-construction" minOccurs="0" />
        <!-- xs:element ref="rm:SyncConfig-component-mappings" minOccurs="0" / -->
        <xs:element ref="rm: SyncConfig-encrypted-attributes" minOccurs="0" />
```

```
        <xs:element minOccurs="0" ref="rm:SyncConfig-ma-partition-data" />
        <xs:element minOccurs="0" ref="rm:SyncConfig-ma-run-data" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

2.2.1 SyncConfig-id

This XML element is an identity attribute. The value of this XML element is a GUID that uniquely represents the management agent in the synchronization engine's database.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-id">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=" {[0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-
9a-fA-F]{12}}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

An example of this identity attribute value is:

```
<rm:SyncConfig-id
xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement">{F2CC710F-99E1-45A2-8F9F-
D6A5D1A3CAC4}</rm:SyncConfig-id>
```

This XML element MUST NOT be supplied by a client for a **Create** operation. This XML element MUST be provided by a client for the Put operation and MUST NOT be changed from the value that was received from the server when obtaining the object using a **Get** operation or **Enumeration**.

2.2.2 SyncConfig-format-version

This XML element is an identity attribute. When an object of object-type ma-data is being created, the value of this XML element MUST be provided as the literal string "1" by the client. When this identity attribute is being returned by the server in a Get response, the value of this XML element MUST be provided as the literal string "1". This identity attribute MUST NOT be modified by the client.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-format-version" type="xs:integer" />
</xs:schema>
```

2.2.3 SyncConfig-category

This XML element is an identity attribute. The value of this XML element is a string which specifies the management agent type. The value MUST be one of the following literal strings:

Value	Management Agent Type
AD	**Active Directory Domain Services (AD DS)**, **Active Directory Lightweight Directory Services (AD LDS)**, Active Directory Domain Services Global Address List
iPlanet	Sun ONE Directory Server (formerly iPlanet Directory Server)
eDirectory	Novell Directory Services
IBM DS	IBM Directory Server
FIM	FIM management agent
Extensible	Extensible Management Agent

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-category">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

This XML element MUST be supplied by the client as an identity attribute when an object of object type ma-data is being created. This XML element MUST NOT be supplied by the client for any other operation.

2.2.4 SyncConfig-subtype

This XML element is an identity attribute. The value of this XML element is a string which contains the human readable type description string for this management agent. This element is only relevant when the management agent category is Extensible Management Agent.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-subtype" type="xs:string" />
</xs:schema>
```

This XML element MUST be supplied by the client when an object of object type ma-data is being created and the value of the **SyncConfig-category** is "Extensible". If a client intends to change the

type description string of an extensible management agent, the client MUST supply this element in a Put operation. This XML element MUST NOT be supplied by the client for any other operation.

2.2.5 SyncConfig-version

This XML element is an identity attribute of the version number of the ma-data object. The value of this XML element is the version number integer. The XML element value MUST match the version on the server in order to complete a Put operation. If the value supplied for a Put operation is less than the value on the server, the server returns a fault as specified in [MS-UPSCP] section 2.2.2.20 or 2.2.2.21.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-version" type="xs:integer" />
</xs:schema>
```

The XML element MUST be supplied by the client in a **Put** operation of an identity object of the **ma-data** object type. This XML element MUST NOT be supplied by the client in a **Create** operation.

2.2.6 SyncConfig-ma-listname

This XML element is an identity attribute. The value of this XML element is a string which specifies the management agent type name for an extensible management agent.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-ma-listname">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

This XML element MUST be supplied by the client in a **Create** operation in which the client supplies the **SyncConfig-category** identity attribute with value "Extensible". If a client intends to change the value of the **SyncConfig-ma-listname** identity attribute in an object in which the value of the **SyncConfig-category** identity attribute is "Extensible", this XML element MUST be supplied in a **Put** operation. This XML element MUST NOT be supplied by the client for any other operation.

2.2.7 SyncConfig-ma-companyname

This XML element is an identity attribute. The value of this XML element is a string whose value specifies the company name for the developer of an extensible management agent.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-ma-companyname">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

This XML element MUST be supplied by the client in a Create operation in which the client supplies the **SyncConfig-category** identity attribute with value "Extensible". The value MUST be empty. This XML element MUST NOT be supplied by the client for any other operation.

2.2.8 SyncConfig-creation-time

This XML element is an identity attribute. The value of this XML element is a string containing the date and time (in UTC) when the ma-data object was created on the server. It is returned by the server for informational purposes.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-creation-time">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

This XML element MUST NOT be supplied by the client in any operation.

2.2.9 SyncConfig-last-modification-time

This XML element is an identity attribute. The value of this XML element is a string containing the date and time (in UTC) when the ma-data object was last modified on the server. It is returned by the server for informational purposes.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-last-modification-time">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
```

```
  </xs:element>
</xs:schema>
```

An example of this identity attribute value is:

```
<rm:SyncConfig-last-modification-time
xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement">
2008-09-21 20:09:40.043
</rm:SyncConfig-last-modification-time>
```

This XML element MUST NOT be supplied by the client in any operation.

2.2.10 SyncConfig-internal-version

This XML element is an identity attribute. In an object in which the value of the **SyncConfig-category** identity attribute is "Extensible", the value of this XML element MUST be the literal string "0".

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-internal-version" type="xs:integer" />
</xs:schema>
```

This XML element MUST be supplied by the client in a Create operation in which the client supplies the **SyncConfig-category** identity attribute with value "Extensible". This XML element MUST NOT be supplied by the client in a Put operation.

2.2.11 SyncConfig-schema

This XML element is an identity attribute. The value of this XML element is a string containing the management agent schema, which MUST either be DSMLv1 format as specified in [DSML] or a string of zero length. All connector space attributes referred to in a management agent's configuration MUST be defined in that management agent's DSML schema. The **SyncConfig-refresh-schema** XML element enables the client to request updated schema.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-schema" type="xs:string" />
</xs:schema>
```

The value of this identity attribute can be empty as shown in the example that follows. If the value of this identity attribute is not empty, it MUST be a string encoding of the **dsml** XML element in the namespace http://www.dsml.org/DSML. The format of the DSMLv1 schema MUST be as specified in [DSML]. The dsml XML element MUST contain one **directory-schema** XML element in the namespace http://www.dsml.org/DSML.

The **directory-schema** XML element MUST contain a sequence of one or more class XML elements in the namespace http://www.dsml.org/DSML and one or more **attribute-type** XML elements in the namespace http://www.dsml.org/DSML.

This XML element MUST be provided by the client in a create operation. If a client intends to change the schema, the client MUST provide this XML element in a Put operation. This XML element MUST NOT be provided for any other operation on an object of object type ma-data. An example of an empty **SyncConfig-schema** is:

```
<rm:SyncConfig-schema/>
```

2.2.12 SyncConfig-refresh-schema

This XML element is an identity attribute. This XML element provides a mechanism to have the management agent obtain its schema and populate the **SyncConfig-schema** XML element. The value of this XML element is an integer with values of "0" and "1". When the value of this XML element is set to the literal string "1" by a client in a **Create** or **Put** operation, the management agent will attempt to discover the schema from the connected data source using the credentials provided in this management agent's configuration (see management agent-partition-data in section 2.2.31). If successful, the **SyncConfig-schema** XML element of the object will be updated by the server with the latest schema, and a value of "0" will replace the value of this XML element in the object which is visible to a client if it subsequently performs a **Get** operation on the object. If an error occurs, or if is not a capability of the indicated management agent as defined in the table that follows, the schema refresh **Put** operation returns a fault as specified in [MS-UPSCP] section 2.2.2.20 or 2.2.2.21 and a value of "0" is stored for this XML element.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-refresh-schema" type="xs:integer" />
</xs:schema>
```

The following table illustrates management agents with the capability of refreshing the schema:

SyncConfig-category	Capability of refreshing the schema
AD	Yes
iPlanet	Yes
eDirectory	Yes
IBMDS	Yes
LDIF	No
FIM	No
Extensible	No

2.2.13 SyncConfig-attribute-inclusion

This XML element is an identity attribute. This XML element lists the directory attributes that the management agent imports or exports from or to the connected data source.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-attribute-inclusion" type="xs:string" />
</xs:schema>
```

This XML element is defined as having a value which is a string encoding of a sequence of zero or more XML elements, each XML element is named "attribute". The **attribute** XML element is defined in the sub-section of this section. Only directory attributes that appear as values in this list can be part of any of the synchronization rules configured for this management agent. If the **SyncConfig-attribute-inclusion** XML element is missing or empty, then on a subsequent import operation performed by the management agent, objects will only be imported with DN, anchor, and change type (section 2.2.25.6.16).

An example of this XML element is follows:

```
<rm:SyncConfig-attribute-inclusion>
  <attribute>description</attribute>
  <attribute>displayName</attribute>
  <attribute>givenName</attribute>
  <attribute>manager</attribute>
  <attribute>member</attribute>
  <attribute>sAMAccountname</attribute>
  <attribute>sn</attribute>
</rm:SyncConfig-attribute-inclusion>
```

2.2.13.1 attribute

The value of this XML element is a string containing the name of a directory attribute. The referenced directory attribute MUST be included in schema definition contained in the **SyncConfig-schema** identity attribute.

2.2.14 SyncConfig-stay-disconnector

This XML element is an identity attribute. This XML element contains a list of connector filters that specify whether connector space objects are candidates for connection to metaverse objects during the inbound synchronization process. In the connector filters, each condition specifies an operator and a connector space attribute to evaluate with the operator and value operands. The result of each condition's evaluation is a Boolean. A sample condition can be found in the following example of a filter. Additional information on conditions can be found in section 2.2.14.1.1.1.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-stay-disconnector" type="xs:string" />
```

```
</xs:schema>
```

The **SyncConfig-stay-disconnector** XML element is defined as having a value of a string encoding of a sequence of zero or more filter-set XML elements. The **filter-set** XML element is defined in a sub-section of this section.

The following is an example that specifies a filter that prevents the connector space object from being connected to a metaverse object if the **employeeID** connector space attribute on the contact connector space object type is not present:

```
<rm:SyncConfig-stay-disconnector>
  <filter-set cd-object-type="contact"  type="declared">
    <filter-alternative id="{234A9523-A3CA-4BC5-ADA0-D6D95D979422}">
      <condition cd-attribute="employeeID"  intrinsic-attribute="false" operator="not-
present">
        <value/>
      </condition>
    </filter-alternative>
  </filter-set>
</rm:SyncConfig-stay-disconnector>
```

During inbound synchronization, any object in this management agent's connector space that meets the criteria of one of the filter alternatives (as specified in section 2.2.14.1.1) will not be considered for join or projection. The result of a filter-set for a given object type is the result of a logical OR on all the filters in the filter-set. The result of a condition in a filter is the result of a logical AND on all the criteria in the condition. An empty SyncConfig-stay-disconnector is interpreted during inbound synchronization as no filtering. With no filtering, any connector space object is a candidate for projection and join during inbound synchronization.

This XML element MUST be provided by the client in a Create operation. If a client intends to change the list of the connector filters, the client MUST provide this XML element in a Put operation. This XML element MUST NOT be provided by the client in any other operation.

A more complete example of this XML element is shown in section 3.1 of this document.

2.2.14.1 filter-set

The value of this XML element contains filtering conditions for a specific connected data source object type.

The name of the connected data source object type is specified as the value of the **cd-object-type** XML attribute of the filter-set XML element. The cd-object-type XML attribute MUST be present on a **filter-set** XML element. At most one filter-set XML element can be configured for a specific connected data source object type in a SyncConfig-stay-disconnector XML element.

Each filter-set XML element MUST have a **type** XML attribute, and the value of the **type** XML attribute MUST be configured as either declarative or scripted by setting the value of the XML attribute **type** to either the literal string "declared" or the literal string "scripted".

The id XML attribute MUST NOT be provided by the client on **filter-set** XML element when the value of the type XML attribute on the **filter-set** XML element is "declared".

The filtering portion of the inbound synchronization process applies the **filter-set** based on the connector space object type of the imported object. If no applicable **filter-set** is found, then no filtering is performed on the object and the synchronization engine will proceed to attempt join or projection.

If the synchronization engine identifies a declared **filter-set** for the connector space's object type, then the connector space object is evaluated against each filter-alternative. If the connector space object satisfies any filter set, then the synchronization engine marks the object as a normal disconnector and no further inbound synchronization rules apply to the object. If the synchronization engine identifies a scripted **filter-set** for the connector space's object type, then the synchronization will call the rules extension configured as defined in section 2.2.20. If no **filter-set** is satisfied, then synchronization engine will evaluate the join and projection portions of inbound synchronization on the connector space object.

A **filter-set** of type "declared" MUST contain a sequence of one or more filter-alternative XML elements, and MUST NOT have an id XML attribute. If the **filter-set** is of type "declared" then the **id** XML attribute is only present on each of the child filter-alternative XML elements. The id XML attribute MUST be provided on the **filter-set** if its type is "scripted". An implicit "or" exists between all filter-alternative XML elements contained in a specific **filter-set**, such that an object need only satisfy at least one filter-alternative in order to satisfy the **filter-set**. Satisfying the filter means the connector space object will remain a disconnector.

A scripted **filter-set** is used in scenarios where simple declarative rules which each only specify a condition on a single connector space attribute are insufficient to describe the filtering requirements. A **filter-set** type of "scripted" is specified as an empty **filter-set** XML element that does not have any filter-alternative child XML elements. A **filter-set** XML element with a type XML attribute value of "scripted" MUST have an id XML attribute that uniquely identifies the **filter-set** rule on the server and its value MUST be a globally unique identifier (GUID).

An example of this XML element is:

```
<filter-set cd-object-type="contact"  type="declared">
  <filter-alternative id="{234A9523-A3CA-4BC5-ADA0-D6D95D979422}">
    <condition cd-attribute="employeeID"  intrinsic-attribute="false"
   operator="not-present">
      <value/>
    </condition>
  </filter-alternative>
  <filter-alternative id="{334A9523-A3CA-4BC5-ADA0-D6D95D979423}">
    <condition cd-attribute="rdn" intrinsic-attribute="false"
   operator="equality">
      <value>Jane Doe</value>
    </condition>
  </filter-alternative>
  <filter-alternative id="{434A9523-A3CA-4BC5-ADA0-D6D95D979424}">
    <condition cd-attribute="dn" intrinsic-attribute="true"
   operator="equality">
      <value>cn=Jane Doe,o=Microsoft</value>
    </condition>
  </filter-alternative>
</filter-set>
```

2.2.14.1.1 filter-alternative

Each **filter-alternative** XML element in a filter-set defines a sequence of one or more conditions. Each condition involves either the DN or involves one or more connector space attributes of an object in connector space. An object in a connector space is said to satisfy a **filter-alternative** if the object's DN and attributes meet all the specified condition XML elements contained within the **filter-alternative** XML element.

The value of the **id** XML attribute MUST be provided by the client on the **filter-alternative** XML element when the value of the type XML attribute on the filter-set XML element is "declared".

The **filter-alternative** XML element is defined as a sequence of condition XML elements.

The application of an individual logical condition within a **filter-alternative** can yield a TRUE result if the object meets the condition, and a FALSE result if it does not. All child node conditions MUST resolve to TRUE in order for the **filter-alternative** to be satisfied.

The **id** XML attribute uniquely identifies the filter alternative and its value MUST be a GUID. Each filter alternative MUST have a unique value on the server for the **id** attribute.

2.2.14.1.1.1 condition

Filter conditions are logical expressions that describe the connector space attribute or DN requirements that cause a connector space object to become filtered as a disconnector.

The following example shows two conditions. The first condition filters any connector space object with a **displayName** value that contains the literal string "Admins". The second condition filters any connector space object with the displayName "Administrator".

```
<condition cd-attribute="displayName" operator="not-substring-any">
  <value>Admins</value>
</condition>
<condition cd-attribute="displayName" operator="inequality">
  <value>Administrator</value>
</condition>
```

The **condition** XML element MUST have a "**cd-attribute**" XML attribute.

The **condition** XML element MUST have an "intrinsic-attribute" XML attribute when the client intends to configure a filter condition based on a connector space attribute that is a built-in synchronization engine attribute and not part of the connected data source schema.

The **condition** XML element MUST have an "operator" XML attribute.

The **condition** XML element MUST contain a "value" XML element, defined in the next section.

The value of the **cd-attribute** XML attribute identifies the connector space attribute to which the condition applies and MUST be present. The connector space attribute MUST have a connector space attribute data type that is either of syntax indexable string, numeric, or Boolean.

The value of **intrinsic-attribute** XML attribute MUST be the lower case literal string "true" if **cd-attribute** identifies an attribute intrinsic to the synchronization engine, specifically if **cd-attribute** identifies the connector space attribute **dn**. If **cd-attribute** does not identify the connector space attribute **dn**, then the value of the **intrinsic-attribute** XML attribute MUST be the lower case literal string "false".

The "operator" XML attribute defines the operation to perform and MUST be one of the following:

- equality
- inequality
- less-than
- less-than-or-equal
- greater-than
- greater-than-or-equal
- present
- not-present

- substring-start
- not-substring-start
- substring-end
- not-substring-end
- substring-any
- not-substring-any
- bit-on
- bit-off

The general purpose "equality" and "inequality" operators specify comparison of the complete DN or connector space attribute of an object with a specified operand value. These operators can be used to compare operand values with connector space attributes that have a string syntax, a numeric syntax, or a Boolean syntax.

The "less-than", "less-than-or-equal", "greater-than", and "greater-than-or-equal" operators apply to connector space attributes of a numeric syntax. They specify the connector space attribute of an object to be compared against a specified operand value.

To test for the presence or absence of a connector space attribute in a connector space object, the respective "present" and "not-present" operators can be used. For these operators, the value XML element MUST be empty.

If only a portion of a connector space attribute with string syntax or the DN is to be configured with a connector filter by the client, then the "substring-start" or "substring-end" operators can be employed to check for equality at the start or end, respectively. To match any part of a string attribute, the client uses the "substring-any" operator. Negative substring operators are substring operators that return the Boolean complement of the substring operators. If a substring-end operation results in a filtered disconnection, the not-substring-end operation results in no filtered disconnection at synchronization time. The negative substring operators are "not-substring-start", "not-substring-end", and "not-substring-any". The substring-start, not-substring-start, substring-end, not-substring-end, substring-any and not-substring-any comparisons are not case sensitive based on the settings defined in SQL Server for the configured codepage.

The bitwise operators "bit-on" and "bit-off" allow individual bits of a connector space attribute with numeric syntax to be checked against a bit mask that is specified by the value XML element. If the bit-on operator is specified, a TRUE condition is obtained in the synchronization engine if the result of applying a bitwise AND function to the numeric value obtained from the connector space attribute value and to the bit mask is equal to the bit mask. If the bit-off operator is specified, a TRUE condition is obtained if the result of applying a bitwise AND function to the numeric value obtained from the connector space attribute value and to the bit mask is equal to 0.

In cases where the attribute value is absent in the imported object, a condition involving an "inequality" operator or any of the "not" prefixed operators will resolve to TRUE, whereas all other operators will resolve to FALSE.

2.2.14.1.1.1.1 value

The contents of the **value** XML element specify one of the operands employed in the comparison (the other operand is the value of the attribute from the connector space object itself). When specifying a value for a numeric attribute type, the value MUST be expressed in as a hexadecimal (base 16) string with a "0x" prefix. The **ui-radix** attribute allows a UI to preserve the radix in which user numeric data was originally entered. This setting is preserved to facilitate redisplay of the value in the original radix. The **ui-radix** attribute MUST be "10" for the value to be displayed in decimal (base-10), or "16" for

the value to be displayed in hexadecimal (base 16). The following example shows a value XML element that has a numeric value and includes a radix XML attribute.

```
<condition cd-attribute="versionNumber" operator="greater-than-or-equal">
  <value ui-radix="10">0xB</value>
</condition>
```

When the client configures a **SyncConfig-stay-disconnector filter-alternative** with a condition that refers to a multi-valued attribute, the condition is interpreted as a test to determine if any value in the object matches that specified by the value XML element.

2.2.15 SyncConfig-join

This XML element is an identity attribute. This XML element specifies the search criteria for matching a connector space object with a metaverse object. Any join candidates found by the join search at synchronization time are then resolved to a single join target. Once a metaverse object has been identified as the join target, it is automatically joined to the connector space object.

The Join Rules are expressed in XML and are responsible for configuring:

- the search criteria
- the method of join resolution/validation
- how to handle ambiguous results
- scoping of join rules by CD object types

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-join" type="xs:string" />
</xs:schema>
```

This XML element is defined as having a value which is a string encoding of a sequence of zero or more **join-profil**e XML elements, which are defined in the next section.

This XML element MUST be provided by a client when requesting a **Create** operation of an object of the ma-data object type. If a client intends to change the search criteria, the client MUST provide this XML element when requesting a **Put** operation of an object of the ma-data object type. A client MUST NOT request a **Put** operation to remove this XML element from an object.

The following is an example of an identity attribute value containing a set of Join Rules:

```
<rm:SyncConfig-join>
  <join-profile  cd-object-type="user">
    <join-criterion id="{934A9523-A3CA-4BC5-ADA0-D6D95D979429}">
      <search mv-object-type="user">
        <attribute-mapping  mv-attribute="uid">
          <direct-mapping>
            <src-attribute>empId</src-attribute>
          </direct-mapping>
        </attribute-mapping>
        <attribute-mapping  mv-attribute="company">
          <constant-mapping>
```

```
            <constant-value>Microsoft</constant-value>
          </constant-mapping>
        </attribute-mapping>
      </search>
      <resolution type="scripted">
        <script-context>Criterion1</script-context>
      </resolution>
    </join-criterion>
    <join-criterion id="{534A9523-A3CA-4BC5-ADA0-D6D95D979425}">
      <search mv-object-type="user">
        <attribute-mapping  mv-attribute="mail">
          <direct-mapping>
            <src-attribute>alias</src-attribute>
          </direct-mapping>
        </attribute-mapping>
      </search>
      <resolution type="scripted">
        <script-context>Criterion2</script-context>
      </resolution>
    </join-criterion>
  </join-profile>
  <join-profile cd-object-type="prov-user">
    <join-criterion id="{5C875108-D0CD-471a-9D9C-BC3E9C2C4A12}">
      <search  mv-object-type="user">
        <attribute-mapping  intrinsic-attribute="true" mv-attribute="object-id">
          <direct-mapping>
            <src-attribute>mv-object-id</src-attribute>
          </direct-mapping>
        </attribute-mapping>
      </search>
      <resolution type="none"/>
    </join-criterion>
  </join-profile>
  <join-profile cd-object-type="contact">
    <join-criterion id="{134A9523-A3CA-4BC5-ADA0-D6D95D979421}">
      <search mv-object-type="user">
        <attribute-mapping intrinsic-attribute="false" mv-attribute="mail">
          <direct-mapping>
            <src-attribute>mail</src-attribute>
          </direct-mapping>
        </attribute-mapping>
      </search>
      <resolution type="none"/>
    </join-criterion>
  </join-profile>
</rm:SyncConfig-join>
```

2.2.15.1 join-profile

Each **join-profile** XML element specifies the join search criteria that are specific to a particular connector space object type. Users, for example, might be configured with one join-profile, whereas groups are configured with a different profile. Together, all of the join-profile elements constitute the set of join rules for the management agent.

Each **join-profile** XML element specifies the object type that it applies to as the value of its **cd-object-type** XML attribute. If an object type is referred to by a join criterion, then that join-criterion MUST be the only one for that management agent that refers to that object type. A given cd-object-type MUST NOT appear in more than one join-profile. Within each join-profile, at least one join-criterion XML elements MUST be present. When more than one join-criterion XML element is present, the synchronization engine will join objects based on the ordering of the join-criterion XML elements in the join-profile XML element.

2.2.15.1.1 join-criterion

Within a join-profile, the join-criterion XML element is responsible for configuring the search criterion as well as the method of join resolution. The synchronization engine evaluates each join-criterion XML element independently as there is no relationship between join-criterion searches. The attribute mappings in the join criterion define which metaverse attributes are compared to connector space attributes as specified in src-attributes.

An example of the join-criterion XML element is:

```
<join-criterion id="{493DD4D1-C49C-4EE0-BDB5-DAB9E6DC2A9B}">
  <collation-order>Latin1_General_CI_AS</collation-order>
  <search mv-object-type="group">
    <attribute-mapping mv-attribute="accountName">
      <direct-mapping>
        <src-attribute>sAMAccountName</src-attribute>
      </direct-mapping>
    </attribute-mapping>
  </search>
  <resolution type="none">
    <script-context></script-context>
  </resolution>
</join-criterion>
```

The **id** XML attribute for the join-criterion XML element has a value that is a GUID that uniquely identifies the join criterion rule. The client MUST generate a GUID and provide it as the value of the id XML attribute of the join-criteria element when a new join-criterion is added. When a join-criterion XML element is present, it MUST contain one search XML element and one resolution XML element.

2.2.15.1.1.1 collation-order

The **collation-order** XML element specifies how string comparisons are performed by SQL Server. The collation-order element MUST be provided if the collation order is other than default SQL Server collation for the synchronization engine database, currently, "Latin1_General_CI_AS", which is case-insensitive and accent-sensitive. The permitted values for this XML element are specified in [MSDN-SQLCollation].

Equality of indexable strings is defined by the combination of the collation-order set for the join search criterion, and whether the specified collation-order requires case sensitivity and accent sensitivity. Comparisons of data which is specified as either indexable binary or integer are performed using a binary ordering.

This element is optional.

2.2.15.1.1.2 search

The **search** XML element MUST be provided within the join-criterion XML element.

The **search** XML element specifies a sequence of one or more conditions on the values of the metaverse object being searched for. The **search** XML element MUST contain at least one XML element. The search can be further scoped by providing an **mv-object-type** XML attribute on the **search** XML element. When omitted, the synchronization engine ignores the object type of the metaverse object and will include metaverse objects of any type in the list of join candidates.

An example of the **search** XML element follows:

```
<search mv-object-type="group">
  <attribute-mapping mv-attribute="accountName">
    <direct-mapping>
      <src-attribute>sAMAccountName</src-attribute>
    </direct-mapping>
  </attribute-mapping>
```

```
</search>
```

2.2.15.1.1.2.1 attribute-mapping

Each condition is specified by an **attribute-mapping** XML element. Each **attribute-mapping** XML element MUST have a value that contains either a **direct-mapping** XML element, a constant-mapping XML element, or a **scripted-mapping** XML element. The following are two examples of the attribute-mapping XML element:

```
<attribute-mapping mv-attribute="mvAttributeName">
  <direct-mapping>
    <src-attribute>csAttributeName</src-attribute>
  </direct-mapping>
</attribute-mapping>
```

or

```
<attribute-mapping mv-attribute="mvAttributeName">
  <scripted-mapping>
    <src-attribute>csAttributeName</src-attribute>
    <script-context>contextString</script-context>
  </scripted-mapping>
  </attribute-mapping>
```

An example of an actual **attribute-mapping** with a **direct-mapping** XML element is:

```
  <attribute-mapping mv-attribute="accountName">
    <direct-mapping>
      <src-attribute>sAMAccountName</src-attribute>
    </direct-mapping>
  </attribute-mapping>
```

The boolean-valued XML attribute intrinsic-attribute on the **attribute-mapping** XML element specifies that the metaverse attribute designated by the **mv-attribute** XML attribute in the attribute-mapping XML element is an "intrinsic" synchronization engine attribute, that is, not an attribute in the schema, but metadata exposed by the synchronization engine for a metaverse object. When the metaverse attribute supplied by the client in the **attribute-mapping** XML element is specified as intrinsic, the intrinsic-attribute XML attribute on the **attribute-mapping** XML element MUST be provided. The default value for the **intrinsic-attribute** attribute is "false". This value, if provided, MUST be one of the literal lower case strings "true" or "false". The client MUST provide the literal string "true" for the **intrinsic-attribute** XML attribute when the **mv-attribute** XML attribute has the value "object-id". The client MUST NOT configure join search on both the metaverse object ID and on any other attribute that is part of the metaverse schema.

Each attribute-mapping XML element specifies that a value or values, depending on whether or not the connector space attribute is multi-valued, from the connector space attribute (if direct-mapping) or a calculated value or values (if scripted-mapping) is compared at synchronization time to the metaverse attribute specified by **mv-attribute**. The comparison function is defined in the following table:

Connector Space Attribute	Metaverse Attribute	Successful Comparison
Direct mapping of single valued attribute in connector space	Single valued metaverse attribute	Connector space attribute value equals the metaverse attribute value

Connector Space Attribute	Metaverse Attribute	Successful Comparison
Direct mapping of multi-valued attribute in connector space	Single valued metaverse attribute	One of connector space attribute values equal to the metaverse attribute value
Direct mapping of single valued attribute in connector space	Multi-valued metaverse attribute	connector space attribute value equal to one of the metaverse attribute values
Direct mapping of multi-valued attribute in connector space	Multi-valued metaverse attribute	One of connector space attribute values equal to one of the metaverse attribute values
Scripted mapping generates a single value	Single valued metaverse attribute	Scripted value equals the metaverse attribute value
Scripted mapping generates multiple values	Single value metaverse attribute	One of scripted values equals the metaverse attribute value
Scripted mapping generates a single value	Multi-valued metaverse attribute	Scripted value equals one of the metaverse attribute values
Scripted mapping generates multiple values	Multi-valued metaverse attributes	One of the scripted values equals one of the metaverse attribute values

The synchronization engine only allows comparisons between the same attribute types; indexable string type can only be compared with indexable string, indexable binary type can only be compared with indexable binary, and so forth. The basic types are:

- Boolean
- indexable string
- indexable binary
- integer

The client MUST NOT specify reference attributes (GUID in metaverse, DN-based in CD), non-indexable string attributes, and non-indexable binary attributes in joins. When providing an attribute-mapping XML element, the client MUST NOT configure mappings for multi-valued metaverse attributes with types that are defined as non-indexable.

2.2.15.1.1.2.1.1 scripted-mapping

The client provides a **scripted-mapping** XML element if it intends to provide more complex join rules than a simple comparison of connector space attribute values to metaverse attribute values. The **scripted-mapping** XML element enables the client to specify the connector space attributes to pass to the rules extension at synchronization time, and the name of a scripting context. Each **scripted-mapping** XML element MUST have one or more **src-attribute** XML elements specified, and MUST have exactly one **script-context** XML element specified.

2.2.15.1.1.2.1.1.1 src-attribute

The **src-attribute** XML element has a string value which is the name of a connector space attribute to use at synchronization time for the purpose of identifying whether or not the connector space object is a join candidate.

2.2.15.1.1.2.1.1.2 script-context

If the client intends to configure scripted mapping, the client supplies this XML element to specify a string that contains the name of the rules extension context the synchronization engine uses at run time to execute the mapping. Using the string passed in the script-context, at run time, the rules

extension determines which logic to run for the purpose of determining whether a metaverse object and connector space object are join candidates.

2.2.15.1.1.2.1.2 direct-mapping

For **direct-mapping**, the value of the **src-attribute** XML element is a string that specifies the name of the connector space attribute used by the synchronization engine to determine whether the connector space object being synchronized is a join candidate.

There MUST be one **src-attribute** in a direct-mapping. The use of the **src-attribute** XML element is as specified in section 2.2.15.1.1.2.1.1.1.

The following is an example of a **direct-mapping** XML element:

```
<direct-mapping>
  <src-attribute>displayName</src-attribute>
</direct-mapping>
```

2.2.15.1.1.2.1.3 constant-mapping

When the client intends to configure a join based partly on a string constant, it uses a **constant-mapping** XML element to specify the constant.

The value of the **constant-mapping** XML element is an XML element with the name constant-value. The value of the **constant-value** XML element is a string which the synchronization engine uses as part of a search for join candidates.

```
<attribute-mapping  mv-attribute="company">
  <constant-mapping>
    <constant-value>Microsoft</constant-value>
  </constant-mapping>
</attribute-mapping>
```

2.2.15.1.1.3 resolution

The client uses a **resolution** XML element to in a **Create** operation for an **ma-data** object or a **Put** operation for the **SyncConfig-join** identity attribute to specify the rules extension context for resolving ambiguous join at synchronization run time with a rules extension as specified in the **SyncConfig-extension** identity attribute defined in section 2.2.20. The client supplies a contextString value for this XML element. The **contextString** value is a string that is passed to the assembly at synchronization time

```
<resolution type="scripted">
  <script-context>contextString</script-context>
</resolution>
```

If the value of the **type** XML attribute on the **resolution** XML element is "scripted", the **resolution** XML element indicates that a user-written script entry point is called to validate a single result or pick between multiple join candidates coming back from the search. The user defined **script-context** XML element allows the script to determine the context in which it has been invoked (that is, from which **join-criterion** XML element). The callout to the rules extension will return a Boolean to indicate whether the join target has been successfully resolved.

If no resolution script is desired, the client MUST include a **resolution** XML element with the **type** XML attribute set to "none" as follows:

```
<resolution type="none">
  <script-context></script-context>
</resolution>
```

2.2.16 SyncConfig-projection

This XML element is an identity attribute. This XML element specifies projection rules that the synchronization engine uses to determine whether to create a metaverse object corresponding to a given a connector space object based on the connector space object's type. This XML element contains as a value a string encoding of a sequence of zero or more class-mapping XML elements. Each class-mapping XML element defines connector space to metaverse object type mappings.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-projection" type="xs:string" />
</xs:schema>
```

Declarative mappings allow a client to specify the type of metaverse object to create when a given CD object type is to be projected. Each declarative mapping is a pair of object types that MUST identify both a connector space object type for the source of the object and a resulting metaverse object type that the synchronization engine will create during inbound synchronization if no join candidates exist for the source of the object.

An example of a many-to-one mapping would be where both "user" and "contact" object types in AD are mapped onto the metaverse "person" object type. This would be accomplished by employing two distinct mappings: one for AD "user" to metaverse "person", and another for AD "contact" to metaverse "person".

A user-written script can be used in scenarios where simple declarative mappings are not sufficient to determine the metaverse object type. The script will take a connector space object as input and, based on its CD object type and/or attributes; it will determine the metaverse object type. It can also selectively make decisions on whether or not to project.

The **SyncConfig-projection** XML element MUST be provided by the client when creating an object of object type **ma-data**. If a client intends to change the projection rules, the client MUST provide this XML element in a **Put** operation. This XML element MUST NOT be provided by the client for any other operation.

The following is an example set of Projection Rules:

```
  <rm:SyncConfig-projection>
    <class-mapping type="declared" id="{A481C0EC-A40F-4667-80F8-E5017AD0AEF4}" cd-object-
type="Group">
      <mv-object-type>group</mv-object-type>
    </class-mapping>
    <class-mapping type="declared" id="{B3A4EEE3-8ADA-47B6-8D48-1702EA40499E}" cd-object-
type="Person">
      <mv-object-type>person</mv-object-type>
    </class-mapping>
  </rm:SyncConfig-projection>
```

2.2.16.1 class-mapping

In **SyncConfig-projection**, the **class-mapping** XML element specifies the object's type when the synchronization engine creates a metaverse object at synchronization time. Associated with each **class-mapping** is an ID GUID. This GUID will be used by the synchronization engine when marking the lineage on the metaverse object when it is projected. The client MUST generate new ID values and provide them when creating projection rules. Each **class-mapping** XML element MUST specify a **type** XML attribute which indicates whether the mapping is "scripted" or "declared".

The value of the **class-mapping** XML element's type XML attribute MUST be either "declared" or "scripted." If the type is "scripted" then a script that implements the IMASynchronization interface and configured in **SyncConfig-extension** as specified in section 2.2.20 is called by the synchronization engine to determine whether to project and, if so, which metaverse object type is used for the created metaverse object.

The **cd-object**-type XML attribute's value is a string containing the name of a connector space object type that the synchronization engine uses as the source for projection of a new metaverse object.

When configuring management agents for AD, Sun ONE Directory Server, iPlanet Directory Server, IBM Directory Server, or Novell eDirectory, the client MUST specify if multiple mappings for different connector space classes (for example, person, organizationalPerson) are to be mapped to the same metaverse object type.

The value of the **class-mapping** XML element is a single **mv-object-type** XML element.

The following is an example of a declared **class-mapping** XML element:

```
  <class-mapping type="declared" id="{B3A4EEE3-8ADA-47B6-8D48-1702EA40499E}" cd-object-
type="Person">
    <mv-object-type>person</mv-object-type>
  </class-mapping>
```

The following is an example of a scripted **class-mapping** XML element:

```
  <class-mapping type="scripted" id="{A481C0EC-A40F-4667-80F8-E5017AD0AEF4}" cd-object-
type="Person">
  </class-mapping>
```

2.2.16.1.1 mv-object-type

The **mv-object-type** XML element contains as its value an object type name.

The **mv-object-type** XML element MUST be provided when the **class-mapping** XML element's type XML attribute is "declared". The **mv-object-type** XML element MUST NOT be provided when the class-mapping XML element's type XML attribute has a value that is anything other than "declared". Only one projection is allowed per connector space object type.

2.2.17 SyncConfig-export-attribute-flow

This XML element is an identity attribute. This XML element describes how attribute values flow from metaverse objects to linked connector space objects. At the lowest level of the export attribute flow rules, a mapping describes how to generate a destination connector space attribute value given a set of source metaverse attribute values. At the next higher level is a flow, which encapsulates the mapping, providing metadata (a unique ID and mapping configuration) and scoping by destination connector space attribute. Flows are then grouped into flow sets, scoped by source metaverse object type and destination connector space object type. Thus, a flow ends up defining a relationship between a single destination connector space attribute and any number of source metaverse

attributes from a single object type (many-to-many flows are not supported). More details are given in the sub-sections of this section.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-export-attribute-flow" type="xs:string" />
</xs:schema>
```

This XML element contains as a value a string encoding of a sequence of zero or more **export-flow-set** XML elements, which are defined in the next section.

The **SyncConfig-export-attribute-flow** XML element MUST be provided by the client when creating an object of object type ma-data. If a client intends to change the export attribute flow rules, the client MUST provide this XML element in a **Put** operation. This XML element MUST NOT be provided by the client for any other operation.

The following is an example of a value containing one set of Export Attribute Flows:

```
<rm:SyncConfig-export-attribute-flow>
  <export-flow-set cd-object-type="User" mv-object-type="person">
    <export-flow cd-attribute="email"
                 id="{9E691F4E-4301-4112-B964-CE7E8A\F7CAC}"
                 suppress-deletions="true">
      <direct-mapping>
        <src-attribute>email</src-attribute>
      </direct-mapping>
    </export-flow>
    <export-flow cd-attribute="description"
                 id="{8F15B855-0517-40f8-9AE9-0565600C0017}">
      <scripted-mapping>
        <src-attribute>email</src-attribute>
        <src-attribute>description</src-attribute>
        <script-context>contextString</script-context>
      </scripted-mapping>
    </export-flow>
    <export-flow cd-attribute="uid"
                 id="{DCC92CCA-A2DA-4060-8605-78755F072616}">
      <direct-mapping>
        <src-attribute intrinsic="true">object-id</src-attribute>
      </direct-mapping>
    </export-flow>
  </export-flow-set>
  <export-flow-set cd-object-type="Contact" mv-object-type="person">
    <export-flow cd-attribute="linkedl"
                 id="{A3D569E9-5DD9-4ece-8AB6-4A4BA4b5554A}">
      <constant-mapping>
        <constant-value>some value</constant-value>
      </constant-mapping>
    </export-flow>
  </export-flow-set>
</rm:SyncConfig-export-attribute-flow>
```

2.2.17.1 export-flow-set

Within a **SyncConfig-export-attribute-flow** XML element there can be zero or more export-flow-set XML elements, which themselves can contain one or more export-flow XML elements. The export-flow-

set XML elements act to scope child flow declarations by source metaverse object type (**mv-object-type** XML attribute) and destination connector space object type (cd-object-type XML attribute).

This is an example of the XML:

```
<export-flow-set cd-object-type="Contact" mv-object-type="person">
  <export-flow cd-attribute="linkedl"
               id="{A3D569E9-5DD9-4ece-8AB6-4A4BA4b5554A}">
    <constant-mapping>
      <constant-value>some value</constant-value>
    </constant-mapping>
  </export-flow>
</export-flow-set>
```

The export-flow-set XML element has cd-object-type and **mv-object-type** attributes that serve to scope its child elements by source metaverse object type and destination connector space object type. The value of the cd-object-type attribute MUST be the name of a connector space object type (a primary object class) defined in the destination management agent's schema. The value of the **mv-object-type** attribute MUST be the name of an object type defined in the metaverse schema**. Export-flow**, **direct-mapping**, **scripted-mapping**, **constant-mapping** and **cn-part-mapping** XML elements in the **export-flow-set** XML element define flows between a specific pair of connector space and metaverse object types. The pairing of metaverse and connector space objects in an **export-flow-set** MUST be unique. The same pair MUST NOT be present more than once in an **export-flow-set**.

2.2.17.1.1 export-flow

Flows encapsulate mappings, providing metadata (a unique ID and mapping configuration) and scoping by destination connector space attribute. Flows are defined via the **export-flow** XML element, which MUST have only one **direct-mapping**, **scripted-mapping**, **constant-mapping**, or **dn-part-mapping** XML element. The **export-flow** XML elements MUST have both of the XML attributes **cd-attribute** and **id**.

At synchronization time, when the result of the mapping is a null value, the synchronization engine might export an attribute value delete to the target connected data source. When the client intends to suppress this behavior, it MUST supply a **suppress-deletions** XML attribute on the **export-flow** XML element with a value of "true". The value of the **suppress-deletions** XML attribute, if supplied, MUST either be the string literal "true" or the string literal "false".

The following is an example **export-flow** XML element.

```
<export-flow cd-attribute="uid" suppress-deletions="false"
             id="{DCC92CCA-A2DA-4060-8605-78755F072616}">
  <direct-mapping>
    <src-attribute intrinsic="true">object-id</src-attribute>
  </direct-mapping>
</export-flow>
```

The **cd-attribute** XML attribute provides scoping for the mapping XML element by defining the mapping's destination connector space attribute. The value of **cd-attribute** MUST be the name of a schema-defined connector space attribute that is a member of the destination connector space object type (as defined by the **export-flow-set** XML element) or an auxiliary class associated with the destination connector space object type. A destination connector space attribute MUST appear only once so that only one export mapping is defined per destination connector space attribute per scoping source metaverse object type and destination connector space object type.

In the case the connector space schema supports auxiliary classes such as AD, Sun ONE Directory Server, iPlanet Directory Server, IBM Directory Server, or Novell eDirectory, then the attribute for

export attribute flow MUST either be defined as an attribute of the target connector space object type or an attribute of an auxiliary class from which the target connector space object type derives or whose attributes it includes.

The **id** XML attribute MUST be a GUID. Each mapping MUST have a unique value for the **id** attribute.

The **suppress-deletions** XML attribute specifies whether deletions are suppressed for the mapping, meaning whether or not NULL values and deletions on source attributes will be transferred to destination attributes as a delete. This XML attribute can have as the values the literal strings "true" and "false", the default if the XML attribute is absent being "false". The "true" and "false" are case sensitive and in this XML attribute MUST be lower case.

For export attribute flow, the four types of mappings listed as follows describe how to generate a destination connector space attribute value(s) or given a set of source metaverse attribute values. The four types are:

- Direct
- Scripted
- Constant
- DN-part

Each type of mapping has an associated XML element type: **direct-mapping**, **scripted-mapping**, **constant-mapping**, and **dn-part-mapping** respectively.

2.2.17.1.1.1 direct-mapping

For **direct-mapping**, the **src-attribute** XML element it contains specifies the metaverse attribute that is used to populate the destination attribute specified in the **cd-attribute** in the parent **export-flow** element.

There MUST be one and only one **src-attribute** in a **direct-mapping**.

The following is an example of a **direct-mapping** XML element:

```
<direct-mapping>
  <src-attribute>displayName</src-attribute>
</direct-mapping>
```

2.2.17.1.1.2 scripted-mapping

For **scripted-mapping**, the **src-attribute** elements specify the metaverse attributes that are used to populate the destination attribute specified in the **cd-attribute** attribute in the parent **export-flow** element. The metaverse attributes are passed to a rules extension, along with the value of the **script-context** element, and the script determines the resulting value to populate the destination attribute. The client MUST provide at least one **src-attribute** and a single script-context when using this type of mapping. When the **src-attribute** is used by the synchronization engine to uniquely identify the metaverse object for this management agent, the **intrinsic** XML element MUST be provided and have the lowercase literal string value "true".

The following is an example **scripted-mapping**:

```
<scripted-mapping>
  <src-attribute>attribute name</src-attribute>
  <src-attribute>attribute name</src-attribute>
  <src-attribute intrinsic="true">object-id</src-attribute>
  <script-context>context string</script-context>
```

```
</scripted-mapping>
```

2.2.17.1.1.3 constant-mapping

For **constant-mapping**, the **constant-value** element specifies the value with which to populate the destination attribute specified in the **cd-attribute** attribute in the parent **export-flow** element. The client MUST provide the **constant-value** XML element when using this type of mapping.

```
<constant-mapping>
  <constant-value>value</constant-value>
</constant-mapping>
```

2.2.17.1.1.4 dn-part-mapping

To use a portion of a DN, a **dn-part-mapping** element specifies in the dn-part XML element a part of the DN starting from the right-hand side, with the first component numbered 1. The client MUST provide the **dn-part** XML element when using this type of mapping.

```
<dn-part-mapping>
  <dn-part>3</dn-part>
</dn-part-mapping>
```

2.2.17.1.1.4.1 dn-part

This XML element's value is an integer that specifies which part of the DN is to be mapped for export to the connector space attribute specified in the **export-flow** in section 2.2.17.1.1. The relative DN is indexed starting from the right-hand side, with the first component numbered 1.

2.2.18 SyncConfig-provisioning-cleanup-type

This XML element is an identity attribute. This XML element specifies how to handle disconnection or deletion of a connector space object. By default, when a connector space object disconnects from a metaverse object as a result of sync rules, the connector space object remains in the connector space as an explicit disconnector.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-provisioning-cleanup-type" type="xs:string" />
</xs:schema>
```

This XML element MUST be specified with a value that is a literal string either "declared" or "scripted".

```
<rm:SyncConfig-provisioning-cleanup-type>
  declared
</rm:SyncConfig-provisioning-cleanup-type>
```

or

```
<rm:SyncConfig-provisioning-cleanup-type>
```

```
  scripted
</rm:SyncConfig-provisioning-cleanup-type>
```

2.2.19 SyncConfig-provisioning-cleanup

This XML element is an identity attribute.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-provisioning-cleanup" type="xs:string" />
</xs:schema>
```

When the **SyncConfig-provisioning-cleanup-type** XML element has as its value "declared", the SyncConfig-provisioning-cleanup XML element MUST contain a string encoding of exactly one action XML element. The action XML element MUST contain exactly one of the values "delete-object", "make-normal-disconnector" or "make-explicit-disconnector".

The identity attribute will have one of the following forms:

```
<rm:SyncConfig-provisioning-cleanup>
  <action>delete-object</action>
</rm:SyncConfig-provisioning-cleanup>
```

or

```
<rm:SyncConfig-provisioning-cleanup>
  <action>make-normal-disconnector</action>
</rm:SyncConfig-provisioning-cleanup>
```

or

```
<rm:SyncConfig-provisioning-cleanup>
  <action>make-explicit-disconnector</action>
</rm:SyncConfig-provisioning-cleanup>
```

or

```
<rm:SyncConfig-provisioning-cleanup>
</rm:SyncConfig-provisioning-cleanup>
```

A value of "delete-object" causes the synchronization engine to send a delete to the connected directory whenever a connector space object is deprovisioned.

A value of "make-normal-disconnector" causes the synchronization engine to keep the connector space object as a normal disconnector. The synchronization engine evaluates the disconnector for future joins whenever a connector space object is deprovisioned.

A value of "make-explicit-disconnector" causes the synchronization engine to keep the connector space object as an explicit disconnector. The synchronization engine skips the disconnector for future joins whenever a connector space object is deprovisioned.

An empty **SyncConfig-provisioning-cleanup** XML element MUST be provided when the **SyncConfig-provisioning-cleanup-type** XML element's value is the literal string "scripted".

2.2.20 SyncConfig-extension

This XML element is an identity attribute. This XML element identifies the optional name of the rules extension assembly to use and indicates whether to run the extension within the synchronization server process.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-extension" type="xs:string" />
</xs:schema>
```

The value of this XML element is defined as either empty or as a string encoding of a sequence of an assembly-name XML element and an application-protection XML element.

Running the extension within the synchronization server process is indicated by setting the **application-protection** XML element's value to "low". To configure the synchronization engine to run the management agent outside the synchronization server process, the client MUST supply a value of "high" for the application-protection XML element.

When empty, the **SyncConfig-extension**, XML element indicates no metaverse extension. When the assembly-name XML element is provided within the **SyncConfig-extension** XML element, the client also MUST provide the application-protection XML element.

The rules extension is a .NET assembly that is located on the server in the synchronization engine's "extensions" folder and implements the IMASynchronization interface. If the client intends to configure any "scripted" mappings, for example in a join-criterion as defined in section 2.2.15.1.1, then the client MUST provide an **assembly-name** XML element in this identity attribute in which the value of the assembly-name XML element is the filename and extension of the rules extension.

The **assembly-name** value MUST NOT include any path components. The assembly-name value MUST NOT exceed 128 characters in length. The **assembly-name** value MUST include only one or more of:

- characters in the range [a-z]
- characters in the range [A-Z]
- characters in the range [0-9]
- the literal character "-"
- the literal character "_"
- the literal character " "
- the literal character "."
- the literal character ","

The assembly-name value MUST NOT be any of the following disallowed names:

```
"."
".."
"CON"
"PRN"
"AUX"
"CLOCK$"
"NUL"
"COM1"
"COM2"
"COM3"
"COM4"
"COM5"
"COM6"
"COM7"
"COM8"
"COM9"
"LPT1"
"LPT2"
"LPT3"
"LPT4"
"LPT5"
"LPT6"
"LPT7"
"LPT8"
"LPT9"
```

The assembly-name value MUST NOT be a disallowed name from the preceding list followed by a file extension.

This is an example of a valid extension XML element:

```
<extension>
  <assembly-name>MyExtension.dll</assembly-name>
  <application-protection>low</application-protection>
</extension>
```

2.2.21 SyncConfig-controller-configuration

This XML element is an identity attribute. This XML element describes how the management agent runs relative to the synchronization engine's server process.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-controller-configuration" type="xs:string" />
</xs:schema>
```

The value of this XML element is defined as either empty or as a string encoding of a sequence of an optional application-protection XML element, an optional application-architecture XML element and an optional impersonation XML element.

If the client intends to configure this management agent to run in a specific address space, this XML element MUST contain as a value a string encoding of an **application-protection** XML element. If the client intends to configure this management agent assembly's application architecture settings, this

XML element MUST contain an **application-architecture** XML element. If the client intends to configure this management agent to impersonate a particular identity at run time, this XML element MUST contain an impersonation XML element.

An example of the contents of this XML element is:

```
<rm:SyncConfig-controller-configuration>
  <application-protection>low</application-protection>
  <application-architecture>process</application-architecture>
  <impersonation>
    <domain>fabrikam</domain>
    <user>ssmith</user>
    <password>password</password>
  </impersonation>
</rm:SyncConfig-controller-configuration>
```

2.2.21.1 application-protection

The synchronization engine can either run the management agent within the synchronization engine's server process or outside the server process, depending on the value of the **application-protection** XML element. This XML element MUST have one of the following values:

application-protection Value	Description
low	Run the management agent within the synchronization engine's server process. This is the default behavior if the optional application-protection XML element is not provided.
high	Run the management agent in a separate process. This value MUST be supplied when the value of the application-architecture XML element is "x86".

2.2.21.2 application-architecture

The management agent can either be run as a 32-bit or 64-bit process by specifying an **application-architecture** XML element with one of the following values:

application-architecture Value	Description	Notes
process	Run the management agent in 32-bit or 64-bit process, whichever processor architecture the synchronization engine service is running	
x64	Run the management agent in a 64-bit process	This is the default behavior if the optional application-architecture XML element is not provided.
x86	Run the management agent in a 32-bit process	The value of the application-protection XML element MUST be "high" as a 32-bit management agent MUST run in a separate process.

2.2.21.3 impersonation

This XML element's value is a set of child XML elements, namely **domain**, user and password XML elements. The synchronization engine uses the value of the **impersonation** XML element to run the management agent using the identity specified with the **domain** and **user** XML elements. If this **impersonation** XML element is present, the **domain** and **user** XML elements MUST both be present (omission of the **password** XML element indicates that there is no password). If no impersonation context needs to be configured, the entire **impersonation** XML element MUST be omitted. When the client performs a **Get** on the **SyncConfig-controller-configuration** XML element, the password element is never returned.

2.2.21.3.1 domain

This XML element's value when it is provided in an **impersonation** XML element is a string containing the name of the domain in which the account specified in the **user** XML element specified in section 2.2.21.3.2 MUST exist.

2.2.21.3.2 user

This XML element's value is a string containing the name of the account to be impersonated when the management agent runs.

2.2.21.3.3 password

This XML element's value is a string containing the password with which the synchronization will log in to run the management agent.

2.2.22 SyncConfig-password-sync-allowed

This XML element is an identity attribute. The value of this XML element is an integer of 0 or 1. A value of 1 specifies that the management agent supports set password and change password. A value of 0 specifies that the management agent does not support setting or changing passwords.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-password-sync-allowed" type="xs:integer" />
</xs:schema>
```

2.2.23 SyncConfig-password-sync

This XML element is an identity attribute. This XML element allows configuration of the maximum retry count, retry interval (in seconds) and the whether to allow a low security connection to be used to propagate password, which is an integer value where 1 allows low security, and 0 does not.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-password-sync">
    <xs:simpleType>
```

```
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

This **SyncConfig-password-sync** XML element MUST contain as a value a string encoding of the sequence of a **maximum-retry-count** XML element, a **retry-interval** XML element, and an **allow-low-security** XML element.

An example of this XML element is:

```
<rm:SyncConfig-password-sync>
  <maximum-retry-count>10</maximum-retry-count>
  <retry-interval>60</retry-interval>
  <allow-low-security>0</allow-low-security>
</rm:SyncConfig-password-sync>
```

2.2.23.1 maximum-retry-count

This XML element's value is an integer indicating the number of times the synchronization engine will retry, in the event of failure, the attempt to export a password through the management agent.

2.2.23.2 retry-interval

This XML element's value is an integer indicating the number of seconds to wait after an attempt to export the same password in the event of an error at run time.

2.2.23.3 allow-low-security

This XML element's value is an integer with 0 and 1 as its permitted values. A value of 0 indicates that the synchronization will only attempt password synchronization with this management agent if the connection settings include security options such as sign and seal, SSL or SASL. A value of 1 indicates that the synchronization engine will attempt to synchronize passwords even if a less secure connection has been configured.

2.2.24 SyncConfig-ma-ui-settings

This XML element is an identity attribute.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-ma-ui-settings" type="xs:string" />
</xs:schema>
```

This identity attribute MUST be supplied by the client in a **Create** operation of an identity object of the ma-data object type and MUST be transferred as follows:

```
<rm:SyncConfig-ma-ui-settings>
```

```
  <account-joiner-queries>
    <attributes>
      <cs>
        <attribute name="&lt;DN&gt;" header="DN" size="220" />
        <attribute name="&lt;objectType&gt;" header="objectType" size="100" />
        <attribute name="displayname" header="displayname" size="100" />
      </cs>
      <mv>
        <attribute name="displayName" header="displayName" size="100" />
      </mv>
    </attributes>
    <filters max_mv_search_results="" />
  </account-joiner-queries>
</rm:SyncConfig-ma-ui-settings>
```

2.2.25 SyncConfig-private-configuration

This XML element is an identity attribute. This XML element contains management agent-specific configuration information.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-private-configuration" type="xs:string" />
</xs:schema>
```

The **SyncConfig-private-configuration** XML element can contain as a value a string encoding of exactly one of the XML elements **adma-configuration**, **ipma-configuration**, **edma-configuration**, **dsma-configuration**, **fimma-configuration** or **MAConfig**.

The sub-sections of this section define management agent-specific configuration for each of the following values of the **SyncConfig-category** XML element:

SyncConfig-category	XML sub-element
AD	adma-configuration
iPlanet	ipma-configuration
eDirectory	edma-configuration
IBM DS	dsma-configuration
FIM	fimma-configuration
Extensible	MAConfig

Each of the management agents listed in the preceding table by **SyncConfig-category** MUST have a corresponding XML element that is management agent specific from one of the five sub-sections of this section.

A management agent with **SyncConfig-category** value equal to "AD" MUST include an adma-configuration XML element.

A management agent with **SyncConfig-category** value equal to "iPlanet" MUST include an ipma-configuration XML element.

A management agent with **SyncConfig-category** value equal to "eDirectory" MUST include an **edma-configuration** XML element.

A management agent with **SyncConfig-category** value equal to "IBM DS" MUST include a **dsma-configuration** XML element.

A management agent with **SyncConfig-category** value equal to "FIM" MUST include a fimma-configuration XML element.

2.2.25.1 adma-configuration

The Active Directory private configuration XML element adma-configuration stores forest connection information. When the management agent's **SyncConfig-category** XML element's value is "AD", the **SyncConfig-private-configuration** XML element MUST contain as its value a string encoding of an adma-configuration XML element.

The **adma-configuration** XML element MUST contain a **forest-name** XML element, a **forest-login-domain** XML element, a **forest-login-user** XML element, a **ssl-bind** XML element, and a **sign-and-seal** XML element. In addition, the AD management agent can be configured for Exchange 2007 SP1 provisioning by adding a **cd-extension** XML fragment after the sign-and-seal element.

The password for the management agent to use at login time when the synchronization engine is running MUST be supplied by the client in the **SyncConfig-encrypted** attributes **identity** attribute as specified in section 2.2.30. The password attribute MUST be supplied as an attribute XML element with the name "password" and the value MUST be the password that corresponds to the account specified in the forest-login-user XML element as specified in section 2.2.25.1.3.

An example of AD private configuration follows:

```
<adma-configuration>
  <forest-name>forest-01.fabrikam.com</forest-name>
  <forest-login-domain>domain</forest-login-domain>
  <forest-login-user>administrator</forest-login-user>
  <ssl-bind crl-check="0">0</ssl-bind>
  <sign-and-seal>1</sign-and-seal>
  <cd-extension>
    <assembly-name>Exch2007Extension.dll</assembly-name>
    <application-protection>low</application-protection>
    <pre-export>0</pre-export>
    <post-export>1</post-export>
    <pre-import>0</pre-import>
  </cd-extension>
</adma-configuration>
```

2.2.25.1.1 forest-name

The **forest-name** XML element is provided in the **adma-configuration** XML element. This XML element's value is either the NetBIOS name or the DNS name of the AD forest that this management agent connects to at run time for imports and exports at run time.

2.2.25.1.2 forest-login-domain

The **forest-login-domain** XML element is provided in the **adma-configuration** XML element. This XML element's value is name of the domain in which the login user account exists.

2.2.25.1.3 forest-login-user

The **forest-login-user** XML element is provided in the **adma-configuration** XML element. This XML element's value is the account name with which the management agent logs in. This account name is used by the synchronization engine when this management agent runs.

2.2.25.1.4 ssl-bind

The **ssl-bind** XML element is provided in the **adma-configuration** XML element. This XML element's value is an integer with permitted values as the literal strings 1 and 0. A value of 1 specifies that the management agent will use SSL to bind with AD. A value of 0 specifies that the management agent will not use SSL to bind with AD. The crl-check XML attribute's MUST be provided and the values of this XML attribute are the literal strings 1 and 0. A value of 1 specifies that the management agent is check the validity of the AD server's SSL certificate using a certificate revocation list (CRL). A value of 0 specifies that the management agent will not check the AD server's SSL certificate.

2.2.25.1.5 sign-and-seal

The **sign-and-seal** XML element is provided in the **adma-configuration** XML element. The **sign-and-seal** XML element's value specifies whether the management agent is to use Kerberos signing and sealing (encryption) as defined in [RFC1964] for communication to the directory server at import and export time. The permitted values for this XML element are the literal strings 1 and 0. A value of 1 specifies that the management agent uses both signing and sealing encryption when communicating with the AD server. A value of 0 specifies that signing and sealing encryption is not to be used by the management agent when communicating with the AD server.

2.2.25.1.6 cd-extension

When the client intends to configure the AD management agent with messaging server management capabilities, the client MUST provide a **cd-extension** XML element inside the **adma-configuration** XML element.

The **cd-extension** XML element MUST contain an **assembly-name** XML element, an **application-protection** XML element, a **pre-export** XML element, a **post-export** XML element, and a **pre-import** XML element.

```
<cd-extension>
  <assembly-name>Exch2007Extension.dll</assembly-name>
  <application-protection>low</application-protection>
  <pre-export>0</pre-export>
  <post-export>1</post-export>
  <pre-import>0</pre-import>
</cd-extension>
```

2.2.25.1.6.1 assembly-name

The **assembly-name** XML element is provided in the **cd-extension** XML element. The **assembly-name** XML element MUST be provided when the **cd-extension** XML element is provided. The value of the **assembly-name** XML element MUST be the literal string "Exch2007Extension.dll".

2.2.25.1.6.2 application-protection

The **application-protection** XML element is provided in the **cd-extension** XML element. The **application-protection** XML element's value specifies whether the Exchange 2007 SP1 extension runs in the synchronization's address space at import and export time. The permitted values are the literal strings "low" or "high". A value of "low" specifies that the Exchange 2007 SP1 extension runs in the synchronization engine process's address space. A value of "high" specifies that the Exchange 2007 SP1 extension runs outside the synchronization engine's process.

2.2.25.1.6.3 pre-export

The **pre-export** XML element MUST be provided in the **cd-extension** XML element. The value of the **pre-export** XML element MUST be the literal string value "0"

2.2.25.1.6.4 post-export

The **post-export** XML element MUST be provided in the **cd-extension** XML element. The value of the **post-export** XML element MUST be the literal string value "1"

2.2.25.1.6.5 pre-import

The **pre-import** XML element MUST be provided in the **cd-extension** XML element. The value of the **pre-import** XML element MUST be the literal string value "0"

2.2.25.2 ipma-configuration

This XML element MUST be provided in the **SyncConfig-private-configuration** XML element when the **SyncConfig-category** XML element's value is "iPlanet". This XML element's value, when provided, MUST contain a **default-server** XML element, **default-port** XML element, **default-login-user** XML element, **default-ssl-bind** XML element and **default-sasl-mechanism** XML element.

The password for the management agent to use at login time when the synchronization engine is running MUST be supplied by the client in the **SyncConfig-encrypted** attributes **identity** attribute as specified in section 2.2.30. The **password** attribute MUST be supplied as an attribute XML element with the name "password" and the value MUST be the password that corresponds to the account specified in the **default-login-user** XML element as specified in section 2.2.25.2.

An example of Sun ONE and Netscape Directory Server management agent private configuration:

```
<ipma-configuration>
  <default-server>miis-ip5-bvt</default-server>
  <default-port>389</default-port>
  <default-login-user>cn=Directory Manager</default-login-user>
  <default-ssl-bind>0</default-ssl-bind>
  <default-sasl-mechanism>DIGEST-MD5</default-sasl-mechanism>
  <ui-data>
    <session>{709DAEED-29B1-47A5-9B4A-375F38C66DA7}</session>
    <server-type>SERVER_TYPE_IPLANET5</server-type>
    <supportchangelog>1</supportchangelog>
  </ui-data>
  <anti-trawling/>
</ipma-configuration>
```

2.2.25.2.1 default-server

The **default-server** XML element MUST be provided in the **ipma-configuration** XML element. The value of the **default-server** XML element is an identifier of the server for the management agent to communicate with at import and export time. The server MUST be identified by one of its DNS name, its NetBIOS name, its IPv4 address or its IPv6 address.

2.2.25.2.2 default-port

The **default-port** XML element MUST be provided in the ipma-configuration XML element. The value of the **default-port** XML element is an integer that specifies the TCP port number for the LDAP connection to the server at import and export time.

2.2.25.2.3 default-login-user

The **default-login-user** XML element MUST be provided in the **ipma-configuration** XML element. The value of the **default-login-user** is common name of the user for logon when the management agent connects to the directory server.

2.2.25.2.4 default-ssl-bind

The **default-ssl-bind** XML element MUST be provided in the **ipma-configuration** XML element. The permitted values of the **default-ssl-bind** XML element are the string literal "0" or the string literal "1". A value of "1" specifies that the management agent is to use SSL at bind time when the management agent connects to the directory server. A value of "0" specifies that the management agent is not to use SSL at bind time when connecting to the directory server.

2.2.25.2.5 default-sasl-mechanism

The **default-sasl-mechanism** XML element MUST be provided in the **ipma-configuration** XML element. The value of this XML element MUST be the string literal "DIGEST-MD5".

2.2.25.2.6 ui-data

The **ui-data** XML element, when returned by the synchronization engine to the client as the result of a **Get** or **Enumerate**, MUST be provided in the **ipma-configuration** XML element and MUST NOT be provided on a **Create** operation. The value of the **ui-dat**a XML element is a **session** XML element, a **server-type** XML element, and a **supportchangelog** XML element.

Directory server information discovered by the management is stored in XML elements contained in the **ui-data** XML element.

2.2.25.2.6.1 session

The **session** XML element's value is a GUID that represents a session token the management agent uses to keep track of its connection between operations. This XML element MUST NOT be provided by the client on a **Create**. This information is returned to the client by the synchronization engine as the result of a **Get** or **Enumerate**.

2.2.25.2.6.2 server-type

The **server-type** XML element's value is a string that is determined by the management agent. The string specifies the directory server type, which MUST be either the literal string "SERVER_TYPE_IPLANET5" or the literal string "SERVER_TYPE_IPLANET4". The value of the **server-type** XML element is determined by the management agent. This XML element MUST NOT be provided by the client on a **Create**. This information is returned to the client by the synchronization engine as a result of a **Get** or **Enumerate**.

2.2.25.2.6.3 supportchangelog

The **supportchangelog** XML element's value is either the literal string "0" or "1". The value is determined by the management agent. The value "1" indicates that the management agent has determined the directory server implements an LDAP change log. The "0" indicates that the management agent has determined the directory server does not implement an LDAP change log. This XML element MUST NOT be provided by the client on a **Create**. This information is returned to the client by the synchronization engine as a result of a **Get** or **Enumerate**.

2.2.25.2.7 anti-trawling

The anti-trawling XML element MUST be empty.

2.2.25.3 edma-configuration

For the Novell eDirectory management agent, this XML element specifies the partition connection data, server information and trawling filters, and MUST be provided when the management agent's **SyncConfig-category** XML element's value is "eDirectory".

The **edma-configuration** element MUST contain the following XML elements: default-server, default-port, default-login-user, default-ssl-bind, default-sasl-mechanism, avoid-vlv and anti-trawling.

The password for the management agent to use at login time when the synchronization engine is running MUST be supplied by the client in the SyncConfig-encrypted attributes identity attribute as specified in section 2.2.30. The password attribute MUST be supplied as an attribute XML element with the name "password" and the value MUST be the password that corresponds to the account specified in the default-login-user XML element as specified in section 2.2.25.2.

An example of Novell eDirectory management agent private configuration follows:

```
<edma-configuration>
  <default-server>miis-ip5-bvt</default-server>
  <default-port>389</default-port>
  <default-login-user>cn=Directory Manager</default-login-user>
  <default-ssl-bind>0</default-ssl-bind>
  <default-sasl-mechanism>DIGEST-MD5</default-sasl-mechanism>
  <avoid-vlv>1</avoid-vlv>
  <anti-trawling/>
</edma-configuration>
```

2.2.25.3.1 default-server

The **default-server** XML element MUST be provided in the **edma-configuration** XML element. The value of the **default-server** XML element is an identifier of the server for the management agent to communicate with at import and export time. The server MUST be identified by one of its DNS name, its NetBIOS name, its IPv4 address or its IPv6 address.

2.2.25.3.2 default-port

The **default-port** XML element MUST be provided in the **edma-configuration** XML element. The value of the **default-port** XML element is an integer that specifies the TCP port number for the LDAP connection to the server at import and export time.

2.2.25.3.3 default-login-user

The **default-login-user** XML element MUST be provided in the **edma-configuration** XML element. The value of the **default-login-user** is common name of the user for logon when the management agent connects to the directory server.

2.2.25.3.4 default-ssl-bind

The **default-ssl-bind** XML element MUST be provided in the **edma-configuration** XML element. The permitted values of the **default-ssl-bind** XML element are the string literal "0" or the string literal "1". A value of "1" specifies that the management agent is to use SSL at bind time when the management agent connects to the directory server. A value of "0" specifies that the management agent is not to use SSL at bind time when connecting to the directory server.

2.2.25.3.5 default-sasl-mechanism

The default-**sasl-mechanism** XML element MUST be provided in the **edma-configuration** XML element. The value of this XML element MUST be the string literal "DIGEST-MD5".

2.2.25.3.6 avoid-vlv

The **avoid-vlv** XML element MUST be provided in the **edma-configuration** XML element. The **avoid-vlv** XML element MUST be supplied with a value equal to the string literal "1".

2.2.25.3.7 anti-trawling

The **anti-trawling** XML element MUST be provided in the **edma-configuration** XML element and the **anti-trawling** XML element MUST be empty.

2.2.25.4 dsma-configuration

For the IBM Directory server management agent, this XML element specifies the partition connection data, server information and trawling filters and MUST be provided when the management agent's **SyncConfig-category** XML element's value is "IBM DS".

The name of the server is specified using the **default-server** element. The port for the server is specified using the **default-por**t element. The user name for logon is specified with the **default-login-user** element. SSL is specified using the **default-ssl-bind** element, where a value of 1 is used to activate the feature and a value of 0 is used to deactivate the feature. The SASL mechanism is specified using the **default-sasl-mechanism** element, which can only contain DIGEST_MD5. This XML element MUST be provided. These attributes correspond to the Server, Port, User name, Enabled Secure Socket Layer (SASL) for communication, and Enabled Simple Authentication and Security Layer (SASL) for communication and determine how the management agent connects to the connected data source. For the Password, see **SyncConfig-encrypted-attributes** in section 2.2.30.

Server information is stored in the **ui-data** element. The server-type is the server type, which MUST be 0 for an unknown version, 4 for version 4.x or 5 for version 5.x or 6.x as determined by the management agent.

An example of IBM Directory Server management agent private configuration follows:

```
<dsma-configuration>
  <default-server>miis-ip5-bvt</default-server>
  <default-port>389</default-port>
  <default-login-user>cn=Directory Manager</default-login-user>
  <default-ssl-bind>0</default-ssl-bind>
  <default-sasl-mechanism>DIGEST-MD5</default-sasl-mechanism>
   <ui-data>
    <session>{709DAEED-29B1-47A5-9B4A-375F38C66DA7}</session>
    <server-type>5</server-type>
  </ui-data>
</dsma-configuration>
```

2.2.25.4.1 default-server

The **default-server** XML element MUST be provided in the **dsma-configuration** XML element. The value of the **default-serve**r XML element is a string identifier of the server for the management agent to communicate with at import and export time. The server MUST be identified by one of its DNS name, its NetBIOS name, its IPv4 address or its IPv6 address.

2.2.25.4.2 default-port

The **default-port** XML element MUST be provided in the **dsma-configuration** XML element. The value of the **default-port** XML element is an integer that specifies the TCP port number for the LDAP connection to the server at import and export time.

2.2.25.4.3 default-login-user

The **default-login-user** XML element MUST be provided in the **dsma-configuration** XML element. The value of the **default-login-user** is common name of the user for logon when the management agent connects to the directory server.

2.2.25.4.4 default-ssl-bind

The **default-ssl-bind** XML element MUST be provided in the **dsma-configuration** XML element. The permitted values of the **default-ssl-bind** XML element are the string literal "0" or the string literal "1". A value of "1" specifies that the management agent is to use SSL at bind time when the management agent connects to the directory server. A value of "0" specifies that the management agent is not to use SSL at bind time when connecting to the directory server.

2.2.25.4.5 default-sasl-mechanism

The SASL mechanism is specified using the **default-sasl-mechanism** XML element, which MUST contain the string literal "DIGEST-MD5" for IBM Directory Server versions 5.2 and higher. For lower versions of IBM Directory Server, the management agent does not use any SASL mechanism.

2.2.25.4.6 ui-data

The **ui-data** XML element, when returned by the synchronization engine to the client as the result of a **Get** or **Enumerate**, MUST be provided in the **dsma-configuration** XML element and MUST NOT be provided on a **Create** operation. The value of the **ui-data** XML element is a **session** XML element and a **server-type** XML element.

Directory server information discovered by the management is stored in XML elements contained in the **ui-data** XML element.

2.2.25.4.6.1 session

The **session** XML element's value is a GUID that represents a session token the management agent uses to keep track of its connection between operations. This XML element MUST NOT be provided by the client on a **Create**. This information is returned to the client by the synchronization engine as the result of a **Get** or **Enumerate**.

2.2.25.4.6.2 server-type

The **server-type** XML element has a value that is an integer that represents the server type, which MUST be 0 for an unknown version, 4 for version 4.x or 5 for version 5.x or 6.x as determined by the management agent. The value of the server-type XML element is determined by the management agent. This XML element MUST NOT be provided by the client on a **Create**. This information is returned to the client by the synchronization engine as a result of a **Get** or **Enuerate**.

2.2.25.5 fimma-configuration

The FIM management agent private configuration section stores configuration and runtime properties, including

- Schema information
- Connection information

The **fimma-configuration** XML element MUST contain an **mms-info** XML element and a **connection-info** XML element.

2.2.25.5.1 mms-info

The **mms-info** XML element contains a sequence of zero or more **column-info** XML elements. Each **column-info** XML element describes the schema of an object type in the connector space schema when the **SyncConfig-category** has a value of "FIM".

2.2.25.5.2 column-info

The **column-info** XML element contains a sequence of one or more **column** XML elements. The **column-info** XML element MUST include a **name** XML attribute. The value of the **name** XML attribute MUST be provided. The value of the **name** XML attribute is a string that contains a connector space object type name. When the **name** XML attribute has the value "Group", the isDynamic XML attribute of the **column-info** MUST be provided by the client with a value of a literal string "1".

```
<column-info name="Group" isDynamic="1">
  <column>
    <name>AccountName</name>
    <data-type>String</data-type>
    <isrequired>0</isrequired>
    <ismultivalued>0</ismultivalued>
  </column>
  <column>
    <name>Description</name>
    <data-type>String</data-type>
    <isrequired>0</isrequired>
    <ismultivalued>0</ismultivalued>
  </column>
  <column>
    <name>DisplayName</name>
    <data-type>String</data-type>
    <isrequired>0</isrequired>
    <ismultivalued>0</ismultivalued>
  </column>
  <column>
    <name>Owner</name>
    <data-type>Reference</data-type>
    <isrequired>0</isrequired>
    <ismultivalued>1</ismultivalued>
  </column>
  <column>
    <name>ObjectSID</name>
    <data-type>Binary</data-type>
    <isrequired>0</isrequired>
    <ismultivalued>0</ismultivalued>
  </column>
  <column>
    <name>Member</name>
    <data-type>Reference</data-type>
    <isrequired>0</isrequired>
    <ismultivalued>1</ismultivalued>
  </column>
</column-info>
```

2.2.25.5.2.1 column

The **column** XML element MUST provide a **name** XML element, a **data-type** XML element, an **isrequired** XML element, and an **ismultivalued** XML element.

2.2.25.5.2.1.1 name

The **name** XML element MUST be provided in a **column** XML element. The value of the **name** XML element is a string containing the name of a connector space attribute defined in the connector space schema as specified in the **SyncConfig-schema** identity attribute for this management agent when the **SyncConfig-category** is "FIM".

2.2.25.5.2.1.2 data-type

The **data-type** XML element MUST be provided in a **column** XML element. The value of the **data-type** XML element MUST be one of the following permitted string literal values:

- Reference
- Binary
- String
- DateTime
- Text
- Boolean

2.2.25.5.2.1.3 isrequired

The **isrequired** XML element MUST be provided in a **column** XML element. The permitted values for the **isrequired** XML element are the string literal "1" meaning the connector space attribute is required on each connector space object, or the string "0" meaning the connector space attribute is optional on each connector space object.

2.2.25.5.2.1.4 ismultivalued

The **ismultivalued** XML element MUST be provided in a **column** XML element. The permitted values for the **ismultivalued** XML element are the string literal "1" meaning the connector space attribute is multi-valued, or the string "0" meaning the connector space attribute is not multi-valued.

2.2.25.5.3 connection-info

The **connection-info** XML element MUST be provided in the fimma-configuration XML element when the **SyncConfig-category** identity attribute has the value "FIM".

The **connection-info** XML element MUST contain a **serviceHost** XML element, a **server** XML element, a **database** XML element, an **authentication** XML element, a **user** XML element, and a **domain** XML element.

The password for the management agent to use at login time when the synchronization engine is running MUST be supplied by the client in the SyncConfig-encrypted attributes identity attribute as specified in section 2.2.30. The password attribute MUST be supplied as an **attribute** XML element with a name "password" and the value MUST be the password that corresponds to the account specified in the user XML element as specified in section 2.2.25.5.3.5.

The following is an example of a **connection-info** XML element:

```
<connection-info>
  <serviceHost>http://FIM-SERVER1:5725</serviceHost>
  <authentication>integrated</authentication>
  <server>FIM-SERVER1\SQLEXPRESS</server>
  <databasename>FIMService</databasename>
  <user>FIMSvcAcct</user>
  <domain>Fabrikam</domain>
</connection-info>
```

2.2.25.5.3.1 server

The **server** XML element MUST be provided in a **connection-info** XML element. The value of the **server** XML element is the computer name and the database instance name of the FIM service database.

2.2.25.5.3.2 serviceHost

The **serviceHost** XML element MUST be provided in a **connection-info** XML element. The value of the **serviceHost** XML element is the **URI** of the synchronization engine's web service.

2.2.25.5.3.3 authentication

The **authentication** XML element MUST be provided in a **connection-info** XML element. The value of the **authentication** XML element MUST be the literal string "integrated".

2.2.25.5.3.4 databasename

The **databasename** XML element when it is provided in a **connection-info** XML element specifies as its value the name of the database to which the management agent connects.

2.2.25.5.3.5 user

The **user** XML element when it is provided in a **connection-info** XML element specifies as its value the username for the management agent to use when connecting to the database.

2.2.25.5.3.6 domain

This XML element's value when it is provided in a **connection-info** XML element is a string containing the name of the domain in which the account specified in the user XML element exists.

2.2.25.6 Extensible

The **SyncConfig-private-configuration** identity attribute contains a string encoding of an **MAConfig** XML element and MUST be provided by the client when the **SyncConfig-category** is "Extensible".

The configuration specifies:

- Schema file and encoding
- Partitions
- Class mappings
- Object Classes
- Attributes
- DN and Anchor settings
- Change type attributes and values
- Extension configuration
- File type
- Data normalization
- Password extension configuration

An example of Extensible private configuration under its parent **SyncConfig-private-configuration** parent identity attribute XML element is:

```
<rm:SyncConfig-private-configuration>
      <MAConfig>
        <ui-data>
          <xmlwizard>
            <properties>
              <code page description>Unicode (UTF-8)</code page description>
            </properties>
            <partitions>
              <partition cd_name="default" guid="{B7FF22CB-99F8-44AD-8FBB-E522F707BC2B}"
version="28">
                <object class>user</object class>
                <object_class>group</object_class>
                <object_class>contact</object_class>
                <object_class>organization</object_class>
              </partition>
            </partitions>
            <primary class mappings>
              <mapping object_class="user" primary_class="user" user_define="-1">
                <attribute>domain</attribute>
                <attribute>SPS-DistinguishedName</attribute>
                <attribute>PreferredName</attribute>
                <attribute>SPS-SourceObjectDN</attribute>
                <attribute>UserName</attribute>
                <attribute>SID</attribute>
                <attribute>AccountName</attribute>
                <attribute>Manager</attribute>
                <attribute>UserProfile_GUID</attribute>
                <attribute>ADGuid</attribute>
                <attribute>FirstName</attribute>
                <attribute>LastName</attribute>
                <attribute>WorkPhone</attribute>
                <attribute>WorkEmail</attribute>
                <attribute>Office</attribute>
                <attribute>Title</attribute>
                <attribute>Department</attribute>
                <attribute>PublicSiteRedirect</attribute>
                <attribute>SPS-Memberof</attribute>
                <attribute>SPS-SipAddress</attribute>
                <attribute>SPS-ProxyAddresses</attribute>
                <attribute>SourceReference</attribute>
                <attribute>Description</attribute>
                <attribute>Url</attribute>
                <attribute>Member</attribute>
                <attribute>GroupType</attribute>
                <attribute>MailNickName</attribute>
                <attribute>UserProperty</attribute>
                <attribute>Hobbies</attribute>
              </mapping>
              <mapping object_class="group" primary_class="group" user_define="-1">
                <attribute>domain</attribute>
                <attribute>SPS-DistinguishedName</attribute>
                <attribute>PreferredName</attribute>
                <attribute>SPS-SourceObjectDN</attribute>
                <attribute>UserName</attribute>
                <attribute>SID</attribute>
                <attribute>AccountName</attribute>
                <attribute>Manager</attribute>
                <attribute>UserProfile GUID</attribute>
                <attribute>ADGuid</attribute>
                <attribute>FirstName</attribute>
                <attribute>LastName</attribute>
                <attribute>WorkPhone</attribute>
                <attribute>WorkEmail</attribute>
                <attribute>Office</attribute>
                <attribute>Title</attribute>
                <attribute>Department</attribute>
                <attribute>PublicSiteRedirect</attribute>
                <attribute>SPS-Memberof</attribute>
                <attribute>SPS-SipAddress</attribute>
```

```
                <attribute>SPS-ProxyAddresses</attribute>
                <attribute>SourceReference</attribute>
                <attribute>Description</attribute>
                <attribute>Url</attribute>
                <attribute>Member</attribute>
                <attribute>GroupType</attribute>
                <attribute>MailNickName</attribute>
                <attribute>UserProperty</attribute>
                <attribute>Hobbies</attribute>
              </mapping>
              <mapping object class="contact" primary class="contact" user define="-1">
                <attribute>domain</attribute>
                <attribute>SPS-DistinguishedName</attribute>
                <attribute>PreferredName</attribute>
                <attribute>SPS-SourceObjectDN</attribute>
                <attribute>UserName</attribute>
                <attribute>SID</attribute>
                <attribute>AccountName</attribute>
                <attribute>Manager</attribute>
                <attribute>UserProfile_GUID</attribute>
                <attribute>ADGuid</attribute>
                <attribute>FirstName</attribute>
                <attribute>LastName</attribute>
                <attribute>WorkPhone</attribute>
                <attribute>WorkEmail</attribute>
                <attribute>Office</attribute>
                <attribute>Title</attribute>
                <attribute>Department</attribute>
                <attribute>PublicSiteRedirect</attribute>
                <attribute>SPS-Memberof</attribute>
                <attribute>SPS-SipAddress</attribute>
                <attribute>SPS-ProxyAddresses</attribute>
                <attribute>SourceReference</attribute>
                <attribute>Description</attribute>
                <attribute>Url</attribute>
                <attribute>Member</attribute>
                <attribute>GroupType</attribute>
                <attribute>MailNickName</attribute>
                <attribute>UserProperty</attribute>
                <attribute>Hobbies</attribute>
              </mapping>
              <mapping object class="organization" primary class="organization"
user_define="-1">
                <attribute>domain</attribute>
                <attribute>SPS-DistinguishedName</attribute>
                <attribute>PreferredName</attribute>
                <attribute>SPS-SourceObjectDN</attribute>
                <attribute>UserName</attribute>
                <attribute>SID</attribute>
                <attribute>AccountName</attribute>
                <attribute>Manager</attribute>
                <attribute>UserProfile GUID</attribute>
                <attribute>ADGuid</attribute>
                <attribute>FirstName</attribute>
                <attribute>LastName</attribute>
                <attribute>WorkPhone</attribute>
                <attribute>WorkEmail</attribute>
                <attribute>Office</attribute>
                <attribute>Title</attribute>
                <attribute>Department</attribute>
                <attribute>PublicSiteRedirect</attribute>
                <attribute>SPS-Memberof</attribute>
                <attribute>SPS-SipAddress</attribute>
                <attribute>SPS-ProxyAddresses</attribute>
                <attribute>SourceReference</attribute>
                <attribute>Description</attribute>
                <attribute>Url</attribute>
                <attribute>Member</attribute>
                <attribute>GroupType</attribute>
```

```
                <attribute>MailNickName</attribute>
                <attribute>UserProperty</attribute>
                <attribute>Hobbies</attribute>
              </mapping>
            </primary_class_mappings>
            <object classes>
              <object_class cd_name="user" selected="-1" user_define="0" configured="-1"
anchor="" dn_as_anchor="-1">
                <attribute mandatory="0">domain</attribute>
                <attribute mandatory="-1">SPS-DistinguishedName</attribute>
                <attribute mandatory="-1">SID</attribute>
                <attribute mandatory="-1">AccountName</attribute>
                <attribute mandatory="0">Manager</attribute>
                <attribute mandatory="0">UserProfile_GUID</attribute>
                <attribute mandatory="0">ADGuid</attribute>
                <attribute mandatory="0">FirstName</attribute>
                <attribute mandatory="0">LastName</attribute>
                <attribute mandatory="0">PreferredName</attribute>
                <attribute mandatory="0">WorkPhone</attribute>
                <attribute mandatory="0">WorkEmail</attribute>
                <attribute mandatory="0">Office</attribute>
                <attribute mandatory="0">Title</attribute>
                <attribute mandatory="0">Department</attribute>
                <attribute mandatory="-1">UserName</attribute>
                <attribute mandatory="0">PublicSiteRedirect</attribute>
                <attribute mandatory="0">SPS-Memberof</attribute>
                <attribute mandatory="0">SPS-SipAddress</attribute>
                <attribute mandatory="0">SPS-ProxyAddresses</attribute>
                <attribute mandatory="0">SPS-SourceObjectDN</attribute>
                <attribute mandatory="0">UserProperty</attribute>
                <attribute mandatory="0">Hobbies</attribute>
              </object_class>
              <object_class cd_name="group" selected="-1" user_define="0" configured="-1"
anchor="" dn as anchor="-1">
                <attribute mandatory="0">domain</attribute>
                <attribute mandatory="-1">SourceReference</attribute>
                <attribute mandatory="-1">SID</attribute>
                <attribute mandatory="0">PreferredName</attribute>
                <attribute mandatory="0">Description</attribute>
                <attribute mandatory="0">Url</attribute>
                <attribute mandatory="0">Member</attribute>
                <attribute mandatory="0">GroupType</attribute>
                <attribute mandatory="0">MailNickName</attribute>
                <attribute mandatory="0">SPS-DistinguishedName</attribute>
              </object_class>
              <object class cd name="contact" selected="-1" user define="0" configured="-1"
anchor="" dn_as_anchor="-1">
                <attribute mandatory="0">domain</attribute>
                <attribute mandatory="-1">SPS-DistinguishedName</attribute>
                <attribute mandatory="0">PreferredName</attribute>
                <attribute mandatory="0">SPS-SourceObjectDN</attribute>
                <attribute mandatory="-1">UserName</attribute>
              </object_class>
              <object class cd name="organization" selected="-1" user define="0"
configured="-1" anchor="UserProfile_GUID" dn_as_anchor="0">
                <attribute mandatory="-1">UserProfile_GUID</attribute>
                <attribute mandatory="-1">PreferredName</attribute>
              </object class>
            </object classes>
            <attributes>
              <attribute cd_name="domain" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
              <attribute cd_name="SPS-DistinguishedName" binary="0" sample_data=""
multi valued="0" file reference="0" selected="-1" type="String" lower bound="" upper bound=""
user_define="-1" />
              <attribute cd_name="PreferredName" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
```

```
            <attribute cd_name="SPS-SourceObjectDN" binary="0" sample_data=""
multi_valued="0" file_reference="0" selected="-1" type="String" lower_bound="" upper_bound=""
user_define="-1" />
            <attribute cd_name="UserName" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="SID" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="Binary" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="AccountName" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd_name="Manager" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="DN" lower_bound="" upper_bound="" user_define="-1" />
            <attribute cd_name="UserProfile_GUID" binary="0" sample_data=""
multi_valued="0" file_reference="0" selected="-1" type="Binary" lower_bound="" upper_bound=""
user define="-1" />
            <attribute cd_name="ADGuid" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="Binary" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd_name="FirstName" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="LastName" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="WorkPhone" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="WorkEmail" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd_name="Office" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd name="Title" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="Department" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd name="PublicSiteRedirect" binary="0" sample data=""
multi_valued="0" file_reference="0" selected="-1" type="String" lower_bound="" upper_bound=""
user_define="-1" />
            <attribute cd_name="SPS-Memberof" binary="0" sample_data="" multi_valued="-1"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd name="SPS-SipAddress" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="SPS-ProxyAddresses" binary="0" sample_data=""
multi valued="-1" file reference="0" selected="-1" type="String" lower bound=""
upper_bound="" user_define="-1" />
            <attribute cd name="SourceReference" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd name="Description" binary="0" sample data="" multi valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd_name="Url" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd name="Member" binary="0" sample data="" multi valued="-1"
file_reference="0" selected="-1" type="DN" lower_bound="" upper_bound="" user_define="-1" />
            <attribute cd name="GroupType" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="Number" lower_bound="" upper_bound="" user_define="-1"
/>
```

```
              <attribute cd_name="MailNickName" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
              <attribute cd_name="UserProperty" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="Number" lower_bound="" upper_bound="" user_define="-1"
/>
              <attribute cd_name="Hobbies" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            </attributes>
          </xmlwizard>
        </ui-data>
        <importing>
          <anchor>
            <attribute>UserProfile_GUID</attribute>
          </anchor>
          <per-class-settings>
            <class>
              <name>user</name>
              <anchor>
                <dn />
              </anchor>
            </class>
            <class>
              <name>group</name>
              <anchor>
                <dn />
              </anchor>
            </class>
            <class>
              <name>contact</name>
              <anchor>
                <dn />
              </anchor>
            </class>
            <class>
              <name>organization</name>
              <anchor>
                <attribute>UserProfile_GUID</attribute>
              </anchor>
            </class>
          </per-class-settings>
        </importing>
        <exporting></exporting>
        <ldif_format>
          <code page>65001</code page>
        </ldif_format>
        <primary class mappings>
          <mapping>
            <primary_class>user</primary_class>
            <oc-value>user</oc-value>
          </mapping>
          <mapping>
            <primary class>group</primary class>
            <oc-value>group</oc-value>
          </mapping>
          <mapping>
            <primary class>contact</primary class>
            <oc-value>contact</oc-value>
          </mapping>
          <mapping>
            <primary_class>organization</primary_class>
            <oc-value>organization</oc-value>
          </mapping>
        </primary class mappings>
        <password-extension-config>
          <password-extension-enabled>0</password-extension-enabled>
          <dll></dll>
          <password-set-enabled></password-set-enabled>
```

```
        <password-change-enabled></password-change-enabled>
        <connection-info>
          <connect-to></connect-to>
          <user></user>
        </connection-info>
        <timeout></timeout>
      </password-extension-config>
      <extension-config>
        <filename>My.ManagementAgent.dll</filename>
        <export-mode>call-based</export-mode>
        <import-enabled>1</import-enabled>
        <export-enabled>1</export-enabled>
        <connection-info>
          <connect-to>http://Europe/Fabrikam/Identity.asmx</connect-to>
          <user>FabEurope\IDService</user>
        </connection-info>
        <attributes />
      </extension-config>
      <file-type>LDIF</file-type>
    </MAConfig>
  </rm:SyncConfig-private-configuration>
```

2.2.25.6.1 MAConfig

The **SyncConfig-private-configuration** identity attribute contains a string encoding of a MAConfig XML element and MUST be provided by the client when the **SyncConfig-category** is "Extensible".

The MAConfig XML element MUST contain a **ui-data** XML element, importing XML element, exporting XML element, ldif_format XML element, primary_class_mappings XML element, password-extension-config XML element, extension-config XML element, file-type XML element, and a case_normalize_dn_for_anchor XML element.

2.2.25.6.2 ui-data

The **ui-data** XML element has no attributes and MUST be provided within the **MAconfig** XML element when the value of the **SyncConfig-category** identity attribute is "Extensible". This XML element MUST contain an **xmlwizard** XML element.

2.2.25.6.3 xmlwizard

The **xmlwizard** element is a parent for all discovered schema elements. This XML element has no attributes and MUST be provided for an extensible management agent.

2.2.25.6.4 properties

The **properties** XML element contains the location of the schema file and the identifier of the code page used to discover schema. The **sample_file** XML element contains as a value the full path to the schema file. The **code_page_description** XML element contains as its value the name of the code page used to read the file. These elements provide information the management agent uses to parse an input file.

The following is an example of the properties XML element:

```
<properties>
  <sample_file>
    C:\Template.txt
  </sample file>
  <code_page_description>
    Western European (Windows)
  </code_page_description>
```

```
</properties>
```

2.2.25.6.5 partitions

The **partitions** XML element is a parent for the object class to partition mapping. Each directory partition MUST be specified with a partition element contained within a **partitions** XML element. The partition XML element has three XML attributes: **cd_name**, **guid** and **version**. The **cd-name** XML attribute specifies the name of the partition. The **guid** XML attribute specifies a GUID that uniquely defines the partition; its value MUST be a GUID. The **version** XML attribute specifies the version of the partition. When updating the **SyncConfig-private-configuration** XML element the client MUST provide the same value for the **version** XML attribute that it received when last getting the **ma-data** object. If this number received by the server is less than the current version stored in the server, the server MUST return an unwilling to perform fault. This is intended to catch simultaneous editing of **ma-data** objects.

Within each partition element is a sequence of one or more **object_class** elements. Each **object_class** XML element has a value which specifies object class that is contained in the partition. There MUST be only one **partition** XML element. The one **partition** XML element MUST contain all object classes for the management agent.

The following is an example of the **partitions** XML element for a management agent that has a single partition with a single object class:

```
<partitions>
  <partition cd_name="default" guid="{7BACC259-00F5-47C5-81F2-90F5245A1C89}" version="0">
    <object class>User</object class>
  </partition>
</partitions>
```

2.2.25.6.6 primary_class_mappings

Each data source has a list of primary classes, the fundamental object classes within the connected directory.

The **primary_class_mappings** XML element describes the object class to primary class mappings and the connector space attributes that apply to the mapping. There are two constructions of mapping element that can be contained by the **primary_class_mappings** element. The **primary_class_mappings** XML element MUST be provided.

In one construction of the **mapping** XML element, the mapping between the primary classes and the object classes, the classes that represent the entities within the connected directory, is specified using the **mapping** XML element. The value of the **object_class** XML attribute of the **mapping** XML element identifies the object class. The value of the **primary_class** XML attribute of the **mapping** XML element identifies the primary class for this object class. The **user_define** XML attribute of the **mapping** XML element contains a value "-1" or "1" where "-1" specifies that the mapping was created by the management agent and "1" indicates that a manual mapping was created. Within the **mapping** XML element, a series of attribute XML elements specify the names of the connector space attributes bound to this object class.

When an identity attribute containing the **mapping** XML element is created, the client MUST supply in the **Create** or **Put** operation the value of "-1" for the **user_define** XML attribute.

The following is an example of the **primary_class_mappings** XML element:

```
<primary_class_mappings>
  <mapping object class="user" primary class="user" user define="-1">
    <attribute>domain</attribute>
```

```
    <attribute>SPS-DistinguishedName</attribute>
    <attribute>PreferredName</attribute>
    <attribute>SPS-SourceObjectDN</attribute>
    <attribute>UserName</attribute>
    <attribute>SID</attribute>
    <attribute>AccountName</attribute>
    <attribute>Manager</attribute>
    <attribute>UserProfile_GUID</attribute>
    <attribute>ADGuid</attribute>
    <attribute>FirstName</attribute>
    <attribute>LastName</attribute>
    <attribute>WorkPhone</attribute>
    <attribute>WorkEmail</attribute>
    <attribute>Office</attribute>
    <attribute>Title</attribute>
    <attribute>Department</attribute>
    <attribute>PublicSiteRedirect</attribute>
    <attribute>SPS-Memberof</attribute>
    <attribute>SPS-SipAddress</attribute>
    <attribute>SPS-ProxyAddresses</attribute>
    <attribute>SourceReference</attribute>
    <attribute>Description</attribute>
    <attribute>Url</attribute>
    <attribute>Member</attribute>
    <attribute>GroupType</attribute>
    <attribute>MailNickName</attribute>
    <attribute>UserXML element</attribute>
    <attribute>Hobbies</attribute>
  </mapping>
</primary_class_mappings>
```

The second construction of the **mapping** XML element which MUST be provided for file formats that allow multiple classes to be mapped to a primary class. For these file formats, the **mapping** XML element MUST contain a sequence of a **primary_class** XML element and a **oc-value** XML element.

The **primary_class** XML element contains as a value a name of the primary object class.

The **oc-value** XML element contains as a value the name of an object class.

The following is an example of a mapping that specifies the **primary_class** value for a given **oc-value**:

```
<mapping>
  <primary class>user</primary class>
  <oc-value>user</oc-value>
</mapping>
```

2.2.25.6.7 object_classes

The **object_classes** XML element contains a sequence of object classes discovered in the schema. Each **object_class** XML element specifies an object class and has six XML attributes: **cd_name**, **selected**, **user_define**, **configured**, **anchor** and **dn_as_anchor**. The **cd-name** XML attribute is the name of the object class in the connected directory. The **selected** XML attribute is specified if the object class is selected for inclusion by the client in the management agent, where "-1" is unselected and "1" is selected. The **user_define** XML attribute specifies how the object class was discovered, where "-1" identifies an object class discovered in the schema and "0" identifies an object class created outside of management agent schema discovery. The **anchor** XML attribute specifies the anchor attribute for the object class as configured. The **dn_as_anchor** XML attribute specifies if the object class uses the DN as the anchor, where "-1" identifies the object class uses the DN as the anchor and "0" identifies the object class doesn't use the DN as the anchor.

Each **object_class** element contains a sequence of **attribute** XML elements, specified using the **attribute** element. Each attribute XML element whether a connected data source's attribute is mandatory or not, where 0 is not mandatory and -1 is mandatory.

The following example shows object_classes under xmlwizard:

```
    <ui-data>
      <xmlwizard>
        <properties>
          <sample_file>
            C:\Template.txt
          </sample file>
          <code_page_description>
            Western European (Windows)
          </code_page_description>
        </properties>
        <partitions>
          <partition cd name="default" guid="{7BACC259-00F5-47C5-81F2-90F5245A1C89}"
version="0">
            <object class>User</object class>
          </partition>
        </partitions>
        <primary_class_mappings>
          <mapping object class="User" primary class="User" user define="-1">
            <attribute>Address</attribute>
            <attribute>ID</attribute>
            <attribute>Name</attribute>
          </mapping>
        </primary_class_mappings>
        <object classes>
          <object_class cd_name="User" selected="-1" user_define="0" configured="-1"
anchor="" dn as anchor="0">
            <attribute mandatory="-1">Address</attribute>
            <attribute mandatory="-1">ID</attribute>
            <attribute mandatory="-1">Name</attribute>
          </object_class>
        </object classes>
        <attributes>
          <attribute cd_name="Address" binary="-1" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="0"
/>
          <attribute cd_name="ChgType" binary="-1" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="0"
/>
          <attribute cd_name="ID" binary="-1" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound=""
   user define="0" />
          <attribute cd_name="Name" binary="-1" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="0"
/>
        </attributes>
      </xmlwizard>
    </ui-data>
    <importing>
      <dn>
        <attribute>ID</attribute>
      </dn>
      <anchor>
        <attribute>ID</attribute>
      </anchor>
      <per-class-settings></per-class-settings>
      <object_class_attribute>Name</object_class_attribute>
    </importing>
    <exporting></exporting>
    <ldap-dn>1</ldap-dn>
    <change type attribute>ChgType</change type attribute>
    <add_change_type_value>Add</add_change_type_value>
    <modify_change_type_value>Modify</modify_change_type_value>
```

```
    <delete_change_type_value>Delete</delete_change_type_value>
    <ldif_format>
      <code_page>65001</code_page>
    </ldif_format>
    <primary_class_mappings>
      <mapping>
        <primary_class>User</primary_class>
        <oc-value>User</oc-value>
      </mapping>
    </primary_class_mappings>
    <extension-config>
      <filename>MyMA.dll</filename>
      <export-mode>file-based</export-mode>
      <import-enabled>1</import-enabled>
      <export-enabled>1</export-enabled>
      <connection-info>
        <connect-to></connect-to>ConnectTo</connect-to><user>User</user>
      </connection-info>
      <attributes>
        <attribute name="ParamName">ParamValue</attribute>
        <attribute name="EncryptedName" encrypted="1" />
      </attributes>
    </extension-config>
    <file-type>AVP</file-type>
    <data_normalization>
      <force-uppercase>1</force-uppercase>
      <remove-accents>1</remove-accents>
    </data_normalization>
    <password-extension-config>
      <password-extension-enabled>0</password-extension-enabled>
      <dll></dll>
      <password-set-enabled></password-set-enabled>
      <password-change-enabled></password-change-enabled>
      <connection-info>
        <connect-to></connect-to>
        <user></user>
      </connection-info>
      <timeout></timeout>
    </password-extension-config>
    <case_normalize_dn_for_anchor>1</case_normalize_dn_for_anchor>
```

2.2.25.6.8 attributes

The **attributes** element lists all the known attributes for the management agent. Each attribute is specified using an attribute element which contains six attributes: **cd_name**, **binary**, **sample_data**, **multi_valued**, **file_reference**, **selected**, **type**, **lower_bound**, **upper_bound** and **user_define**.

```
  <attributes>
    <attribute cd_name="Address" binary="-1" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="0"
/>
    <attribute cd_name="ID" binary="-1" sample_data="" multi_valued="0" file_reference="0"
selected="-1" type="String" lower_bound="" upper_bound="" user_define="0" />
    <attribute cd_name="Name" binary="-1" sample_data="" multi_valued="0" file_reference="0"
selected="-1" type="String" lower_bound="" upper_bound="" user_define="0" />
  </attributes>
```

2.2.25.6.9 importing

The **importing** XML element under the **MAConfig** XML element describes how to process objects as they are imported and MUST be provided. The following section defines the elements under importing.

2.2.25.6.10 anchor

The **anchor** XML element specifies the list of attributes that uniquely identify the object. This XML element MUST be provided. Each attribute that makes up the anchor is specified as a value of an **attribute** XML element. That XML element is also contained by the **importing** XML element.

2.2.25.6.11 per-class-settings

The **per-class-settings** XML element is optional. If exists, this element contains a sequence of zero or more **class** XML elements. Each **class** XML element MUST contain one **name** XML element which has a value to specify the class name and one **anchor** XML element which contains either one **dn** XML element or one or more **attribute** XML elements that uniquely identify the class. Each attribute that makes up the anchor is specified as a value of an **attribute** XML element. The **dn** XML element is an unused XML element and MUST be empty.

2.2.25.6.12 object_class_attribute

The **object_class_attribute** XML element specifies as its value the name of the connector space attribute that contains the value for the object class for each object.

This XML element is mutually exclusive with the **default_object_class** XML element; if one of these elements is present in the **SyncConfig-private-configuration** element, the other MUST NOT be present.

2.2.25.6.13 default_object_class

The **default_object_class** XML element specifies as its value the name of the object class to be used by the server for all object contained in an import file.

This XML element is mutually exclusive with the **object_class_attribute** element; if one of these elements is present in the **SyncConfig-private-configuration** element, the other MUST NOT be present.

This XML element MUST NOT be provided if the value of the file-type is LDIF. Each of these file formats specify the object class for each object so no default object class is required and is listed here only for completeness due to reference from another section.

2.2.25.6.14 exporting

The **exporting** XML element is an unused element whose parent is the **MAConfig** XML element. The **exporting** XML element MUST remain empty.

2.2.25.6.15 ldap-dn

The **ldap-dn** XML element specifies if the management agent uses LDAP style distinguished names (DNs), where "0" specifies that the management agent does not use LDAP style DNs and "1" specifies that the management agent does use LDAP style DNs. The value of this element MUST be 1.

2.2.25.6.16 change_type_attribute

The **change_type_attribute** XML element specifies the name of the attribute that contains the change type of any given object seen in import or export. The **add_change_type_value** XML element, also contained within the **MAConfig** XML element, specifies as its value the value of the connector space attribute which denotes an "Add" operation. The **modify_change_type_value** XML element contained within the **MAConfig** XML element specifies as its value the value of the connector space attribute which denotes a "Modify" operation. The **delete_change_type_value** XML element contained within the **MAConfig** XML element specifies as its value the value of the connector space attribute which denotes a "Delete" operation.

```
<change_type_attribute>ChgType</change_type_attribute>
```

```
<add_change_type_value>Add</add_change_type_value>
<modify_change_type_value>Modify</modify_change_type_value>
<delete_change_type_value>Delete</delete_change_type_value>
```

2.2.25.6.17 ldif_format

The **ldif_format** XML element specifies the codepage in which the text file used for import had been encoded. This XML element MUST be provided. The **ldif_format** XML element MUST contain a **code_page** XML element. The value of the **code_page** XML element MUST be the numeric identifier of the code page. The numeric identifier of the code page MUST be 65001.

```
<ldif_format>
  <code page>65001</code page>
</ldif_format>
```

2.2.25.6.18 extension-config

The **extension-config** XML element specifies the configuration of the extension assembly. The **extension-config** XML element MUST contain a **filename** XML element, an **export-mode** XML element, an **import-enabled** XML element, an **export-enabled** XML element, a **connection-info** XML element, and an **attributes** XML element, each of which are defined in this section.

The following is an example of the **extension-config** XML element:

```
<extension-config>
  <filename>My.ManagementAgent.dll</filename>
  <export-mode>call-based</export-mode>
  <import-enabled>1</import-enabled>
  <export-enabled>1</export-enabled>
  <connection-info>
    <connect-to>http://Svr-Europe-088:8088/IdentityService.asmx?ApplicationID=87</connect-
to>
    <user>FabEurope\IDSvc</user>
  </connection-info>
  <attributes />
</extension-config>
```

The value of the **filename** XML element specifies the value of the extension assembly. This is a relative file name of a file in the Extensions directory.

The **export-mode** XML element specifies the export method supported. The possible values are "file-based" for file-based extension that implement the IMAExtensibleFileExport interface and "call-based" for call-based extensions that implement the IMAExtensibleCallExport interface.

The **import-enabled** XML element has a value of either "0" to indicate that import is disabled or "1" to indicate that import is enabled in this assembly.

The **export-enabled** XML element has a value of either "0" to indicate the export is not supported in this assembly or "1" that specifies export is supported in this assembly.

The **connection-info** XML element specifies as its value the connection information for synchronization, as a sequence of the **connect-to** XML element and **user** XML element. The **connect-to** XML element contains as its value a string that will be provided by the synchronization engine to the connected data source extension as a connection parameter. The **user** XML element contains as its value the name of the user for the connection. The password for the connection is stored in the encrypted **attributes** XML element as shown in section 2.2.30.

The attributes element MUST be provided and MUST be empty.

2.2.25.6.19 file-type

The **file-type** XML element specifies the import file type for this management agent. The value of this element MUST be the literal string "LDIF".

2.2.25.6.20 data-normalization

The **data_normalization** XML element MUST contain two data normalization elements, force-uppercase and remove-accents.

The **force-uppercase** XML element has as its value the literal strings "0" or "1", indicating whether all connected data source values exported by the management agent at run time are forced to upper-case by the management agent.

The **remove-accents** XML element has as its value, "0" or "1", specifying if the management agent replaces all accented characters with their un-accented equivalents during export.

2.2.25.6.21 password-extension-config

The **password-extension-config** element is a parent for all password synchronization elements. This XML element has no attributes and MUST be provided. The **password-extension-config** XML element contains a sequence of the password-extension-enabled XML element, the dll XML element, the **password-set-enabled** XML element, **the password-change-enabled** XML element, the **connection-info** XML element, and the **timeout** XML element.

The **password-extension-enabled** element has a value, "0" or "1", indicating if this management agent is a target for password synchronization. The value of this XML element MUST be "0".

The value of the **dll** XML element specifies the name of the password extension assembly. The value of this element is either an empty string or a relative file name of a file in the Extensions directory.

The presence of **password-set-enabled** element specifies that the password extension supports the Password Set operation. This XML element MUST be empty.

The presence of the **password-change-enabled** element specifies that the password extension supports the Password Change operation. This element MUST be empty.

The **connection-info** XML element contains a sequence of a connect-to XML element and a user XML element. The connect-to XML element MUST be empty. The user XML element MUST be empty.

The **timeout** XML element MUST be empty.

The following is an example of the **password-extension-config** XML element:

```
<password-extension-config>
  <password-extension-enabled>0</password-extension-enabled>
  <dll></dll>
  <password-set-enabled></password-set-enabled>
  <password-change-enabled></password-change-enabled>
  <connection-info>
    <connect-to></connect-to>
    <user></user>
  </connection-info>
  <timeout></timeout>
</password-extension-config>
```

2.2.25.6.22 case_normalize_dn_for_anchor

The case_normalize_dn_for_anchor<1> XML element MUST be provided and MUST contain as its value either the literal string "0" or the literal string "1". A value of "1" specifies that the management agent MUST lowercase the DN when using the DN value as an anchor.

2.2.26 SyncConfig-capabilities-mask

This XML element is an identity attribute. The value of this XML element can be requested by the client in a **Get** operation to retrieve the management agent capabilities.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-capabilities-mask" type="xs:integer" />
</xs:schema>
```

The following is an example of **SyncConfig-capabilities-mask**:

```
<rm:SyncConfig-capabilities-mask>7ba71</rm:SyncConfig-capabilities-mask>
```

The value of this XML element is a bit-masked value represented as a hexadecimal string that contains the sum of the following bits:

Value	Description
0x01	Provides immediate export confirmation
0x02	DN is the anchor attribute for this management agent
0x04	Provides an immutable anchor
0x08	Objects that when renamed fall out of scope will not be submitted as deletes by this management agent.
0x10	Supports Native DNs
0x20	Supports Hierarchical DNs
0x40	Supports LDAP-style DNs
0x80	Supports renaming of containers
0x0100	Supports providing parent anchor for each object during import
0x0200	Supports renaming of leaf nodes
0x0400	Does not support exporting of reference values on first export pass (supports referential integrity)
0x0800	Supports full import
0x1000	Supports delta import
0x2000	Supports export
0x4000	Full import is optional

Value	Description
0x8000	Supports concurrent operations
0x010000	Requires full replace of object to be deleted
0x020000	Requires attribute update list on export
0x040000	Supports retrieving of schema
0x080000	Requires normalization to uppercase
0x100000	Requires normalization to remove accent characters
0x200000	MUST NOT be included in the value
0x400000	MUST be included in the value for an identity object corresponding to the FIM MA

This XML element MUST NOT be provided by a client as an identity attribute in a Create or Put operation. The value of this element is calculated by the synchronization engine.

2.2.27 SyncConfig-export-type

This XML element is an identity attribute whose value is an integer. This XML element specifies the type of export supported by an management agent. The XML element MUST have as its value one of the following values:

Value	Description
1	The management agent supports updating a single attribute value (Attribute Update).
2	The management agent only supports updating an entire attribute (Attribute Replace). Attribute - value level exports are not supported.
3	The management agent only supports updating an entire object (Object Replace). Attribute and attribute-value level exports are not supported.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-export-type" type="xs:integer" />
</xs:schema>
```

This XML element MUST NOT be provided by the client in a create operation on an ma-data object.

2.2.28 SyncConfig-dn-construction

This XML element is an identity attribute. The XML element specifies how the synchronization engine creates the identifiers, including the DN, for connector space objects associated with the MA identified by the identity object.

If the management agent category is not Extensible, this identity attribute MUST be absent.

If the management agent category is Extensible, then this attribute MUST be present.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-dn-construction">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

The value of this XML element contains a string encoding of an attribute XML element. The value of the attribute XML element specifies the name of a connector space attribute used to identify objects.

An example of this XML element is:

```
<rm:SyncConfig-dn-construction>
  <attribute>ObjectID</attribute>
</rm:SyncConfig-dn-construction>
```

2.2.29 SyncConfig-component-mappings

This XML element is not used and MUST NOT be provided.

2.2.30 SyncConfig-encrypted-attributes

This XML element is an identity attribute. This XML element is used to communicate sensitive management agent connection parameters.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-encrypted-attributes" type="xs:string" />
</xs:schema>
```

The value of this XML element is a string encoding of a sequence of one or more attribute XML elements.

Each connection parameter is specified in an **attribute** XML element. The **attribute** XML element MUST have a **name** XML attribute. When the connection parameter is related to a specific management agent's partition, the **attribute** XML element MUST have a **partition** XML attribute. The value of the **name** XML attribute represents the name of the connection parameter that needs to be stored encrypted. The value of the **partition** XML element is the name of the partition this connection parameter is associated with. The value of the **attribute** XML element is the value of the connection parameter.

The **SyncConfig-encrypted-attributes** identity attribute MUST be provided by the client in a **Create** operation on an identity object of the **ma-data** object type. If a client intends to change the

connection parameters of a management agent, the **SyncConfig-encrypted-attributes** identity attribute MUST be provided by the client in a **Put** operation on the identity object.

When the client creates an identity object of the **ma-data** object type to represent a management agent which makes a connection to a directory service, the client MUST include a connection parameter as an **attribute** XML element with the value of the **name** XML attribute of "password" and the value of the **attribute** XML the password that will be used for authenticating to that directory server.

An example of the **SyncConfig-encrypted-attributes** XML element is:

```
<rm:SyncConfig-encrypted-attributes>
  <attribute name="password">secret</attribute>
  <attribute name="name" partition="partition">value</attribute>
</rm:SyncConfig-encrypted-attributes>
```

The server implements these semantics when this XML element is received in a **Create** or Put operation:

- Each **attribute** XML element in which the combination of the values of the **name** XML **attribute** and the **partition** XML attribute is different from what is currently stored in the synchronization engine database for the management agent and has a non-empty value is added to the list of attribute XML elements stored for the management agent.
- If an **attribute** XML element matches an existing XML element by name and partition and the value is nonempty, then the existing element's value is replaced with the one submitted.
- If an **attribute** element matches an existing element by name and partition but its value is empty, then the existing element is removed from the list of encrypted attribute stored for the management agent.
- If an **attribute** element's name attribute matches an extensible management agent UI XML element as specified in the extension-config element as defined in section 2.2.25.6.18, this encrypted value will be stored in the synchronization engine database for the attribute.

2.2.31 SyncConfig-ma-partition-data

This XML element is a multi-valued identity attribute. This XML element specifies the partitions of the management agent. Connector spaces contain one or more partitions, each partition having a specified container and object type filter criteria.

Each management agent MUST be configured to have at least one partition. Each partition is represented by an identity attribute value of this identity attribute. The value of this identity attribute is a string encoding of the **partition** XML element.

The XML schema of each value of this identity attribute when transferred as an identity attribute value in a **Get** or **Put** operation is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-ma-partition-data" type="xs:string" />
</xs:schema>
```

When this identity attribute is transferred in a **Get** operation response, the **da:PartialAttribute** XML element (defined in [MS-UPSCP] section 2.2.3.16) MUST contain a sequence of zero or more **SyncConfig-ma-partition-data** XML elements, one for each value of this identity attribute.

This identity attribute MUST NOT be provided by the client during a **Create** operation for an object of object type **ma-data**. The management agent discovers partitions and updates this data. If a client intends to modify a sub-element of this identity attribute, the identity attribute containing the element MUST be provided by the client in a **Put** operation.

The **partition** XML element is defined as containing an **id** XML element, a **name** XML element, a **creation-time** XML element, a **last-modification-time** XML element, a **version** XML element, a **selected** XML element, a **filter** XML element, a **custom-data** XML element, an **allowed-operations** XML element, a **current** XML element, **a last-successful-batch** XML element, and a **filter-hints** XML element.

An example of the **SyncConfig-ma-partition-data** XML element:

```
<rm:SyncConfig-ma-partition-data>
  <partition>
    <id>{EA04A1CA-49F8-49D8-B37B-35F2B8582232}</id>
    <name>Name of partition</name>
    <creation-time>2002-07-23 17:12:23.699 </creation-time>
    <last-modification-time>2002-07-23 19:21:17.699</last-modification-time>
    <version>5</version>
    <selected>0</selected>
    <filter>
      <object-classes>
        <object-class>contact</object-class>
        <object-class>container</object-class>
        <object-class>group</object-class>
        <object-class>user</object-class>
      </object-classes>
      <containers>
        <exclusions/>
        <inclusions>
          <inclusion>
            DC=downtown,DC=corporate,DC=fabrikam,DC=contoso,DC=com
          </inclusion>
        </inclusions>
      </containers>
    </filter>
    <custom-data>
    </custom-data>
    <allowed-operations>1073741855</allowed-operations>
    <current>
      <batch-number>1</batch-number>
      <sequence-number>0</sequence-number>
    </current>
    <last-successful-batch>0</last-successful-batch>
    <filter-hints>
      <object-classes>
        <object-class>
          <name>container</name>
          <hierarchy>
            <object-class>top</object-class>
            <object-class>container</object-class>
          </hierarchy>
          <included>1</included>
        </object-class>
      </object-classes>
    </filter-hints>
  </partition>
</rm:SyncConfig-ma-partition-data>
```

2.2.31.1 id

This XML element contains a globally unique identifier (GUID) that identifies the ma-partition object.

This XML element MUST be provided in a **Put** operation of the **SyncConfig-ma-partition-data** identity attribute if the client intends to modify any portion of this particular partition's configuration.

2.2.31.2 name

This XML element MUST be provided in a **Put** operation when the identity attribute value containing this element is being updated.

The value is a string that defines the name for the partition. The length limit is 400 characters.

The characters LESS-THAN SIGN, GREATER-THAN SIGN, AMPERSAND, QUOTATION MARK, APOSTROPHE, and RIGHT SQUARE BRACKET MUST NOT be in the value.

The name MUST conform to the naming requirements of the connected data source, as specified in the following table.

SyncConfig-category	Partition Name
AD	A partition corresponds to a Domain or Configuration container. The name is the DN of the container in AD.
iPlanet	The name is the DN of the container in the directory.
eDirectory	The fixed name ""
IBM DS	The name is the DN of the container in the directory.
FIM	The fixed name "default"
Extensible	The fixed name "default"

2.2.31.3 creation-time

This XML element is the date and time (in UTC) when the partition was created on the server. This value is populated by the server. This value of this XML element MUST NOT be changed by the client.

2.2.31.4 last-modification-time

This XML element is the date and time (in UTC) when the partition configuration was last modified on the server. This value is populated by the server. This value of this XML element MUST NOT be changed by the client.

2.2.31.5 version

This **version** XML element indicates the version of the partition configuration. This XML element has as its value an integer that represents the version number of the partition configuration. When the client is updating a management agent, the client MUST pass the version it received when getting the ma-data object. If this number is less than the current version stored in the server, the modification will fail. This is designed to catch simultaneous editing of ma-data objects.

This XML element MUST NOT be provided when creating the parent XML element. This XML element MUST NOT be modified. This XML element MUST NOT be removed from the parent XML element.

2.2.31.6 selected

This XML element specifies a value indicating whether the partition has been selected for inclusion in the management agent. The value of this XML element MUST be 1 (selected) or 0 (unselected). If the management agents does not have partitions, the single **partition** XML element MUST have a **select** XML element whose value is the literal string "1".

This XML element is only relevant in the case of LDAP management agents, such as AD, which have multiple partitions which can be included or excluded for synchronization.

This XML element MUST be present in the parent **SyncConfig-ma-partition-data** XML element.

2.2.31.7 filter

This XML element MUST be present.

This XML element is used by the server to determine which objects to import. The synchronization engine allows management agents to filter on both object types and containers (DN). This XML element contains an **object-classes** XML element and a **containers** XML element.

The **object-classes** XML element specifies what object types to participate in synchronization. The **object-classes** XML element contains one or more **object-class** XML elements of object types in the partition. The value of an **object-class** XML element is a name of an object class.

The **containers** XML element specifies which container to include as well as which to exclude in synchronization. The **containers** XML element contains one **exclusions** XML element and one **inclusions** XML element.

For management agents which specify connections to directory servers, within the container element container filtering is specified per partition, and inclusions and exclusions can be used together to ensure there is no overlap between parent and child domains. For other management agents, when the partition does not support containers, the **inclusions** XML element MUST contain an inclusion element, which MUST be empty.

2.2.31.7.1 exclusions

The **exclusions** XML element MUST be empty.

2.2.31.7.2 inclusions

The **inclusions** XML element contains one or more **inclusion** XML elements. The value of the **inclusion** XML element MUST be either an empty string or a DN.

2.2.31.8 custom-data

This XML element is used to specify management agent-specific information about the partition.

Depending on the management agent category, at most one of the **adma-partition-data**, **ipma-partition-data**, **edma-partition-data**, or **dsma-partition-data** XML elements defined in one of the following sections MUST be provided to configure connection information.

2.2.31.8.1 adma-partition-data

For the AD management agent, this XML element specifies the partition connection data. For this management agent category, the value of the **custom-data** XML element MUST be an **adma-partition-data** XML element.

The **adma-partition-data** XML element MUST contain a dn XML element, a name XML element, a GUID XML element, a is-domain XML element, a sign-and-seal XML element, a preferred-dcs XML element, a dc-failover XML element, an optional last-dc XML element, an optional cookie XML element, an optional login-domain XML element and an optional login-user XML element.

An example of the **custom-data** XML element which contains an **adma-partition-data** element is:

```
<custom-data>
  <adma-partition-data>
    <dn>
      DC=domain,DC=forest-01,DC=fabrikam,DC=com
    </dn>
    <name>domain.forest-01.fabrikam.com</name>
    <guid>{BA84A62C-504E-44B9-9FFE-CF52028B4A36}</guid>
    <is-domain>1</is-domain>
    <sign-and-seal>1</sign-and-seal>
    <preferred-dcs>
      <preferred-dc>Eur-dc1</preferred-dc>
      <preferred-dc>157.59.74.182</preferred-dc>
    </preferred-dcs>
    <dc-failover>1</dc-failover>
  </adma-partition-data>
</custom-data>
```

2.2.31.8.1.1 dn

The **dn** XML element's value is the DN of AD naming context.

2.2.31.8.1.2 name

The **name** XML element's value is the NetBIOS name of the naming context.

2.2.31.8.1.3 guid

The **guid** XML element's value is the GUID for the naming context specified in AD.

2.2.31.8.1.4 is-domain

The **is-domain** XML element's value indicates whether it is a **domain naming context (domain NC)** or not. This XML element's value is 1 or 0.

2.2.31.8.1.5 sign-and-seal

The **sign-and-seal** XML element's value specifies whether the management agent is to use Kerberos signing and sealing (encryption) for communication to the server at import and export time. This XML element's value is either 1, if use of Kerberos signing and sealing are enabled, or 0 if not enabled.

2.2.31.8.1.6 simple-bind

The **simple-bind** XML element's value indicates whether the management agent will supply a cleartext password in LDAP Bind request using the simple authentication choice as specified in [RFC2251] section 4.2. This XML element's value is 1 for simple bind or 0 for SASL bind.

2.2.31.8.1.7 preferred-dcs

The **preferred-dcs** XML element specifies the list of preferred DCs to use when connecting to this naming context. The **preferred-dcs** XML element contains a sequence of one or more preferred-dc XML elements.

The value of the **preferred-dc** XML element is an address of a domain controller.

When connecting to this naming context, the management agent will attempt to connect to the domain controllers in the order in which the values appear.

2.2.31.8.1.8 dc-failover

The **dc-failover** XML element has a value that indicates whether the synchronization engine allows the management agent to failover to domain controllers not specified in the preferred DC list. The value MUST be the literal string "1" for failover and MUST be the literal string "0" for no failover.

2.2.31.8.1.9 last-dc

The **last-dc** XML element's value is the name of the last DC used for a run on this partition. This XML element is only present when the client retrieves an ma-data object with a Get or Enumeration if the management agent has been run on this partition.

2.2.31.8.1.10 cookie

The **cookie** XML element's value is the AD sequence number of the last change imported from the last import run. It is only present when the client retrieves an ma-data object with a Get or Enumeration if this management agent has been run on this partition. This XML element MUST NOT be provided at management agent creation time and it MUST NOT be provided on a put operation.

2.2.31.8.1.11 login-domain

The **login-domain** XML element's value contains specific domain credentials for this partition if different from the management agent credentials.

2.2.31.8.1.12 login-user

The **login-user** XML element's value contains specific user credentials for this partition, if different from the management agent credentials. The password for this user is provided via **SyncConfig-encrypted-attributes**.

2.2.31.8.2 ipma-partition-data

For the Sun ONE and Netscape Directory Server management agent, this XML element specifies the partition connection data and MUST be provided for this management agent category.

An example of the Sun ONE and Netscape Directory Server management agent custom data element is:

```
<custom-data>
  <ipma-partition-data>
    <dn>o=target</dn>
    <ui-data></ui-data>
  </ipma-partition-data>
</custom-data>
```

2.2.31.8.2.1 dn

The dn XML element's value is the DN of the partition for which this **custom-data** XML element applies.

2.2.31.8.2.2 ui-data

The **ui-data** XML element is an unused XML element which MUST be present and empty.

2.2.31.8.3 edma-partition-data

For the Novell eDirectory management agent, this XML element specifies the partition connection data and MUST be provided for this management agent category.

An example of the Novell eDirectory management agent custom data element is:

```
<custom-data>
  <edma-partition-data>
    <dn></dn>
    <ui-data></ui-data>
  </edma-partition-data>
</custom-data>
```

2.2.31.8.3.1 dn

The **dn** XML element is an unused XML element and MUST be present but empty.

2.2.31.8.3.2 ui-data

The **ui-data** XML element is an unused element and MUST be present but empty.

2.2.31.8.4 dsma-partition-data

This XML element specifies the partition connection data for the IBM Directory Server management agent, and MUST be provided as the value of the **custom-data** element for ma-data objects which correspond to this management agent category.

This XML element contains two XML elements, **dn** and **ui-data**.

An example of the IBM Directory Server management agent custom data element is:

```
<custom-data>
  <dsma-partition-data>
    <dn>o=target</dn>
    <ui-data></ui-data>
  </dsma-partition-data>
</custom-data>
```

2.2.31.8.4.1 dn

The **dn** XML element contains as a value the DN of the partition to which this **custom-data** XML element applies.

2.2.31.8.4.2 ui-data

The **ui-data** XML element is an unused element and MUST be present with an empty (zero-length) value.

2.2.31.8.5 Extensible

The extensible management agent does not make use of the **custom-data** XML element. The **custom-data** XML element MUST NOT be provided for this management agent type.

2.2.31.9 allowed-operations

This XML element is used by the server to convey information about which management agent runs bring up warnings and which are disallowed. The value of this element is either an empty string or it is the sum of bit-masked values represented as a hexadecimal string that contains zero or more the bit values indicated in the following table. This element is included when an identity object of the **ma-data** object type is returned to the client by the server in a **Get** operation:

Value	Description
0x01	Delta Import is allowed
0x02	Delta import not allowed; management agent confirmation has changed.
0x04	Delta import not allowed; management agent confirmation has changed.
0x08	Delta import not allowed; metaverse rules extension has changed.
0x10	Delta import not allowed; management agent rules extension has changed.
0x40000000	No operations are allowed; MUST be set while management agent is being created.

This XML element MUST be provided during a create or put operation of the identity attribute containing this element as an empty string.

2.2.31.10 current

This XML element MUST contain a **batch-number** XML element and a **sequence-number** XML element.

The **batch-number** XML element has as its value an integer that the synchronization engine manages. The synchronization engine uses the batch number to keep track of objects at import time.

The **sequence-number** XML element has as its value an integer that the synchronization engine manages. The synchronization engine uses the sequence number to keep track of the step within the profile run under which this partition was last run.

The **current** XML element MUST NOT be provided when creating the **parent** XML element. When the **ma-data** object is retrieved with a **Get** or **Enumeration** and this XML is present, this XML element MUST be supplied in the **Put** operation as it was retrieved during the **Get** or **Enumeration**. This XML element MUST NOT be removed from the **SyncConfig-ma-partition-data** XML element.

The following is an example of the **current** XML element:

```
<current>
  <batch-number>5</batch-number>
  <sequence-number>2101</sequence-number>
</current>
```

2.2.31.11 last-successful-batch

This XML element has as its value an integer that represents a batch of objects seen at import time when this management agent is running. When the value of this XML element is greater than zero, the integer represents the batch before the one that was running when the import stopped.

This XML element MUST NOT be provided when creating the parent XML element. This XML element MUST be provided unmodified for a put operation on the **SyncConfig-ma-partition-data** identity attribute. This XML element MUST NOT be removed from the **parent** XML element.

2.2.31.12 filter-hints

This XML element provides hints to the management agent for which object types to import. The XML element **filter-hints** contains exactly one **object-classes** XML element. The **object-classes** XML element contains a collection of zero or more **object-class** XML elements. The following is an example of the filter-hints XML element for the container object class.

```
<filter-hints>
  <object-classes>
    <object-class>
      <name>container</name>
      <hierarchy>
        <object-class>top</object-class>
        <object-class>container</object-class>
      </hierarchy>
      <included>1</included>
    </object-class>
  </object-classes>
</filter-hints>
```

Each **object-class** element contains a name XML element, which describes the name of the object class, and a hierarchy XML element, which contains as its value a list of one or more **object-class** XML elements. Each of these **object-class** XML elements describes the hierarchy of the class types that are the parent of the outer **object-class**, with the most derived class listed first. The outer **object-class** also contains an included XML element. The value of the included XML element MUST be a literal string of either "1" or "0", which indicates whether the object class specified by the **object-class** is included for synchronization.

2.2.32 SyncConfig-ma-run-data

This XML element is a multi-valued identity attribute which describes the run profiles of the management agent. This XML element with at least one value MUST be provided by the client in a **Create** operation. If **SyncConfig-ma-run-data** is present, each value MUST contain a string encoding of a sequence of one or more **run-configuration** XML elements.

The XML schema of a value of this identity attribute when transferred as an identity attribute value in a **Create**, **Get** or **Put** operation is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-ma-run-data" type="xs:string" />
</xs:schema>
```

When this identity attribute is transferred in a Get operation response, the **da:PartialAttribute** XML element (defined in [MS-UPSCP] section 2.2.3.16) MUST contain a sequence of zero or more **SyncConfig-ma-run-data elements**, one for each value of this identity attribute.

A **run-configuratio**n XML element specifies a run profile. **A run-configuration** XML element contains a sequence of a **name** XML element, an id XML element, an optional **version** XML element, an optional **creation-time** XML element, an optional **last-modification-time** XML element, and a **configuration** XML element.

The following is an example of a SOAP body, prior to encryption, of a message from a client in a **Create** operation with two identity attribute values of the **SyncConfig-ma-run-data** identity attribute:

```
<?xml version="1.0" encoding="utf-8"?>
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope">
  <s:Body>
    <AddRequest
Dialect="http://schemas.microsoft.com/2006/11/ResourceManagement/Dialect/IdentityAttributeTyp
e-20080602" xmlns="http://schemas.microsoft.com/2006/11/IdentityManagement/DirectoryAccess">
      <AttributeTypeAndValue>
        <AttributeType>SyncConfig-ma-run-data</AttributeType>
        <AttributeValue>
          <rm:SyncConfig-ma-run-data
xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement">
            <run-configuration>
              <id>{6B93DDBA-7286-4130-8762-34514A380FAE}</id>
              <name>string</name>
              <version>integer</version>
              <creation-time>2002-07-23 17:12:23.699</creation-time>
              <last-modification-time>2002-07-23 19:21:17.699</last-modification-time>
              <configuration>
                <step>
                  <step-type type="full-import">
                    <import-subtype>to-file</import-subtype>
                    <import-subtype>resume-from-file</import-subtype>
                    <import-subtype>to-cs</import-subtype>
                  </step-type>
                  <threshold>
                    <object>integer</object>
                  </threshold>
                  <partition>string</partition>
                  <custom-data>
                    ...
                  </custom-data>
                </step>
                <step>
                  ...
                </step>
              </configuration>
            </run-configuration>
          </rm:SyncConfig-ma-run-data>
        </AttributeValue>
      </AttributeTypeAndValue>
      <AttributeTypeAndValue>
        <AttributeType>SyncConfig-ma-run-data</AttributeType>
        <AttributeValue>
          <rm:SyncConfig-ma-run-data
xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement">
            <run-configuration>
              <id>{B4108213-550A-4A7A-AFE2-29B09E193701}</id>
              <name>Full Import</name>
              <configuration>
                <step>
                  <step-type type="full-import">
                    <import-subtype>to-cs</import-subtype>
                  </step-type>
                  <threshold></threshold>
                  <partition>{EA04A1CA-49F8-49D8-B37B-35F2B8582232}</partition>
                  <custom-data></custom-data>
                </step>
              </configuration>
            </run-configuration>
          </rm:SyncConfig-ma-run-data>
        </AttributeValue>
      </AttributeTypeAndValue>
    </AddRequest>
</s:Body>
```

2.2.32.1 id

The value of this XML element MUST be a GUID that uniquely defines the partition on the server.

This XML element MUST be provided in the run-configuration XML element.

2.2.32.2 name

This XML element contains a non-empty string that defines the name for the partition. The length limit is 400 characters. The characters LESS-THAN SIGN, GREATER-THAN SIGN, AMPERSAND, QUOTATION MARK, APOSTROPHE, and RIGHT SQUARE BRACKET MUST NOT be in the value.

This XML element MUST be present.

2.2.32.3 creation-time

The value of this XML element is a string encoding of the date and time (in UTC) when the run profile was created on the server. This value is populated by the server. This XML element is read-only and is returned by the server for informational purposes.

This XML element MUST be omitted by the client when constructing a value of the SyncConfig-ma-run-data identity attribute for a Create or Put operation on an identity object.

2.2.32.4 last-modification-time

The value of this XML element is a string encoding of the date and time (in GMT) when the run profile was last modified on the server. This value is populated by the server. This XML element is read-only and is returned by the server for informational purposes.

This XML element MUST be omitted by the client when constructing a value of the **SyncConfig-ma-run-data identity** attribute for a **Create** operation on an identity object. If a client intends to modify the value of the **SyncConfig-ma-run-data** identity attribute, the client MUST include this XML element within the **SyncConfig-ma-run-data** XML element with value obtained from a previous **Get** operation of this identity attribute of the identity object.

2.2.32.5 version

This XML element's value is an integer that indicates the version of the run profile. When updating a management agent, the client MUST provide the same version received earlier when getting the **ma-data** object. If this integer is less than the current version stored in the server, the **Put** will fail with an unwilling to perform fault. This is designed to catch simultaneous editing of **ma-data** objects.

When the client intends to change **SyncConfig-ma-run-data**, this XML element MUST be provided during a **Put** operation.

2.2.32.6 configuration

This XML element contains one or more steps for the run profiles. See step for details in the next section.

This XML element MUST be provided by the client during **create** and **put** operations in the parent XML element.

The following is an example of the **configuration** element showing a delta synchronization (apply rules) step type for AD management agent:

```
<configuration>
```

```
    <step>
      <step-type type="apply-rules">
        <apply-rules-subtype>apply-pending</apply-rules-subtype>
      </step-type>
      <threshold></threshold>
      <partition>{BE0B3004-59CF-4BC2-AE47-BA5C033948DB}</partition>
      <custom-data>
        <adma-step-data>
          <batch-size>100</batch-size>
          <page-size>500</page-size>
          <time-limit>120</time-limit>
        </adma-step-data>
      </custom-data>
    </step>
  </configuration>
```

2.2.32.6.1 step

This XML element contains the step details for a step in the run profiles. Multiple step elements are allowed in a management agent's run configuration.

This XML element MUST be included in its parent element.

The following table maps the different kinds of run profile step types that can be configured to **step-type** XML element **type** XML attribute values and **subtype**.

Run profile step type name	step-type type value	subtype
Full Import	full-import	to-cs
Delta Import	delta-Import	to-cs
Delta Import and Delta Synchronization	delta-import	
Full Import and Delta Synchronization	full-import	
Full Import and Full Synchronization	full-import-reevaluate-rules	
Delta Synchronization	apply-rules	apply-pending
Full Synchronization	apply-rules	reevaluate-flow-connectors
Export	export	

2.2.32.6.1.1 step-type

- This XML element describes the step type for the parent step and MUST be provided by the client in **create** and **put** operations for the identity attribute which contains the **parent** XML element. The **step-type** XML element MUST contain a **type** XML attribute. The value of the **type** XML attribute indicates the run profile step type specified by the **step-type** XML element. The value for the **type** XML attribute MUST be one of the following:
- full-import
- delta-import
- export
- apply-rules

- full-import-reevaluate-rules

If the value of the **type** XML attribute is "full-import" or "delta-import, then the **step-type** element MUST contain zero or more **import-subtype** XML elements.

If the value of the **type** XML attribute is "full-import-reevaluate-rules", then the **step-type** element MUST be empty.

If the value of the **type** XML attribute is "export", then the **step-type** element MUST contain zero or more export-subtype XML elements.

If the value of the type XML attribute is "apply-rules", then the **step-type** element MUST contain zero or more apply-rules-subtype XML elements.

An import **step-type** XML element without any **import-subtype** XML elements means that the synchronization is from CD all the way to the metaverse. An export **step-type** XML element without any **export-subtype** XML elements means that the synchronization is from connector space all the way to the CD.

The following example shows an import **step-type** with import-subtype XML elements specifying dropfile behavior:

```
<step-type type="full-import">
  <import-subtype>to-file</import-subtype>
  <import-subtype>resume-from-file</import-subtype>
  <import-subtype>to-cs</import-subtype>
</step-type>
```

No import-subtype is allowed when the **step-type** XML element's value XML attribute is the literal string "full-import-reevaluate-rules".

2.2.32.6.1.1.1 import-subtype

Zero or more **import-subtype** XML elements can be supplied in one **step-type** XML element. The value for this XML element MUST be one of the following:

Import-subtype XML element values(s)	Behavior
to-file	This subtype drops a file during import and stops without staging the import data in the connector space. With this sub-type, watermark will not be updated for delta import.
resume-from-file	This subtype resumes an import run from a drop file. With this sub-type, watermark will not be updated for delta import.
to-file resume-from-file	When these two import-subtype XML elements are supplied together in one step-type XML element, these subtypes drop an audit file and continue the import run without stopping.
to-cs	This subtype stages the import data in the connector space and stops the import run.
resume-from-file to-cs	When these two import-subtype XML elements are supplied together in one step-type XML element, these subtypes resume an import run from a drop file, stage the import data in the connector space and stop the import run. With this sub-type, watermark will not be updated for delta import.
to-file resume-from-file	When these three import-subtype XML elements are supplied together in one step-type XML element, this drops an audit file during import, stages import data in the connector space and stop the import run.

Import-subtype XML element values(s)	Behavior
to-cs	

An import run without any subtype elements means that the synchronization is from CD all the way to the metaverse.

2.2.32.6.1.1.2 export-subtype

Zero or more **export-subtype** XML elements can be supplied in one **step-type** XML element. The value for this XML element MUST be one of the following:

Export-subtype XML element value(s)	Behavior
to-file	This will drop a file during export and stop. With this sub-type, export batch number will not be updated.
resume-from-file	This will resume an export run from a drop file. With this sub-type, export batch number will not be updated.
to-file resume-from-file	When these two export-subtype XML element values are supplied together in one step-tepy XML element, this drops an audit file but will not stop at the drop file during an export run.

An export run without any sub-type means that the synchronization is from connector space all the way to the CD with no dropfile.

2.2.32.6.1.1.3 apply-rules-subtype

One **apply-rules-subtype** XML element MUST be provided when the **step-type** XML element's type XML attribute's value is "apply-rules".

The value for this XML element MUST be one of the following:

Apply-rules-subtype XML element value(s)	Behavior
apply-pending	Attempts to synchronize all connectors with staged pending imports and also attempts to join/project (and flow attributes) on all normal disconnectors even if they have failed to join during previous apply-pending runs.
reevaluate-flow-connectors	Reevaluates attribute flow for all connectors in the connector space under this management agent.
reevaluate-join-flow-all	Reevaluates join and attribute flow for all entries in the connector space (connectors and disconnectors). Explicit connectors/disconnectors will not be reevaluated (can only be change using account joiner).

2.2.32.6.2 threshold

This XML element describes the thresholds for the run profile step. The value of this element is either a number greater than 0 which specifies the maximum number of object to process in the run profile step, the literal string "0", or an empty string. A value of 0 specifies all objects.

This XML element MUST be present in the **parent** XML element.

2.2.32.6.3 partition

This XML element MUST contain as its value the ID of the partition for which the run profile step will run. Its value MUST be a GUID. See **SyncConfig-ma-partition-data** in section 2.2.32.1 for the definition of the **id**.

This XML element MUST be provided when performing a create or put operation on an identity object which contains the identity attribute that contains this XML element. This XML element MUST NOT be provided for any other operation.

2.2.32.6.4 custom-data

The **custom-data** XML element contains either no value or one management agent specific data for the run profile step, defined in a sub-section of this section. This XML element MUST be present.

2.2.32.6.4.1 adma-step-data

For the AD management agent category, the **custom-data** XML element MUST contain an **adma-step-data** XML element.

The **adma-step-data** XML element MUST contain a sequence of **batch-size** XML element, a **page-size** XML element and a **time-limit** XML element. An example of the **custom-data** XML element:

```
<custom-data>
  <adma-step-data>
    <batch-size>100</batch-size>
    <page-size>500</page-size>
    <time-limit>120</time-limit>
  </adma-step-data>
</custom-data>
```

The **batch-size** XML element specifies as its value the number of objects that the management agent will write to the connector space at one time. The **page-size** XML element specifies as its value either the number of objects the management agent will read from the connected directory at one time, or a value of 0 which means there is no limit. The **time-limit** XML element specifies as its value the number of seconds that the management agent will wait for a response from the connected directory.

2.2.32.6.4.2 ipma-step-data

For the Sun ONE and Netscape Directory Server management agent, the value of the **custom-data** XML element MUST be an **ipma-step-data** XML element. The **ipma-step-data** XML element MUST contain a sequence of a **time-limit** XML element, a **size-limit** XML element and a **batch-size** XML element. An example of the **ipma-step-data** XML element is:

```
<custom-data>
  <ipma-step-data>
    <time-limit>120</time-limit>
    <size-limit>0</size-limit>
    <batch-size>1</batch-size>
  </ipma-step-data>
</custom-data>
```

The value of the **batch-size** XML element is an integer which specifies the number of objects that the management agent will write to the connector space at one time. The value of the **size-limit** XML element is either an integer of the number of objects the management agent will read from the connected directory at one time, or a value of 0 which means there is no limit. The value of **time-**

limit element is an integer of the number of seconds that the management agent will wait for a response from the connected directory.

2.2.32.6.4.3 edma-step-data

When the management agent category is the Novell eDirectory Directory Server, the **custom-data** XML element MUST contain the edma-step-data element. The **edma-step-data** element MUST contain the **batch-size**, **page-size** and **time-limit** XML elements.

An example of the eDirectory custom data:

```
<custom-data>
  <edma-step-data>
    <batch-size>100</batch-size>
    <page-size>500</page-size>
    <time-limit>120</time-limit>
  </edma-step-data>
</custom-data>
```

The value of the **batch-size** XML element specifies the number of objects that the management agent will write to the connector space at one time.

The value of the **page-size** XML element is either the number of objects the management agent will read from the connected directory at one time, or a value of 0 which means there is no limit.

The value of the **time-limit** XML element is the number of seconds that the management agent will wait for a response from the connected directory.

2.2.32.6.4.4 dsma-step-data

When the management agent category is the IBM Directory Server, the **custom-data** XML element MUST contain the dsma-step-data element. The dsma-step-data element MUST contain the **batch-size**, **page-size** and **time-limit** XML elements.

An example of the IBM DS MA **custom data**:

```
<custom-data>
  <dsma-step-data>
    <time-limit>120</time-limit>
    <size-limit>0</size-limit>
    <batch-size>1</batch-size>
  </dsma-step-data>
</custom-data>
```

The value of the **batch-size** XML element specifies the number of objects that the management agent will write to the connector space at one time.

The value of the **page-size** XML element is either the number of objects the management agent will read from the connected directory at one time, or a value of 0 which means there is no limit.

The value of the **time-limit** XML element is the number of seconds that the management agent will wait for a response from the connected directory.

2.2.32.6.4.5 FIM MA

For the FIM management agent category, the **custom-data** XML MUST be present and MUST be empty.

```
<custom-data></custom-data>
```

2.2.32.6.4.6 Extensible

The extensible management agent supports the custom data.

The **custom-data** element for the extensible management agent when the run step is of type import MUST contain the XML element **run-config**. The **run-config** XML element MUST contain the XML elements **input-file**, **delete-file-after-use** and **timeout**. An example of these elements:

```
<custom-data>
  <run-config>
    <input-file>myFile.txt</input-file>
    <delete-file-after-use>1</delete-file-after-use>
    <timeout>0</timeout>
  </run-config>
</custom-data>
```

The **input-file** XML element specifies as its value the input file name. The **delete-file-after-use** XML element specifies as its value whether the file is deleted after import, where a value of 0 indicates that the file is not to be deleted, and a value of 1 indicates that the file is to be deleted. The **timeout** XML element contains as its value the number of seconds that the management agent will wait for a response from the connected directory.

The **custom-data** element for the extensible management agent when the run step is of type export MUST contain the XML element run-config. The XML element run-config MUST contain the XML elements **output-file**, **delete-file-after-use** and **timeout**. An example of these elements:

```
<custom-data>
  <run-config>
    <output-file>myFile.txt</output-file>
    <delete-file-after-use>1</delete-file-after-use>
    <timeout>0</timeout>
  </run-config>
</custom-data>
```

The **output-file** XML element specifies as its value the output file name for file-based export MAs. The **delete-file-after-use** XML element specifies as its value whether the file is deleted after import, where a value of 0 indicates that the file is not to be deleted, and a value of 1 indicates that the file is to be deleted. The **timeout** XML element contains as a value an integer representing the number of seconds that the management agent will wait for a response from the connected directory.

2.3 Metaverse Configuration Data Structure

The **mv-data** object contains Metaverse Configuration, including the following:

- version
- metaverse extension
- schema information
- import attribute flow configuration
- metaverse deletion configuration
- provisioning script configuration

In addition to the identity attributes defined in sub-sections of section 2.1, the **mv-data** object can contain the following identity attributes.

Identity Attribute Type Name
SyncConfig-version
SyncConfig-extension
SyncConfig-schema
SyncConfig-import-attribute-flow
SyncConfig-mv-deletion
SyncConfig-format-version
SyncConfig-provisioning-type
SyncConfig-password-change-history-size
SyncConfig-password-sync

The XML schema of an identity object of this object type when transferred as an enumeration item, and the identity attributes **ObjectID**, **ObjectType**, **DisplayName**, **Description**, **CreatedTime**, **Creator**, **SyncConfig-format-version**, **SyncConfig-version**, **SyncConfig-extension**, **SyncConfig-schema**, **SyncConfig-import-attribute-flow**, **SyncConfig-import-attribute-flow**, **SyncConfig-provisioning-type** are requested by the client, is defined as follows.

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="mv-data">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="rm:ObjectID" minOccurs="0" />
        <xs:element ref="rm:ObjectType" minOccurs="0" />
        <xs:element ref="rm:DisplayName" minOccurs="0" />
        <xs:element ref="rm:Description" minOccurs="0" />
        <xs:element ref="rm:CreatedTime" minOccurs="0" />
        <xs:element ref="rm:Creator" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-format-version" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-version" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-extension" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-schema" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-import-attribute-flow" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-mv-deletion" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-provisioning-type" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-password-change-history-size" minOccurs="0" />
        <xs:element ref="rm:SyncConfig-password-sync" minOccurs="0" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

2.3.1 SyncConfig-format-version

This XML element is an identity attribute which provides the version of the schema of the identity object.

The XML schema of this identity attribute when transferred as an identity attribute value is defined in section 2.2.2.

This XML element MUST be provided during a **create** or a **put** of an **mv-data** object and MUST have the value "1".

2.3.2 SyncConfig-version

This XML element is an identity attribute whose value is the version of the metaverse configuration. When updating the metaverse configuration, this identity attribute MUST be provided to the synchronization engine by the client and its value MUST be the same as the value of the **SyncConfig-version** received from a previous Get of the mv-data object. If the number provided by the client in a Put operation is less than the current version stored in the mv-data object on the server, the modification will fail with a fault.

The XML schema of this identity attribute when transferred as an identity attribute value is defined in section 2.2.5.

This XML element MUST be provided on a create or put on an mv-data object.

2.3.3 SyncConfig-extension

This XML element is an identity attribute.

The XML schema of this identity attribute when transferred as an identity attribute value is defined in section 2.2.20.

Its XML type is defined as string encoding of a sequence of four sub-elements, each of which can occur 0 or 1 times: "assembly-name", "application-protection", "enable-debugger" and "timeout".

The value of the **assembly-name** XML element identifies the name of the rules extension assembly to use.

The value of the XML element **application-protection** indicates whether to run the extension within the synchronization server process (when the value is provided as low) or outside the synchronization server process (the value of the XML element application-protection is provided as high).

If the value of the **enable-debugger** XML element is set to the literal string "true", a script exception will launch a debugger; if set to "false", then when a script exception occurs the exception will be logged and the synchronization will continue. Note that "true" and "false" are case sensitive and MUST be lower case.

The **timeout** XML element contains an integer specifying the number of seconds for the timeout. If set to 0, the timeout is disabled.

This XML element MUST be provided on a create or a put operation but it can be empty. When empty, the synchronization engine calls no metaverse rules extensions.

```
<rm:SyncConfig-extension>
      <assembly-name>MVExtension.dll</assembly-name>
      <application-protection>high</application-protection>
      <enable-debugger>false</enable-debugger>
      <timeout>0</timeout>
</rm:SyncConfig-extension>
```

2.3.4 SyncConfig-schema

This XML element is an identity attribute whose value is either a string encoding of the metaverse schema in DSMLv1 format as specified in [DSML] or an empty string. All attributes referred to by the XML elements in sub-sections of section 2.3, such as **SyncConfig-import-attribute-flow**, MUST be

defined in the metaverse schema. This XML element MUST be provided in a Create operation for an object of type mv-data, but can be empty.

The XML schema of this identity attribute when transferred as an identity attribute value is defined section 2.2.11.

If the value of this identity attribute is not empty, it MUST be a string encoding of the dsml XML element in the namespace http://www.dsml.org/DSML. The format of the DSMLv1 schema MUST be as specified in [DSML]. The **dsml** XML element MUST contain one **directory-schema** XML element in the namespace http://www.dsml.org/DSML. As an extension to DSMLv1 format, the directory-schema XML element MUST have an XML attribute **no-objectclass-validation** in the namespace http://www.microsoft.com/MMS/DSML with value "true".

The **directory-schema** XML element MUST contain a sequence of one or more class XML elements in the namespace http://www.dsml.org/DSML and one or more attribute-type XML elements in the namespace http://www.dsml.org/DSML.

An example of an identity attribute value of this identity attribute is:

```
<rm:SyncConfig-schema xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <dsml:dsml xmlns:dsml="http://www.dsml.org/DSML" xmlns:ms-
dsml="http://www.microsoft.com/MMS/DSML">
    <dsml:directory-schema ms-dsml:no-objectclass-validation="true">
      <dsml:class id="ExpectedRuleEntry" type="structural">
        <dsml:name>ExpectedRuleEntry</dsml:name>
        <dsml:attribute ref="#ResourceTime" required="false" />
      </dsml:class>
      <dsml:attribute-type id="ResourceTime" single-value="true">
        <dsml:name>ResourceTime</dsml:name>
        <dsml:syntax>1.3.6.1.4.1.1466.115.121.1.15</dsml:syntax>
      </dsml:attribute-type>
    </dsml:directory-schema>
  </dsml:dsml>
</rm:SyncConfig-schema>
```

2.3.5 SyncConfig-import-attribute-flow

The XML element **SyncConfig-import-attribute-flow** is an identity attribute which specifies import attribute flow rules. Import attribute flow declared rules or rules extensions govern how attributes on connector space objects flow to metaverse objects during inbound synchronization.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-import-attribute-flow" type="xs:string" />
</xs:schema>
```

This identity MUST be provided in a **Create** operation of an identity object of the **mv-data** object type. When the client intends to change the import attribute flow configuration, the **SyncConfig-import-attribute-flow** identity attribute MUST be provided on a **Put** operation.

Import attribute flow rules describe how attribute values flow to metaverse objects from connectors, which are connector space objects with links to metaverse objects.

The model for import attribute flow borrows some of the concepts used with export attribute flow. The flow-set, **import-flows**, import-flow and mapping elements are like the ma-data version involved in

export attribute flow. They configure the same behavior with the exception that import-attribute flow has connector space attributes as the source and metaverse attributes as the destination, while the opposite is true for export attribute flow. The use of mappings is the same with data including **src-attribute** configuration to determine where the flow of data originates.

Import flows for all management agents (MAs) are defined in the Metaverse Configuration data structure (section 2.3). This makes it possible to configure the precedence amongst the attribute flows. Because import attribute flows can be sourced from more than one management agent, they are grouped by metaverse object type and metaverse attribute. Within a set of import flows that have the same metaverse object and metaverse attribute as their destination, the rules are evaluated in terms of the configured attribute flow precedence or ranking.

The **SyncConfig-import-attribute-flow** XML element is defined to contain a string encoding of a sequence. The sequence consists of zero or more **import-flow-set** XML elements, each of which describe the flows for a particular set of connector space and metaverse object types, and zero or one **per-ma-options** XML element. The **import-flow-set** XML element is defined in the next sub-section of this section.

The **per-ma-options** XML element contains zero or more **ma-options** XML elements. Each **ma-option** XML element MUST have a **ma-id** XML attribute, whose value is a GUID identifier of the management agent. Each **ma-option** XML element MUST contain as its value an **enable-recall** XML element. The value of the **enable-recall** XML element is a boolean which MUST be either the literal string "true" or "false".

This is an example of the **SyncConfig-import-attribute-flow** XML element:

```
<rm:SyncConfig-import-attribute-flow>
  <import-flow-set mv-object-type="group">
    <import-flows mv-attribute="member" type="ranked">
      <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-type="Group"
id="{CB3AA2E4-D3DF-48D2-B5C5-DC53FC8EFE65}">
        <direct-mapping>
          <src-attribute>Member</src-attribute>
        </direct-mapping>
      </import-flow>
    </import-flows>
    <import-flows mv-attribute="description" type="ranked">
      <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-type="Group"
id="{240BAD87-2A6A-4647-B1F3-A9ABF9213631}">
        <direct-mapping>
          <src-attribute>Description</src-attribute>
        </direct-mapping>
      </import-flow>
    </import-flows>
    <import-flows mv-attribute="displayName" type="ranked">
      <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-type="Group"
id="{E028434B-8B22-4493-9E5F-D725FE84CF6B}">
        <direct-mapping>
          <src-attribute>DisplayName</src-attribute>
        </direct-mapping>
      </import-flow>
    </import-flows>
  </import-flow-set>
  <per-ma-options>
    <ma-options ma-id="{70843C90-BCF1-44D3-99CF-0592D1ED60AE}">
      <enable-recall>true</enable-recall>
    </ma-options>
    <ma-options ma-id="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}">
      <enable-recall>true</enable-recall>
    </ma-options>
  </per-ma-options>
</rm:SyncConfig-import-attribute-flow>
```

2.3.5.1 import-flow-set

The **SyncConfig-import-attribute-flow** identity attribute value contains in its a string encoding zero or more **import-flow-set** XML elements. Each **import-flow-set** XML element MUST have an **mv-object-type** XML attribute and MUST contain zero or more **import-flows** XML elements. The **import-flow-set** element defines the metaverse object type scope for a set of flows that follow. All child elements of the **import-flow-set** element apply to the metaverse object type named in the **import-flow-set mv-object-type** XML attribute. Within **SyncConfig-import-attribute-flow** identity attribute value, **mv-object-type** XML attribute values MUST be unique. The value of an **mv-object-type** XML attribute MUST be the name of an object type which exists in metaverse schema.

```
<import-flow-set mv-object-type="objectType">
  ...
</import-flow-set>
```

2.3.5.1.1 import-flows

The **import-flows** XML element, if provided, MUST contain one or more **import-flow** XML elements. Taken together, the **import-flow-set** and **import-flows** XML elements scope flow mappings by destination metaverse object type and destination metaverse attribute. Within an **import-flow-set** element, **mv-attribute** values MUST be unique. The value of the **mv-attribute** XML attribute MUST be the name of an attribute type which exists in metaverse schema.

This is an example of the XML element:

```
<import-flow-set mv-object-type="object type">
    <import-flows mv-attribute="attribute name" type="ranked">
        <import-flow src-ma="guid" cd-object-type="object type" id="guid">
          ...
        </import-flow>
        ...
    </import-flows>
    ...
</import-flow-set>
```

The **import-flow-set** XML element defines an **mv-object-type** XML attribute that scopes **import-flows** by metaverse object type. The value of this **mv-object-type** attribute MUST be the name of an object type defined in the metaverse schema.

Similarly, the **import-flows** XML element specifies an mv-attribute XML attribute that serves to scope its child elements by metaverse attribute. The value given for the mv-attribute attribute MUST be the name of an attribute defined in the metaverse schema. Furthermore, the attribute MUST be a member of the object type specified by the **mv-object-type** attribute in the parent **import-flow-set** XML element.

The **import-flows** XML element also defines a type attribute that MUST have either the value "ranked" for ordered precedence, or "equal" for shared contribution of attribute values.

The value "ranked" denotes that the child flows (**import-flow** XML elements) are ranked, so that only one mapping onto the attribute will be in effect at any given point in time. The ranking is determined by the order in which the mappings appear in the XML, and lower-ranked flows (those flows coming first in the XML) are said to have higher precedence than higher-ranked flows and will override them (they will flow over them).

The value "equal" denotes that all defined flows will contribute values to the destination metaverse attribute. That is, all flows will be processed for all connectors and the resultant values will be merged into the destination metaverse attribute. For single-valued attributes, the management agent with a pending import and import attribute flow with equal precedence will flow to the metaverse.

2.3.5.1.1.1 import-flow

Flows encapsulate mappings, providing a unique ID and scoping by source management agent and source connector space object type. Flows are defined via the **import-flow** XML element. The import-flow XML element MUST contain exactly one XML element to specify the attribute mapping, either the **direct-mapping** XML element, the **scripted-mapping** XML element, the **constant-mapping** XML element or the **dn-part-mapping** XML element. The XML attributes **src-ma**, **cd-object-type**, and id MUST be present on an **import-flow** XML element.

The following is an example of the flow XML.

```
<import-flow src-ma="guid" cd-object-type="object-type" id="guid">
    <direct-mapping>
        <src-attribute>attribute-name</src-attribute>
    </direct-mapping>
</import-flow>
```

The **src-ma** and **cd-object-type** attributes provide scoping for attribute mapping XML elements. The value of src-ma MUST be a GUID which is the ID of the source management agent. The value of **cd-object**-type MUST be the name of a connector space object type (a primary object class) defined in the source management agent's schema.

The **id** attribute MUST be provided by the client based on a value obtained by a previous Get of an object of the **mv-data** object type. This value is an identifier of the lineage information which describes how an attribute in the metaverse has been changed. This value MUST be a GUID.

Each GUID used in an import-flow MUST be unique.

2.3.5.1.1.1.1 direct-mapping

For **direct-mapping**, the **src-attribute** XML element specifies the connector space attribute that is used to populate the destination attribute specified in the **mv-attribute** in the parent **import-flows** element.

There MUST be exactly one **src-attribute** element contained in a **direct-mapping** element.

An example of this XML element is:

```
<direct-mapping>
  <src-attribute>attributename</src-attribute>
</direct-mapping>
```

2.3.5.1.1.1.2 scripted-mapping

For **scripted-mapping**, the **src-attribute** elements specify the connector space attributes that are used to populate the destination attribute specified in the mv-attribute in the parent **import-flows** element. The connector space attributes are passed to a rules extension, along with the value of the script-context element, and the script determines the resulting value to populate the destination metaverse attribute.

An example of this XML element is:

```
<scripted-mapping>
  <src-attribute>attributename</src-attribute>
  <src-attribute>attributename</src-attribute>
  <src-attribute intrinsic="true">object-id</src-attribute>
  <script-context>context string</script-context>
</scripted-mapping>
```

2.3.5.1.1.1.3 constant-mapping

For **constant-mapping**, the constant-value element specifies the value with which to populate the destination attribute specified in the mv-attribute attribute in the parent **import-flows** element.

An example of this XML element is:

```
<constant-mapping>
  <constant-value>value</constant-value>
</constant-mapping>
```

2.3.5.1.1.1.4 dn-part-mapping

To use a portion of a DN, a **dn-part-mapping** element specifies the part of the DN starting from the right-hand side, with the first component numbered 1.

An example of this XML element is:

```
<dn-part-mapping>
  <dn-part>1</dn-part>
</dn-part-mapping>
```

2.3.6 SyncConfig-mv-deletion

This XML element is an identity attribute which specifies the behavior of metaverse deletions. This XML element is defined as a string encoding of a sequence of zero or more **mv-deletion-rule** elements.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-mv-deletion" type="xs:string" />
</xs:schema>
```

This XML element MUST be provided by the client in a create operation or a put operation on an mv-data object.

An example of this XML element is:

```
  <rm:SyncConfig-mv-deletion>
    <mv-deletion-rule mv-object-type="person" id="{7A97B207-3E90-4462-8AC7-5FB30D000A28}"
type="declared">
      <src-ma>{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}</src-ma>
    </mv-deletion-rule>
    <mv-deletion-rule mv-object-type="group" id="{B9F82AB4-3FC3-4396-AEF8-4CEFD3E1A9B4}"
type="declared">
      <src-ma>{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}</src-ma>
    </mv-deletion-rule>
  </rm:SyncConfig-mv-deletion>
```

2.3.6.1 mv-deletion-rule

Each **mv-deletion-rule** XML element specifies how to delete a metaverse object type. If an **mv-deletion-rule** XML element is not present for a given metaverse object type, then the metaverse object will be deleted when the last connector associated with the metaverse object is deleted. The **mv-deletion-rule** MUST NOT repeat for a given **mv-object-type**. If it exists for an **mv-object-type**, it MUST be the only one.

This XML element MUST be provided when creating the parent XML element. This XML element MUST NOT be modified. This XML element MUST NOT be removed from the **parent** XML element.

2.3.6.1.1 mv-object-type

This XML attribute of the **mv-deletion-rule** XML element identifies the metaverse object type to which the element applies. The metaverse object type MUST be a valid object type as defined in **SyncConfig-schema**. There MUST only be one **mv-deletion-rule** XML element per **mv-object-type**.

This XML attribute MUST be present in the **mv-deletion-rule** XML element.

2.3.6.1.2 id

This XML attribute of the **mv-deletion-rule** XML element MUST be a GUID that uniquely identifies the **mv-deletion-rule**.

This XML attribute MUST be present in the **mv-deletion-rule** XML element.

2.3.6.1.3 type

The XML attribute **type** is an XML attribute on the **mv-deletion-rule** XML element. If the value of the type XML attribute is the literal string "declared", then the **mv-deletion-rule** XML element MUST contain a child **src-ma** XML element which specifies the GUID of the management agent which will cause a deletion of the metaverse object upon deletion of the connector. If the **type** XML attribute is "scripted", then the synchronization engine will make a call to the metaverse extension to determine deletion.

2.3.6.1.4 src-ma

If the value of the **type** XML attribute is the literal string "declared", then the **mv-deletion-rule** XML element MUST contain a child **src-ma** XML element which specifies the GUID of the management agent. This will cause a deletion of the metaverse object when the connector in the connector space identified by this GUID is deleted.

2.3.7 SyncConfig-provisioning-type

This XML element is an identity attribute which specifies the behavior of provisioning that the server calls on a metaverse object when either:

- The metaverse object is projected
- The metaverse object is deleted
- The metaverse object is changed

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
```

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-provisioning-type" type="xs:string" />
</xs:schema>
```

This XML element has the following possible values: "none", or "Scripted":

```
<rm:SyncConfig-provisioning-type>
  none
</rm:SyncConfig-provisioning-type>

<rm:SyncConfig-provisioning-type>
  Scripted
</rm:SyncConfig-provisioning-type>
```

SyncConfig-provisioning-type can either be: "none" or "Scripted". If the value is "Scripted", then the extension specified in **SyncConfig-extension** in section 2.2.20 will be called when the metaverse object is projected, deleted or changed. If the value is "none", no rules are evaluated for those conditions.

2.3.8 SyncConfig-password-change-history-size

This XML element is an identity attribute.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-password-change-history-size" type="xs:integer" />
</xs:schema>
```

This XML element MUST be supplied and MUST have the integer 24 as its value.

2.3.9 SyncConfig-password-sync

This XML element is an identity attribute.

The XML schema of this identity attribute when transferred as an identity attribute value is defined in section 2.2.23.

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="SyncConfig-password-sync" type="xs:string" />
</xs:schema>
```

The **SyncConfig-password-sync** identity attribute MUST contain a **password-sync-enabled** XML element.

```
  <rm:SyncConfig-password-sync>
    <password-sync-enabled>0</password-sync-enabled>
```

```
</rm:SyncConfig-password-sync>
```

2.3.9.1 password-sync-enabled

The **password-sync-enabled** XML element MUST be provided and its value MUST be either literal string "0" or the literal string "1". A value of "0" indicates that the synchronization does not perform password synchronization. A value of "1" enables password synchronization.

2.4 Person Structure

This structure is an object type which represents a person whose account information is known to the server. The person represented is one who can perform operations as specified by one or more managementPolicyRule objects on the server.

The XML schema of an identity object of this object type when transferred as an enumeration item, and the identity attributes **ObjectID**, **ObjectType**, **DisplayName**, **Description**, **CreatedTime**, **Creator**, **AccountName**, **Domain** and **ObjectSID** were requested by the client, is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="Person">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="rm:ObjectID" minOccurs="0" />
        <xs:element ref="rm:ObjectType" minOccurs="0" />
        <xs:element ref="rm:DisplayName" minOccurs="0" />
        <xs:element ref="rm:Description" minOccurs="0" />
        <xs:element ref="rm:CreatedTime" minOccurs="0" />
        <xs:element ref="rm:Creator" minOccurs="0" />
        <xs:element ref="rm:AccountName" minOccurs="0" />
        <xs:element ref="rm:Domain" minOccurs="0" />
        <xs:element ref="rm:ObjectSID" minOccurs="0" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

2.4.1 AccountName

This identity attribute is an XML element whose value is a **Security Account Manager (SAM)** account name. The account name of an identity object of the person object type corresponds to the value of the **samAccountName** attribute of a User object class in Active Directory, as defined in [MS-ADA3] section 2.222.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="AccountName">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value="^.{1,64}$" />
      </xs:restriction>
```

```
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

This XML element MUST be provided during a create or a put on a person object and MUST NOT be deleted.

2.4.2 Domain

This XML element is an identity attribute which specifies as its value the domain in which the account for this person exists.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="Domain">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value=".{0,448}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
</xs:schema>
```

This identity attribute MUST be provided on a Create. When a client intends to change the value of this XML element, this XML element MUST be provided on a Put.

2.4.3 ObjectSID

This XML element is an identity attribute of the account. It corresponds to the value of the objectSid directory attribute, as defined in [MS-ADA3] section 2.45, of a User object class in Active Directory. The value of the **ObjectSID** identity attribute MUST be provided by the client as a byte array, and has a maximum length of 996 bytes.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="ObjectSID" type="xs:base64Binary" />
</xs:schema>
```

This identity attribute MUST be provided on a **Create**. When a client intends to change the value of this XML element, this XML element MUST be provided on a **Put**.

2.5 Set Structure

This structure is an object type which specifies a definition for a set. A set can contain both a query definition for calculation by the server of members of the set and a list of references to identity objects as static members of the set.

The XML schema of an identity object of this object type when transferred as an enumeration item, and the identity attributes **ObjectID**, **ObjectType**, **DisplayName**, **Description**, **CreatedTime**, **Creator**, **Filter** and **ExplicitMember** were requested by the client, is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="Set">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="rm:ObjectID" minOccurs="0" />
        <xs:element ref="rm:ObjectType" minOccurs="0" />
        <xs:element ref="rm:DisplayName" minOccurs="0" />
        <xs:element ref="rm:Description" minOccurs="0" />
        <xs:element ref="rm:CreatedTime" minOccurs="0" />
        <xs:element ref="rm:Creator" minOccurs="0" />
        <xs:element ref="rm:Filter" minOccurs="0" />
        <xs:element minOccurs="0" maxOccurs="unbounded" ref="rm:ExplicitMember" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

2.5.1 Filter

This XML element is an identity attribute which contains the filter definition that specifies the dynamic members of the set. The value of this XML element MUST be provided as an XML Path language (XPATH) query as specified in [XPATH]. The objects returned by this filter, in addition to any explicit members constitute the membership of the set.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="Filter" type="xs:string" />
</xs:schema>
```

This identity attribute MUST be provided on a **Create**. When a client intends to change the value of this XML element, this XML element MUST be provided on a **Put**.

2.5.2 ExplicitMember

This XML element is a multi-valued identity attribute. Each value of this identity attribute is a reference to another identity object. A value is a UUID which corresponds to the value of the **ObjectID** identity attribute of the referenced identity object of object type Person.

The XML schema of each value of this identity attribute when transferred as an identity attribute value in a **Create**, **Get** or **Put** operation is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:simpleType name="ReferenceType">
    <xs:restriction base="xs:string">
```

```
      <xs:pattern value="urn:uuid:([0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-
F]{4}-[0-9a-fA-F]{12})" />
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="ExplicitMember" type="rm:ReferenceType" />
</xs:schema>
```

When this identity attribute is transferred in a Get operation response, the **da:PartialAttribute** XML element (defined in [MS-UPSCP] section 2.2.3.16) MUST contain a sequence of zero or more **ExplicitMember** XML elements, one for each value of this identity attribute.

If the client intends to identify explicit members of a **Set**, the client MUST provide this identity attribute in a Create operation of an identity object of object type **Set**. If the client intends to update the explicit members of a Set, the client MUST provide one or more **Add** or **Delete** changes in a **Put** operation.

2.6 ManagementPolicyRule Structure

The **managementPolicyRule** object type specifies how workflows run when operations are performed by members of the PrincipalSet that cause objects from the **ResourceCurrentSet** to transition to the **ResourceFinalSet** by running the **ActionType** with data in the **ActionParameter**. The **ManagementPolicyRule** defines who can perform what actions on what set of objects that lead to a particular end state. The object being acted on MUST be in the ResourceCurrentSet, and the operation MUST lead to the object becoming a member of **ResourceFinalSet**.

The XML schema of an identity object of this object type when transferred as an enumeration item, and the identity attributes **ObjectID**, **ObjectType**, **DisplayName**, **Description**, **CreatedTime**, **Creator**, **ActionParameter**, **ActionType**, **PrincipalSet**, **ResourceCurrentSet**, **ResourceFinalSet** and **GrantRight** are requested by the client, is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="ManagementPolicyRule">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="rm:ObjectID" minOccurs="0" />
        <xs:element ref="rm:ObjectType" minOccurs="0" />
        <xs:element ref="rm:DisplayName" minOccurs="0" />
        <xs:element ref="rm:Description" minOccurs="0" />
        <xs:element ref="rm:CreatedTime" minOccurs="0" />
        <xs:element ref="rm:Creator" minOccurs="0" />
        <xs:element minOccurs="0" ref="rm:ActionParameter" />
        <xs:element minOccurs="0" ref="rm:ActionType" />
        <xs:element ref="rm:PrincipalSet" minOccurs="0" />
        <xs:element ref="rm:ResourceCurrentSet" minOccurs="0" />
        <xs:element ref="rm:ResourceFinalSet" minOccurs="0" />
        <xs:element ref="rm:GrantRight" minOccurs="0" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

2.6.1 ActionParameter

This XML element is a multi-valued identity attribute. Each value is the name of an identity attribute for which the managementPolicyRule grants the subject of the managementPolicyRule one or more rights.

The XML schema of each value of this identity attribute when transferred as an identity attribute value in a Create, Get or Put operation is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="ActionParameter" type="xs:string" />
</xs:schema>
```

When this identity attribute is transferred in a **Get** operation response, the **da:PartialAttribute** XML element (defined in [MS-UPSCP] section 2.2.3.16) MUST contain a sequence of zero or more **ActionParameter** XML elements, one for each value of this identity attribute.

2.6.2 ActionType

This XML element is a multi-valued identity attribute whose values specify which rights the **managementPolicyRule** confers upon the actor who is a member of the principal set.

The XML schema of each value of this identity attribute when transferred as an identity attribute value in a **Create**, **Get** or **Put** operation is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="ActionType" type="xs:string" />
</xs:schema>
```

When this identity attribute is transferred in a Get operation response, the da:PartialAttribute XML element (defined in [MS-UPSCP] section 2.2.3.16) MUST contain a sequence of zero or more ActionType XML elements, one for each value of this identity attribute.

The allowed values of this identity attribute are the literal strings "Create", "Read", "Remove", "Modify", "Delete", and "Add".

2.6.3 PrincipalSet

This XML element is an identity attribute whose value is a UUID. The UUID is a reference to an identity object of object type set. This UUID corresponds to the value of the objectID identity attribute of the referenced identity object.

The members of the referenced set MUST be of object type Person.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:simpleType name="ReferenceType">
    <xs:restriction base="xs:string">
      <xs:pattern value="urn:uuid:([0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-
F]{4}-[0-9a-fA-F]{12})" />
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="PrincipalSet" type="rm:ReferenceType" />
```

```
</xs:schema>
```

This identity attribute MUST be provided by the client in a create of an identity object of the **managementPolicyRule** object type. This identity attribute MUST NOT be updated or deleted in a **Put** operation.

2.6.4 ResourceCurrentSet

This XML element is an identity attribute whose value is a UUID. The UUID is a reference to an identity object of object type set. This UUID corresponds to the value of the **objectID** identity attribute of the referenced identity object.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:simpleType name="ReferenceType">
    <xs:restriction base="xs:string">
      <xs:pattern value="urn:uuid:([0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-
F]{4}-[0-9a-fA-F]{12})" />
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="ResourceCurrentSet" type="rm:ReferenceType" />
</xs:schema>
```

This identity attribute MUST be provided by the client in a create of an identity object of the **managementPolicyRule** object type. This identity attribute MUST NOT be updated or deleted in a **Put** operation.

2.6.5 ResourceFinalSet

This XML element is an identity attribute whose value is a UUID. The UUID is a reference to an identity object of object type set. This UUID corresponds to the value of the **objectID** identity attribute of the referenced identity object.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:simpleType name="ReferenceType">
    <xs:restriction base="xs:string">
      <xs:pattern value="urn:uuid:([0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-
F]{4}-[0-9a-fA-F]{12})" />
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="ResourceFinalSet" type="rm:ReferenceType" />
</xs:schema>
```

This identity attribute MUST be provided by the client in a create of an identity object of the **managementPolicyRule** object type. This identity attribute MUST NOT be updated or deleted in a **Put** operation.

2.6.6 GrantRight

This XML element is an identity attribute whose value is a Boolean that specifies whether the ManagementPolicyRule grants rights to the member of the **principalSet**. If the value is false, then this management policy rule is not evaluated further by the server during rights evaluation.

The XML schema of this identity attribute when transferred as an identity attribute value is defined as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   xmlns:rm="http://schemas.microsoft.com/2006/11/ResourceManagement"
   targetNamespace="http://schemas.microsoft.com/2006/11/ResourceManagement">
  <xs:element name="GrantRight" type="xs:boolean" />
</xs:schema>
```

This identity attribute MUST be provided by the client in a create of an identity object of the **managementPolicyRule** object type. This identity attribute MUST NOT be updated or deleted in a **Put** operation.

3 Structure Examples

The following sections illustrate ma-data and mv-data configuration.

3.1 ma-data example

The following **ma-data** example from an Active Directory management agent highlights inbound synchronization rules configuration and omits the instance-specific partition data and schema information for brevity (examples of each of those sections are included in section 2):

```
  <rm:ma-data>
    <rm:SyncConfig-format-version>1</rm:SyncConfig-format-version>
    <rm:SyncConfig-id>{70843C90-ECF1-44D3-99CF-0592D1ED60BA}</rm:SyncConfig-id>
    <rm:SyncConfig-name>AD</rm:SyncConfig-name>
    <rm:SyncConfig-category>AD</rm:SyncConfig-category>
    <rm:SyncConfig-subtype/>
    <rm:SyncConfig-ma-listname/>
    <rm:SyncConfig-ma-companyname/>
    <rm:SyncConfig-creation-time>2008-07-30 22:56:52.857</rm:SyncConfig-creation-time>
    <rm:SyncConfig-last-modification-time>2008-07-30 22:58:53.580</rm:SyncConfig-last-
modification-time>
    <rm:SyncConfig-version>3</rm:SyncConfig-version>
    <rm:SyncConfig-internal-version>0</rm:SyncConfig-internal-version>
    <rm:SyncConfig-password-sync-allowed>1</rm:SyncConfig-password-sync-allowed>
    <rm:SyncConfig-schema>

      <dsml xmlns="http://www.dsml.org/DSML" xmlns:m="http://www.microsoft.com/MMS/DSML">
        ...
      </dsml>

    </rm:SyncConfig-schema>
    <rm:SyncConfig-attribute-inclusion>
      <attribute>assistant</attribute>
      <attribute>c</attribute>
      <attribute>cn</attribute>
      <attribute>co</attribute>
      <attribute>company</attribute>
      <attribute>department</attribute>
      <attribute>description</attribute>
      <attribute>displayName</attribute>
      <attribute>employeeID</attribute>
      <attribute>employeeType</attribute>
      <attribute>facsimileTelephoneNumber</attribute>
      <attribute>givenName</attribute>
      <attribute>groupType</attribute>
      <attribute>hideDLMembership</attribute>
      <attribute>homeMDB</attribute>
      <attribute>homePhone</attribute>
      <attribute>homePostalAddress</attribute>
      <attribute>info</attribute>
      <attribute>l</attribute>
      <attribute>mail</attribute>
      <attribute>mailNickname</attribute>
      <attribute>managedBy</attribute>
      <attribute>manager</attribute>
      <attribute>mDBUseDefaults</attribute>
      <attribute>member</attribute>
      <attribute>middleName</attribute>
      <attribute>mobile</attribute>
      <attribute>msExchMailboxSecurityDescriptor</attribute>
      <attribute>objectSid</attribute>
      <attribute>pager</attribute>
      <attribute>photo</attribute>
      <attribute>physicalDeliveryOfficeName</attribute>
      <attribute>postalAddress</attribute>
      <attribute>postalCode</attribute>
```

```
    <attribute>sAMAccountName</attribute>
    <attribute>secretary</attribute>
    <attribute>sIDHistory</attribute>
    <attribute>sn</attribute>
    <attribute>streetAddress</attribute>
    <attribute>telephoneNumber</attribute>
    <attribute>title</attribute>
    <attribute>unicodePwd</attribute>
    <attribute>userAccountControl</attribute>
    <attribute>userPrincipalName</attribute>
  </rm:SyncConfig-attribute-inclusion>
  <rm:SyncConfig-stay-disconnector />
  <rm:SyncConfig-join>
    <join-profile cd-object-type="group">
      <join-criterion id="{493DD4D1-C49C-4EE0-BDB5-DAB9E6DC2A9B}">
        <search mv-object-type="group">
          <attribute-mapping mv-attribute="accountName">
            <direct-mapping>
              <src-attribute>sAMAccountName</src-attribute>
            </direct-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
      <join-criterion id="{77AED4BA-4C65-478A-AFD3-24A8AC386324}">
        <search mv-object-type="group">
          <attribute-mapping mv-attribute="accountName">
            <direct-mapping>
              <src-attribute>mailNickname</src-attribute>
            </direct-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
      <join-criterion id="{4468E941-24BA-450C-B78A-44221C8E703B}">
        <search mv-object-type="group">
          <attribute-mapping mv-attribute="accountName">
            <scripted-mapping>
              <script-context>cd.group:sAMAccountName-&gt;accountName</script-context>
              <src-attribute>sAMAccountName</src-attribute>
            </scripted-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
      <join-criterion id="{76AD4639-75D3-48BC-B618-5F44EF9FF45B}">
        <search mv-object-type="group">
          <attribute-mapping mv-attribute="mailNickname">
            <direct-mapping>
              <src-attribute>mailNickname</src-attribute>
            </direct-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
    </join-profile>
    <join-profile cd-object-type="user">
      <join-criterion id="{F203BE8F-07F2-4F9A-A23D-65C093315F64}">
        <search mv-object-type="person">
          <attribute-mapping mv-attribute="accountName">
            <direct-mapping>
```

```
                <src-attribute>sAMAccountName</src-attribute>
              </direct-mapping>
            </attribute-mapping>
          </search>
          <resolution type="none">
            <script-context></script-context>
          </resolution>
        </join-criterion>
        <join-criterion id="{C68BFFFA-D820-41AE-87E7-AA4C1BEAD4FC}">
          <search mv-object-type="person">
            <attribute-mapping mv-attribute="accountName">
              <direct-mapping>
                <src-attribute>mailNickname</src-attribute>
              </direct-mapping>
            </attribute-mapping>
          </search>
          <resolution type="none">
            <script-context></script-context>
          </resolution>
        </join-criterion>
        <join-criterion id="{ACB21881-8A86-4DC2-983F-70B4AC773757}">
          <search mv-object-type="person">
            <attribute-mapping mv-attribute="accountName">
              <scripted-mapping>
                <script-context>cd.user:sAMAccountName-&gt;accountName</script-context>
                <src-attribute>sAMAccountName</src-attribute>
              </scripted-mapping>
            </attribute-mapping>
          </search>
          <resolution type="none">
            <script-context></script-context>
          </resolution>
        </join-criterion>
      </join-profile>
    </rm:SyncConfig-join>
    <rm:SyncConfig-projection />
    <rm:SyncConfig-export-attribute-flow>
      <export-flow-set cd-object-type="group" mv-object-type="group">
        <export-flow cd-attribute="description" id="{C7EC3192-3815-4393-9A71-27E2803D7E13}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>description</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="member" id="{4EEFAB4E-4E8F-489F-A3F6-8D318653ECC7}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>member</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="displayName" id="{02D3CC9D-CF5F-4E09-A6AD-67BC31ABB0B6}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>displayName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="groupType" id="{3806A2D7-C3C9-43C9-95EE-70E6F6724A5A}"
suppress-deletions="true">
          <scripted-mapping>
            <src-attribute>scope</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:groupType&lt;-mv.group:scope,type</script-context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="sAMAccountName" id="{DD0943C1-9425-4A3E-8F0C-
0E611E1D2817}" suppress-deletions="true">
          <scripted-mapping>
            <src-attribute>accountName</src-attribute>
            <src-attribute>type</src-attribute>
```

```
            <script-context>cd.group:sAMAccountName&lt;-mv.group:accountName,type</script-
context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="mailNickname" id="{EC934491-93E0-47D4-ACFD-46265B491A8C}"
suppress-deletions="false">
          <scripted-mapping>
            <src-attribute>mailNickname</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:mailNickname&lt;-mv.group:mailNickname,type</script-
context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="info" id="{2ADC2714-F371-4474-8D72-FB83F0080DFC}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>csObjectID</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="managedBy" id="{F45F690A-41BA-482B-9FCD-370E9A4D4F44}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>displayedOwner</src-attribute>
          </direct-mapping>
        </export-flow>
      </export-flow-set>
      <export-flow-set cd-object-type="user" mv-object-type="person">
        <export-flow cd-attribute="l" id="{0933B900-0793-4DDF-B757-0930FD863DDB}" suppress-
deletions="false">
          <direct-mapping>
            <src-attribute>city</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="telephoneNumber" id="{158309C6-24E1-46AF-B772-
D299BF1C7CFA}" suppress-deletions="false">
          <direct-mapping>
            <src-attribute>officePhone</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="facsimileTelephoneNumber" id="{D5B0F264-015F-4502-B44D-
BA10447449B2}" suppress-deletions="false">
          <direct-mapping>
            <src-attribute>officeFax</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="physicalDeliveryOfficeName" id="{CD961D96-5B81-4D9D-B484-
C900D4273112}" suppress-deletions="false">
          <direct-mapping>
            <src-attribute>officeLocation</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="postalAddress" id="{3A016290-AB57-4336-B038-192FDB1DDD41}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>address</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="postalCode" id="{592AFC88-7FA9-4E88-9F70-5AF8B66A25AB}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>postalCode</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="displayName" id="{ACFB1F4A-172B-44BE-9FB7-06B4FC8229FB}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>displayName</src-attribute>
          </direct-mapping>
        </export-flow>
```

```
        <export-flow cd-attribute="givenName" id="{645951C4-365F-4996-AEB0-A26DBD277FD4}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>firstName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="middleName" id="{B8CFBFB4-CA23-49C0-9485-D8B59C0959EE}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>middleName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="sn" id="{173CBC30-C9E6-46CD-BEDE-54C7D688E644}" suppress-
deletions="false">
          <direct-mapping>
            <src-attribute>lastName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="sAMAccountName" id="{75653D9F-9ACB-48FF-AA00-
9FA8CBDBFCBB}" suppress-deletions="true">
          <direct-mapping>
            <src-attribute>accountName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="employeeType" id="{5314F4F8-2AE1-42C4-B6E9-8ED0380C3C6A}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>employeeType</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="employeeID" id="{16312EDE-5368-46A5-A3FC-4F049E5EB4A4}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>employeeID</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="company" id="{93128E5F-E1B3-4C08-A2E1-ACC7E86ABF27}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>company</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="department" id="{86849450-1C59-490E-AA67-1A9F97D2F524}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>department</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="manager" id="{7F6B10C4-2F8E-4E5A-A2D1-6696C6B08E00}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>manager</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="assistant" id="{3DE7F48C-7EF5-46B2-A54A-3786CF009C88}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>assistant</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="title" id="{D266133D-9AD3-43AE-87DD-66CE71C546AB}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>jobTitle</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="mobile" id="{E25E1EE4-6542-4F1C-881C-0C7E9BDC7B56}"
suppress-deletions="false">
          <direct-mapping>
```

```
            <src-attribute>mobilePhone</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="co" id="{2B6D3E61-07C6-4AAF-8BF2-1EC48118A06F}" suppress-
deletions="false">
          <direct-mapping>
            <src-attribute>country</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="info" id="{771888BE-9150-4E19-9C04-69EBAE7D9006}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>csObjectID</src-attribute>
          </direct-mapping>
        </export-flow>
      </export-flow-set>
    </rm:SyncConfig-export-attribute-flow>
    <rm:SyncConfig-provisioning-cleanup type="scripted" />
    <rm:SyncConfig-extension>
      <assembly-name>ADExtension.dll</assembly-name>
      <application-protection>low</application-protection>
    </rm:SyncConfig-extension>
    <rm:SyncConfig-controller-configuration>
      <application-protection>low</application-protection>
      <application-architecture>process</application-architecture>
    </rm:SyncConfig-controller-configuration>
    <rm:description></rm:description>
    <rm:SyncConfig-ma-ui-settings>
      <account-joiner-queries>
        <attributes>
          <cs>
            <attribute name="&lt;DN&gt;" header="DN" size="220" />
            <attribute name="&lt;objectType&gt;" header="objectType" size="100" />
            <attribute name="displayname" header="displayname" size="100" />
          </cs>
          <mv>
            <attribute name="displayName" header="displayName" size="100" />
          </mv>
        </attributes>
        <filters max mv search results="" />
      </account-joiner-queries>
    </rm:SyncConfig-ma-ui-settings>
    <rm:SyncConfig-private-configuration>
      <adma-configuration>
        <forest-name>dc1.fabrikam.com</forest-name>
        <forest-login-user>Administrator</forest-login-user>
        <forest-login-domain>dc1.fabrikam.com</forest-login-domain>
        <ssl-bind crl-check="0">0</ssl-bind>
        <sign-and-seal>1</sign-and-seal>
        <cd-extension>
          <assembly-name>Exch2007Extension.dll</assembly-name>
          <application-protection>low</application-protection>
          <pre-export>0</pre-export>
          <post-export>1</post-export>
          <pre-import>0</pre-import>
        </cd-extension>
      </adma-configuration>
    </rm:SyncConfig-private-configuration>

    <rm:SyncConfig-ma-partition-data>
      ...
    </rm:SyncConfig-ma-partition-data>

    <rm:SyncConfig-ma-run-data>
      ...
    </rm:SyncConfig-ma-run-data>

    <rm:SyncConfig-capabilities-mask>fb7f</rm:SyncConfig-capabilities-mask>
    <rm:SyncConfig-export-type>1</rm:SyncConfig-export-type>
```

```
    <rm:SyncConfig-dn-construction/>
    <rm:SyncConfig-password-sync>
      <maximum-retry-count>10</maximum-retry-count>
      <retry-interval>60</retry-interval>
      <allow-low-security>0</allow-low-security>
    </rm:SyncConfig-password-sync>
    <rm:SyncConfig-component_mappings />
    <rm:SyncConfig-encrypted-attributes>
      <attribute name="password">password</attribute>
    </rm:SyncConfig-encrypted-attributes>
  </rm:ma-data>
```

3.1.1 SyncConfig-attribute-inclusion

This XML element's value is the name of a connector space attribute, each contained in an **attribute** XML element. An example of the **SyncConfig-attribute-inclusion** XML element is:

```
<rm:SyncConfig-attribute-inclusion>
  <attribute>description</attribute>
  <attribute>displayName</attribute>
  <attribute>givenName</attribute>
  <attribute>manager</attribute>
  <attribute>member</attribute>
  <attribute>sAMAccountname</attribute>
  <attribute>sn</attribute>
</rm:SyncConfig-attribute-inclusion>
```

3.1.2 SyncConfig-stay-disconnector

This XML element contains a series of filter-sets, one for each object type. Each filter set contains a list of filters. Each filter contains a list of conditions. An example of this XML element is:

```
<rm:SyncConfig-stay-disconnector>
  <filter-set cd-object-type="contact"  type="declared">
    <filter-alternative id="{234A9523-A3CA-4BC5-ADA0-D6D95D979422}">
      <condition cd-attribute="employeeID"  intrinsic-attribute="false"
     operator="not-present">
        <value/>
      </condition>
    </filter-alternative>
    <filter-alternative id="{334A9523-A3CA-4BC5-ADA0-D6D95D979423}">
      <condition cd-attribute="rdn" intrinsic-attribute="false"
     operator="equality">
        <value>Jane Doe</value>
      </condition>
    </filter-alternative>
    <filter-alternative id="{434A9523-A3CA-4BC5-ADA0-D6D95D979424}">
      <condition cd-attribute="dn" intrinsic-attribute="true"
     operator="equality">
        <value>cn=Jane Doe,o=Microsoft</value>
      </condition>
    </filter-alternative>
  </filter-set>
  <filter-set cd-object-type="user" type="declared">
    <filter-alternative id="{534A9523-A3CA-4BC5-ADA0-D6D95D979425}">
      <condition cd-attribute="title" operator="substring-start">
        <value>administrator</value>
      </condition>
      <condition cd-attribute="company" operator="equality">
        <value>Microsoft</value>
      </condition>
    </filter-alternative>
    <filter-alternative id="{634A9523-A3CA-4BC5-ADA0-D6D95D979426}">
```

```
        <condition cd-attribute="mail" operator="equality">
          <value>administrator@Microsoft.com</value>
        </condition>
      </filter-alternative>
      <filter-alternative id="{734A9523-A3CA-4BC5-ADA0-D6D95D979427}">
        <condition cd-attribute="userAccountControl" operator="bit-off">
          <value ui-radix="16">0x200</value>
        </condition>
      </filter-alternative>
      <filter-alternative id="{834A9523-A3CA-4BC5-ADA0-D6D95D979428}">
        <condition cd-attribute="userAccountControl" operator="bit-on">
          <value ui-radix="10">0x2</value>
        </condition>
      </filter-alternative>
    </filter-set>
  </rm:SyncConfig-stay-disconnector>
```

3.1.2.1 filter-set

An example of opening a declared filter-set is:

```
<filter-set  cd-object-type="cdObjectType" type="declared">
```

An example of opening a scripted filter-set is:

```
<filter-set  cd-object-type="cdObjectType" type="scripted" id="{534A9523-A3CA-4BC5-ADA0-
D6D95D979425}">
```

3.1.3 SyncConfig-join

The following is a set of join rules for group and user connector space object types:

```
    <rm:SyncConfig-join>
      <join-profile cd-object-type="group">
        <join-criterion id="{493DD4D1-C49C-4EE0-BDB5-DAB9E6DC2A9B}">
          <search mv-object-type="group">
            <attribute-mapping mv-attribute="accountName">
              <direct-mapping>
                <src-attribute>sAMAccountName</src-attribute>
              </direct-mapping>
            </attribute-mapping>
          </search>
          <resolution type="none">
            <script-context></script-context>
          </resolution>
        </join-criterion>
        <join-criterion id="{77AED4BA-4C65-478A-AFD3-24A8AC386324}">
          <search mv-object-type="group">
            <attribute-mapping mv-attribute="accountName">
              <direct-mapping>
                <src-attribute>mailNickname</src-attribute>
              </direct-mapping>
            </attribute-mapping>
          </search>
          <resolution type="none">
            <script-context></script-context>
          </resolution>
        </join-criterion>
        <join-criterion id="{4468E941-24BA-450C-B78A-44221C8E703B}">
          <search mv-object-type="group">
            <attribute-mapping mv-attribute="accountName">
```

```
            <scripted-mapping>
              <script-context>cd.group:sAMAccountName-&gt;accountName</script-context>
              <src-attribute>sAMAccountName</src-attribute>
            </scripted-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
      <join-criterion id="{76AD4639-75D3-48BC-B618-5F44EF9FF45B}">
        <search mv-object-type="group">
          <attribute-mapping mv-attribute="mailNickname">
            <direct-mapping>
              <src-attribute>mailNickname</src-attribute>
            </direct-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
    </join-profile>
    <join-profile cd-object-type="user">
      <join-criterion id="{F203BE8F-07F2-4F9A-A23D-65C093315F64}">
        <search mv-object-type="person">
          <attribute-mapping mv-attribute="accountName">
            <direct-mapping>
              <src-attribute>sAMAccountName</src-attribute>
            </direct-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
      <join-criterion id="{C68BFFFA-D820-41AE-87E7-AA4C1BEAD4FC}">
        <search mv-object-type="person">
          <attribute-mapping mv-attribute="accountName">
            <direct-mapping>
              <src-attribute>mailNickname</src-attribute>
            </direct-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
      <join-criterion id="{ACB21881-8A86-4DC2-983F-70B4AC773757}">
        <search mv-object-type="person">
          <attribute-mapping mv-attribute="accountName">
            <scripted-mapping>
              <script-context>cd.user:sAMAccountName-&gt;accountName</script-context>
              <src-attribute>sAMAccountName</src-attribute>
            </scripted-mapping>
          </attribute-mapping>
        </search>
        <resolution type="none">
          <script-context></script-context>
        </resolution>
      </join-criterion>
    </join-profile>
  </rm:SyncConfig-join>
```

3.1.3.1 join-profile

The following provides an example of a sequence of **join-profile** XML elements which shows joining for multiple object types with multiple mapping and resolution types:

```
<join-profile cd-object-type="user">
  <join-criterion id="{934A9523-A3CA-4BC5-ADA0-D6D95D979429}">
    <search mv-object-type="user">
      <attribute-mapping  mv-attribute="uid">
        <direct-mapping>
          <src-attribute>empId</src-attribute>
        </direct-mapping>
      </attribute-mapping>
      <attribute-mapping  mv-attribute="company">
        <constant-mapping>
          <constant-value>Microsoft</constant-value>
        </constant-mapping>
      </attribute-mapping>
    </search>
    <resolution type="scripted">
      <script-context>Criterion1</script-context>
      </resolution>
    </join-criterion>
  <join-criterion id="{534A9523-A3CA-4BC5-ADA0-D6D95D979425}">
    <search mv-object-type="user">
      <attribute-mapping  mv-attribute="mail">
        <direct-mapping>
          <src-attribute>alias</src-attribute>
        </direct-mapping>
      </attribute-mapping>
    </search>
    <resolution type="scripted">
      <script-context>Criterion2</script-context>
      </resolution>
    </join-criterion>
</join-profile>
<join-profile cd-object-type="prov-user">
  <join-criterion id="{5C875108-D0CD-471a-9D9C-BC3E9C2C4A12}">
    <search  mv-object-type="user">
      <attribute-mapping  intrinsic-attribute="true"
  mv-attribute="object-id">
        <direct-mapping>
          <src-attribute>mv-object-id</src-attribute>
        </direct-mapping>
      </attribute-mapping>
    </search>
    <resolution type="none"/>
  </join-criterion>
</join-profile>
<join-profile cd-object-type="contact">
  <join-criterion id="{134A9523-A3CA-4BC5-ADA0-D6D95D979421}">
    <search mv-object-type="user">
      <attribute-mapping intrinsic-attribute="false" mv-attribute="mail">
        <direct-mapping>
          <src-attribute>mail</src-attribute>
        </direct-mapping>
      </attribute-mapping>
    </search>
    <resolution type="none"/>
  </join-criterion>
</join-profile>
```

3.1.3.2 join-criterion

An example of the **join-criterion** XML element is:

```
  <join-criterion id="{934A9523-A3CA-4BC5-ADA0-D6D95D979429}">
    <search mv-object-type="user">
      <attribute-mapping  mv-attribute="uid">
        <direct-mapping>
          <src-attribute>empId</src-attribute>
        </direct-mapping>
      </attribute-mapping>
      <attribute-mapping  mv-attribute="company">
        <constant-mapping>
          <constant-value>Microsoft</constant-value>
        </constant-mapping>
      </attribute-mapping>
    </search>
    <resolution type="scripted">
      <script-context>Criterion1</script-context>
    </resolution>
  </join-criterion>
```

3.1.4 SyncConfig-projection

The following provides a complete example of a set of projection rules:

```
    <rm:SyncConfig-projection>
      <class-mapping type="declared" id="{A481C0EC-A40F-4667-80F8-E5017AD0AEF4}" cd-object-
type="Group">
        <mv-object-type>group</mv-object-type>
      </class-mapping>
      <class-mapping type="declared" id="{B3A4EEE3-8ADA-47B6-8D48-1702EA40499E}" cd-object-
type="Person">
        <mv-object-type>person</mv-object-type>
      </class-mapping>
    </rm:SyncConfig-projection>
```

3.1.4.1 class-mapping

The following is a sample declared projection mapping:

```
      <class-mapping type="declared" id="{B3A4EEE3-8ADA-47B6-8D48-1702EA40499E}" cd-object-
type="Person">
        <mv-object-type>person</mv-object-type>
      </class-mapping>
```

3.1.5 SyncConfig-export-attribute-flow

The following is an example of a complete **export-attribute-flow** element for an Active directory management agent's group and user connector space object types. Note that the user connector space object type is mapped to the person metaverse object type in the second **export-flow**-set with:

```
    <rm:SyncConfig-export-attribute-flow>
      <export-flow-set cd-object-type="group" mv-object-type="group">
        <export-flow cd-attribute="description" id="{C7EC3192-3815-4393-9A71-27E2803D7E13}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>description</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="member" id="{4EEFAB4E-4E8F-489F-A3F6-8D318653ECC7}"
suppress-deletions="false">
          <direct-mapping>
```

```
            <src-attribute>member</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="displayName" id="{02D3CC9D-CF5F-4E09-A6AD-67BC31ABB0B6}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>displayName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="groupType" id="{3806A2D7-C3C9-43C9-95EE-70E6F6724A5A}"
suppress-deletions="true">
          <scripted-mapping>
            <src-attribute>scope</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:groupType&lt;-mv.group:scope,type</script-context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="sAMAccountName" id="{DD0943C1-9425-4A3E-8F0C-
0E611E1D2817}" suppress-deletions="true">
          <scripted-mapping>
            <src-attribute>accountName</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:sAMAccountName&lt;-mv.group:accountName,type</script-
context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="mailNickname" id="{EC934491-93E0-47D4-ACFD-46265B491A8C}"
suppress-deletions="false">
          <scripted-mapping>
            <src-attribute>mailNickname</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:mailNickname&lt;-mv.group:mailNickname,type</script-
context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="info" id="{2ADC2714-F371-4474-8D72-FB83F0080DFC}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>csObjectID</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="managedBy" id="{F45F690A-41BA-482B-9FCD-370E9A4D4F44}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>displayedOwner</src-attribute>
          </direct-mapping>
        </export-flow>
      </export-flow-set>
      <export-flow-set cd-object-type="user" mv-object-type="person">
        <export-flow cd-attribute="l" id="{0933B900-0793-4DDF-B757-0930FD863DDB}" suppress-
deletions="false">
          <direct-mapping>
            <src-attribute>city</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="telephoneNumber" id="{158309C6-24E1-46AF-B772-
D299BF1C7CFA}" suppress-deletions="false">
          <direct-mapping>
            <src-attribute>officePhone</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="facsimileTelephoneNumber" id="{D5B0F264-015F-4502-B44D-
BA10447449B2}" suppress-deletions="false">
          <direct-mapping>
            <src-attribute>officeFax</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="physicalDeliveryOfficeName" id="{CD961D96-5B81-4D9D-B484-
C900D4273112}" suppress-deletions="false">
```

```
          <direct-mapping>
            <src-attribute>officeLocation</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="postalAddress" id="{3A016290-AB57-4336-B038-192FDB1DDD41}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>address</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="postalCode" id="{592AFC88-7FA9-4E88-9F70-5AF8B66A25AB}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>postalCode</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="displayName" id="{ACFB1F4A-172B-44BE-9FB7-06B4FC8229FB}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>displayName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="givenName" id="{645951C4-365F-4996-AEB0-A26DBD277FD4}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>firstName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="middleName" id="{B8CFBFB4-CA23-49C0-9485-D8B59C0959EE}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>middleName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="sn" id="{173CBC30-C9E6-46CD-BEDE-54C7D688E644}" suppress-
deletions="false">
          <direct-mapping>
            <src-attribute>lastName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="sAMAccountName" id="{75653D9F-9ACB-48FF-AA00-
9FA8CBDBFCBB}" suppress-deletions="true">
          <direct-mapping>
            <src-attribute>accountName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="employeeType" id="{5314F4F8-2AE1-42C4-B6E9-8ED0380C3C6A}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>employeeType</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="employeeID" id="{16312EDE-5368-46A5-A3FC-4F049E5EB4A4}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>employeeID</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="company" id="{93128E5F-E1B3-4C08-A2E1-ACC7E86ABF27}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>company</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="department" id="{86849450-1C59-490E-AA67-1A9F97D2F524}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>department</src-attribute>
          </direct-mapping>
```

```
        </export-flow>
        <export-flow cd-attribute="manager" id="{7F6B10C4-2F8E-4E5A-A2D1-6696C6B08E00}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>manager</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="assistant" id="{3DE7F48C-7EF5-46B2-A54A-3786CF009C88}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>assistant</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="title" id="{D266133D-9AD3-43AE-87DD-66CE71C546AB}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>jobTitle</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="mobile" id="{E25E1EE4-6542-4F1C-881C-0C7E9BDC7B56}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>mobilePhone</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="co" id="{2B6D3E61-07C6-4AAF-8BF2-1EC48118A06F}" suppress-
deletions="false">
          <direct-mapping>
            <src-attribute>country</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="info" id="{771888BE-9150-4E19-9C04-69EBAE7D9006}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>csObjectID</src-attribute>
          </direct-mapping>
        </export-flow>
      </export-flow-set>
    </rm:SyncConfig-export-attribute-flow>
```

3.1.5.1 export-flow-set

The following example shows a set of export attribute flows for an Active Directory management agent's group object type:

```
      <export-flow-set cd-object-type="group" mv-object-type="group">
        <export-flow cd-attribute="description" id="{C7EC3192-3815-4393-9A71-27E2803D7E13}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>description</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="member" id="{4EEFAB4E-4E8F-489F-A3F6-8D318653ECC7}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>member</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="displayName" id="{02D3CC9D-CF5F-4E09-A6AD-67BC31ABB0B6}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>displayName</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="groupType" id="{3806A2D7-C3C9-43C9-95EE-70E6F6724A5A}"
suppress-deletions="true">
```

```
          <scripted-mapping>
            <src-attribute>scope</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:groupType&lt;-mv.group:scope,type</script-context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="sAMAccountName" id="{DD0943C1-9425-4A3E-8F0C-
0E611E1D2817}" suppress-deletions="true">
          <scripted-mapping>
            <src-attribute>accountName</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:sAMAccountName&lt;-mv.group:accountName,type</script-
context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="mailNickname" id="{EC934491-93E0-47D4-ACFD-46265B491A8C}"
suppress-deletions="false">
          <scripted-mapping>
            <src-attribute>mailNickname</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:mailNickname&lt;-mv.group:mailNickname,type</script-
context>
          </scripted-mapping>
        </export-flow>
        <export-flow cd-attribute="info" id="{2ADC2714-F371-4474-8D72-FB83F0080DFC}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>csObjectID</src-attribute>
          </direct-mapping>
        </export-flow>
        <export-flow cd-attribute="managedBy" id="{F45F690A-41BA-482B-9FCD-370E9A4D4F44}"
suppress-deletions="false">
          <direct-mapping>
            <src-attribute>displayedOwner</src-attribute>
          </direct-mapping>
        </export-flow>
      </export-flow-set>
```

3.1.5.2 export-flow

The following example shows an export attribute flow for an Active Directory management agent's group object type:

```
        <export-flow cd-attribute="groupType" id="{3806A2D7-C3C9-43C9-95EE-70E6F6724A5A}"
suppress-deletions="true">
          <scripted-mapping>
            <src-attribute>scope</src-attribute>
            <src-attribute>type</src-attribute>
            <script-context>cd.group:groupType&lt;-mv.group:scope,type</script-context>
          </scripted-mapping>
        </export-flow>
```

3.1.5.3 direct-mapping

The following example shows the metaverse attribute **displayName** as the source for a direct export attribute flow:

```
          <direct-mapping>
            <src-attribute>displayName</src-attribute>
          </direct-mapping>
```

3.1.5.4 scripted-mapping

The following example shows the metaverse **type** attribute and scope being used as sources for a rules extension to calculate an Active Directory management agent's **groupType** attribute value on a group connector space object type (not shown in this XML element; see **export-flow** example):

```
<scripted-mapping>
  <src-attribute>scope</src-attribute>
  <src-attribute>type</src-attribute>
  <script-context>cd.group:groupType&lt;-mv.group:scope,type</script-context>
</scripted-mapping>
```

3.1.5.5 constant-mapping

This example shows a constant being used as a source of an export attribute flow (notice the destination is not in the mapping and is defined in the **export-flow** XML element):

```
<constant-mapping>
  <constant-value>Object managed by sync</constant-value>
</constant-mapping>
```

3.1.5.6 dn-part-mapping

The following example maps part of a DN for an attribute flow:

Assuming a DN of "cn=ssmith,ou=Employees, dc=corporate,dc=fabrikam,dc=com" this **dn-part-mapping** would flow the "dc=corporate" portion of the name.

```
<dn-part-mapping>
  <dn-part>3</dn-part>
</dn-part-mapping>
```

3.1.6 SyncConfig-extension

The following example illustrates an in-process assembly configuration for ADExtension.dll:

```
<rm:SyncConfig-extension>
  <assembly-name>ADExtension.dll</assembly-name>
  <application-protection>low</application-protection>
</rm:SyncConfig-extension>
```

3.1.7 SyncConfig-controller-configuration

The following example shows a management configuration running inside the synchronization engine service's address space and with the same processor architecture:

```
<rm:SyncConfig-controller-configuration>
  <application-protection>low</application-protection>
  <application-architecture>process</application-architecture>
</rm:SyncConfig-controller-configuration>
```

3.1.8 SyncConfig-password-sync

The following example shows a configuration that allows 10 retry attempts, one every 60 seconds, and disallows a low security connection (not encrypted) for the password export:

```
<rm:SyncConfig-password-sync>
  <maximum-retry-count>10</maximum-retry-count>
  <retry-interval>60</retry-interval>
  <allow-low-security>0</allow-low-security>
</rm:SyncConfig-password-sync>
```

3.1.9 SyncConfig-private-configuration

The following sections illustrate sample private configurations for Active Directory Domain Services and extensible connectivity management agents.

3.1.9.1 adma-configuration

The following illustrates an Active Directory management agent private configuration with an extension configured.

```
<rm:SyncConfig-private-configuration>
  <adma-configuration>
    <forest-name>dc1.fabrikam.com</forest-name>
    <forest-login-user>Administrator</forest-login-user>
    <forest-login-domain>dc1.fabrikam.com</forest-login-domain>
    <ssl-bind crl-check="0">0</ssl-bind>
    <sign-and-seal>1</sign-and-seal>
    <cd-extension>
      <assembly-name>Exch2007Extension.dll</assembly-name>
      <application-protection>low</application-protection>
      <pre-export>0</pre-export>
      <post-export>1</post-export>
      <pre-import>0</pre-import>
    </cd-extension>
  </adma-configuration>
</rm:SyncConfig-private-configuration>
```

3.1.9.2 fimma-configuration

The following is an example of the private configuration for a FIM management agent:

```
<rm:SyncConfig-private-configuration>
  <fimma-configuration>
    <mms-info></mms-info>
    <connection-info>
      <serviceHost>http://FAB-FIMSVR:5725</serviceHost>
      <server>FAB-FIMSVR</server>
      <databasename>FIMService</databasename>
      <authentication>integrated</authentication>
      <user>fimSyncSvcAcct</user>
      <domain>fabrikam</domain>
    </connection-info>
  </fimma-configuration>
</rm:SyncConfig-private-configuration>
```

3.1.9.3 Extensible

The following example shows an extensible connectivity management agent's private configuration. The management agent uses an LDIF intermediary file for import:

```
        <MAConfig>
          <ui-data>
            <xmlwizard>
              <properties>
                <code_page_description>Unicode (UTF-8)</code_page_description>
              </properties>
              <partitions>
                <partition cd name="default" guid="{B7FF22CB-99F8-44AD-8FBB-E522F707BC2B}"
version="28">
                  <object_class>user</object_class>
                  <object_class>group</object_class>
                  <object class>contact</object class>
                  <object_class>organization</object_class>
                </partition>
              </partitions>
              <primary_class_mappings>
                <mapping object_class="user" primary_class="user" user_define="-1">
                  <attribute>domain</attribute>
                  <attribute>SPS-DistinguishedName</attribute>
                  <attribute>PreferredName</attribute>
                  <attribute>SPS-SourceObjectDN</attribute>
                  <attribute>UserName</attribute>
                  <attribute>SID</attribute>
                  <attribute>AccountName</attribute>
                  <attribute>Manager</attribute>
                  <attribute>UserProfile GUID</attribute>
                  <attribute>ADGuid</attribute>
                  <attribute>FirstName</attribute>
                  <attribute>LastName</attribute>
                  <attribute>WorkPhone</attribute>
                  <attribute>WorkEmail</attribute>
                  <attribute>Office</attribute>
                  <attribute>Title</attribute>
                  <attribute>Department</attribute>
                  <attribute>PublicSiteRedirect</attribute>
                  <attribute>SPS-Memberof</attribute>
                  <attribute>SPS-SipAddress</attribute>
                  <attribute>SPS-ProxyAddresses</attribute>
                  <attribute>SourceReference</attribute>
                  <attribute>Description</attribute>
                  <attribute>Url</attribute>
                  <attribute>Member</attribute>
                  <attribute>GroupType</attribute>
                  <attribute>MailNickName</attribute>
                  <attribute>UserXML element</attribute>
                  <attribute>Hobbies</attribute>
                </mapping>
                <mapping object_class="group" primary_class="group" user_define="-1">
                  <attribute>domain</attribute>
                  <attribute>SPS-DistinguishedName</attribute>
                  <attribute>PreferredName</attribute>
                  <attribute>SPS-SourceObjectDN</attribute>
                  <attribute>UserName</attribute>
                  <attribute>SID</attribute>
                  <attribute>AccountName</attribute>
                  <attribute>Manager</attribute>
                  <attribute>UserProfile_GUID</attribute>
                  <attribute>ADGuid</attribute>
                  <attribute>FirstName</attribute>
                  <attribute>LastName</attribute>
                  <attribute>WorkPhone</attribute>
                  <attribute>WorkEmail</attribute>
                  <attribute>Office</attribute>
```

```
                <attribute>Title</attribute>
                <attribute>Department</attribute>
                <attribute>PublicSiteRedirect</attribute>
                <attribute>SPS-Memberof</attribute>
                <attribute>SPS-SipAddress</attribute>
                <attribute>SPS-ProxyAddresses</attribute>
                <attribute>SourceReference</attribute>
                <attribute>Description</attribute>
                <attribute>Url</attribute>
                <attribute>Member</attribute>
                <attribute>GroupType</attribute>
                <attribute>MailNickName</attribute>
                <attribute>UserXML element</attribute>
                <attribute>Hobbies</attribute>
              </mapping>
              <mapping object_class="contact" primary_class="contact" user_define="-1">
                <attribute>domain</attribute>
                <attribute>SPS-DistinguishedName</attribute>
                <attribute>PreferredName</attribute>
                <attribute>SPS-SourceObjectDN</attribute>
                <attribute>UserName</attribute>
                <attribute>SID</attribute>
                <attribute>AccountName</attribute>
                <attribute>Manager</attribute>
                <attribute>UserProfile_GUID</attribute>
                <attribute>ADGuid</attribute>
                <attribute>FirstName</attribute>
                <attribute>LastName</attribute>
                <attribute>WorkPhone</attribute>
                <attribute>WorkEmail</attribute>
                <attribute>Office</attribute>
                <attribute>Title</attribute>
                <attribute>Department</attribute>
                <attribute>PublicSiteRedirect</attribute>
                <attribute>SPS-Memberof</attribute>
                <attribute>SPS-SipAddress</attribute>
                <attribute>SPS-ProxyAddresses</attribute>
                <attribute>SourceReference</attribute>
                <attribute>Description</attribute>
                <attribute>Url</attribute>
                <attribute>Member</attribute>
                <attribute>GroupType</attribute>
                <attribute>MailNickName</attribute>
                <attribute>UserXML element</attribute>
                <attribute>Hobbies</attribute>
              </mapping>
              <mapping object_class="organization" primary_class="organization"
user define="-1">
                <attribute>domain</attribute>
                <attribute>SPS-DistinguishedName</attribute>
                <attribute>PreferredName</attribute>
                <attribute>SPS-SourceObjectDN</attribute>
                <attribute>UserName</attribute>
                <attribute>SID</attribute>
                <attribute>AccountName</attribute>
                <attribute>Manager</attribute>
                <attribute>UserProfile GUID</attribute>
                <attribute>ADGuid</attribute>
                <attribute>FirstName</attribute>
                <attribute>LastName</attribute>
                <attribute>WorkPhone</attribute>
                <attribute>WorkEmail</attribute>
                <attribute>Office</attribute>
                <attribute>Title</attribute>
                <attribute>Department</attribute>
                <attribute>PublicSiteRedirect</attribute>
                <attribute>SPS-Memberof</attribute>
                <attribute>SPS-SipAddress</attribute>
                <attribute>SPS-ProxyAddresses</attribute>
```

```
                <attribute>SourceReference</attribute>
                <attribute>Description</attribute>
                <attribute>Url</attribute>
                <attribute>Member</attribute>
                <attribute>GroupType</attribute>
                <attribute>MailNickName</attribute>
                <attribute>UserXML element</attribute>
                <attribute>Hobbies</attribute>
              </mapping>
            </primary_class_mappings>
            <object classes>
              <object_class cd_name="user" selected="-1" user_define="0" configured="-1"
anchor="" dn_as_anchor="-1">
                <attribute mandatory="0">domain</attribute>
                <attribute mandatory="-1">SPS-DistinguishedName</attribute>
                <attribute mandatory="-1">SID</attribute>
                <attribute mandatory="-1">AccountName</attribute>
                <attribute mandatory="0">Manager</attribute>
                <attribute mandatory="0">UserProfile GUID</attribute>
                <attribute mandatory="0">ADGuid</attribute>
                <attribute mandatory="0">FirstName</attribute>
                <attribute mandatory="0">LastName</attribute>
                <attribute mandatory="0">PreferredName</attribute>
                <attribute mandatory="0">WorkPhone</attribute>
                <attribute mandatory="0">WorkEmail</attribute>
                <attribute mandatory="0">Office</attribute>
                <attribute mandatory="0">Title</attribute>
                <attribute mandatory="0">Department</attribute>
                <attribute mandatory="-1">UserName</attribute>
                <attribute mandatory="0">PublicSiteRedirect</attribute>
                <attribute mandatory="0">SPS-Memberof</attribute>
                <attribute mandatory="0">SPS-SipAddress</attribute>
                <attribute mandatory="0">SPS-ProxyAddresses</attribute>
                <attribute mandatory="0">SPS-SourceObjectDN</attribute>
                <attribute mandatory="0">UserXML element</attribute>
                <attribute mandatory="0">Hobbies</attribute>
              </object_class>
              <object_class cd_name="group" selected="-1" user_define="0" configured="-1"
anchor="" dn_as_anchor="-1">
                <attribute mandatory="0">domain</attribute>
                <attribute mandatory="-1">SourceReference</attribute>
                <attribute mandatory="-1">SID</attribute>
                <attribute mandatory="0">PreferredName</attribute>
                <attribute mandatory="0">Description</attribute>
                <attribute mandatory="0">Url</attribute>
                <attribute mandatory="0">Member</attribute>
                <attribute mandatory="0">GroupType</attribute>
                <attribute mandatory="0">MailNickName</attribute>
                <attribute mandatory="0">SPS-DistinguishedName</attribute>
              </object_class>
              <object_class cd_name="contact" selected="-1" user_define="0" configured="-1"
anchor="" dn as anchor="-1">
                <attribute mandatory="0">domain</attribute>
                <attribute mandatory="-1">SPS-DistinguishedName</attribute>
                <attribute mandatory="0">PreferredName</attribute>
                <attribute mandatory="0">SPS-SourceObjectDN</attribute>
                <attribute mandatory="-1">UserName</attribute>
              </object class>
              <object class cd name="organization" selected="-1" user define="0"
configured="-1" anchor="UserProfile_GUID" dn_as_anchor="0">
                <attribute mandatory="-1">UserProfile_GUID</attribute>
                <attribute mandatory="-1">PreferredName</attribute>
              </object class>
            </object_classes>
            <attributes>
              <attribute cd_name="domain" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
```

```
            <attribute cd_name="SPS-DistinguishedName" binary="0" sample_data=""
multi_valued="0" file_reference="0" selected="-1" type="String" lower_bound="" upper_bound=""
user_define="-1" />
            <attribute cd_name="PreferredName" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="SPS-SourceObjectDN" binary="0" sample_data=""
multi_valued="0" file_reference="0" selected="-1" type="String" lower_bound="" upper_bound=""
user_define="-1" />
            <attribute cd_name="UserName" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd_name="SID" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="Binary" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="AccountName" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd name="Manager" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="DN" lower_bound="" upper_bound="" user_define="-1" />
            <attribute cd_name="UserProfile_GUID" binary="0" sample_data=""
multi_valued="0" file_reference="0" selected="-1" type="Binary" lower_bound="" upper_bound=""
user define="-1" />
            <attribute cd_name="ADGuid" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="Binary" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="FirstName" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="LastName" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd_name="WorkPhone" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd name="WorkEmail" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="Office" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd name="Title" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="Department" binary="0" sample_data="" multi_valued="0"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd name="PublicSiteRedirect" binary="0" sample data=""
multi_valued="0" file_reference="0" selected="-1" type="String" lower_bound="" upper_bound=""
user_define="-1" />
            <attribute cd_name="SPS-Memberof" binary="0" sample_data="" multi_valued="-1"
file reference="0" selected="-1" type="String" lower bound="" upper bound="" user define="-1"
/>
            <attribute cd name="SPS-SipAddress" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd name="SPS-ProxyAddresses" binary="0" sample data=""
multi valued="-1" file reference="0" selected="-1" type="String" lower bound=""
upper bound="" user define="-1" />
            <attribute cd_name="SourceReference" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd name="Description" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="Url" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
```

```
            <attribute cd_name="Member" binary="0" sample_data="" multi_valued="-1"
file_reference="0" selected="-1" type="DN" lower_bound="" upper_bound="" user_define="-1" />
            <attribute cd_name="GroupType" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="Number" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd name="MailNickName" binary="0" sample data="" multi valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="UserXML element" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="Number" lower_bound="" upper_bound="" user_define="-1"
/>
            <attribute cd_name="Hobbies" binary="0" sample_data="" multi_valued="0"
file_reference="0" selected="-1" type="String" lower_bound="" upper_bound="" user_define="-1"
/>
          </attributes>
        </xmlwizard>
      </ui-data>
      <importing>
        <anchor>
          <attribute>UserProfile_GUID</attribute>
        </anchor>
        <per-class-settings>
          <class>
            <name>user</name>
            <anchor>
              <dn />
            </anchor>
          </class>
          <class>
            <name>group</name>
            <anchor>
              <dn />
            </anchor>
          </class>
          <class>
            <name>contact</name>
            <anchor>
              <dn />
            </anchor>
          </class>
          <class>
            <name>organization</name>
            <anchor>
              <attribute>UserProfile_GUID</attribute>
            </anchor>
          </class>
        </per-class-settings>
      </importing>
      <exporting></exporting>
      <ldif_format>
        <code_page>65001</code_page>
      </ldif format>
      <primary_class_mappings>
        <mapping>
          <primary_class>user</primary_class>
          <oc-value>user</oc-value>
        </mapping>
        <mapping>
          <primary class>group</primary class>
          <oc-value>group</oc-value>
        </mapping>
        <mapping>
          <primary class>contact</primary class>
          <oc-value>contact</oc-value>
        </mapping>
        <mapping>
          <primary_class>organization</primary_class>
          <oc-value>organization</oc-value>
        </mapping>
```

```
        </primary_class_mappings>
        <password-extension-config>
          <password-extension-enabled>0</password-extension-enabled>
          <dll></dll>
          <password-set-enabled></password-set-enabled>
          <password-change-enabled></password-change-enabled>
          <connection-info>
            <connect-to></connect-to>
            <user></user>
          </connection-info>
          <timeout></timeout>
        </password-extension-config>
        <extension-config>
          <filename>ManagementAgent.dll</filename>
          <export-mode>call-based</export-mode>
          <import-enabled>1</import-enabled>
          <export-enabled>1</export-enabled>
          <connection-info>
            <connect-to>http://server-007:8786</connect-to>
            <user>FABRIKAM\SYNCACCT</user>
          </connection-info>
          <attributes />
        </extension-config>
        <file-type>LDIF</file-type>
      </MAConfig>
```

3.2 mv-data example

The following example omits the schema section and shows a simple set of import attribute flow rules for the metaverse "person" object type.

```
  <rm:mv-data>
    <rm:SyncConfig-format-version>1</rm:SyncConfig-format-version>
    <rm:SyncConfig-version>23</rm:SyncConfig-version>
    <rm:SyncConfig-import-attribute-flow>
      <import-flow-set mv-object-type="person">
        <import-flows mv-attribute="objectSid" type="ranked">
          <import-flow src-ma="{70843C90-BCF1-44D3-99CF-0592D1ED60AE}" cd-object-type="user"
id="{ACD0F9D1-1195-47B5-9914-F8EF5BA8D6B9}">
            <direct-mapping>
              <src-attribute>objectSid</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="sIDHistory" type="ranked">
          <import-flow src-ma="{70843C90-BCF1-44D3-99CF-0592D1ED60AE}" cd-object-type="user"
id="{2E53245B-8C08-47C6-9455-D7748EEDAD60}">
            <direct-mapping>
              <src-attribute>sIDHistory</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="csObjectID" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{B4478CA8-3D95-4CEB-9672-63F6E00F210A}">
            <direct-mapping>
              <src-attribute intrinsic="true">dn</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="accountName" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{EB21625F-6A16-4345-B1BC-1492F9C83E14}">
            <direct-mapping>
              <src-attribute>AccountName</src-attribute>
            </direct-mapping>
```

```
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="address" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{6A8C7AAB-3B0B-4768-B6A3-9A26A33689A3}">
            <direct-mapping>
              <src-attribute>Address</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="assistant" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{915A0967-8CE7-4BB8-9519-FDEF3994A2FD}">
            <direct-mapping>
              <src-attribute>Assistant</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="company" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{CEF84FD0-199E-4664-BC8F-7FCFD36D8B24}">
            <direct-mapping>
              <src-attribute>Company</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="country" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{A1D59412-F057-421E-8BE0-159C5B929807}">
            <direct-mapping>
              <src-attribute>Country</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="department" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{8726006B-17EA-4785-80F5-A5CDCC78D0C9}">
            <direct-mapping>
              <src-attribute>Department</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="displayName" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{BF0630C0-B711-4E78-A7BE-E7BC42610177}">
            <direct-mapping>
              <src-attribute>DisplayName</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="domain" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{1928CAAF-4F02-4FF1-B4C8-C3FBF8ABBBF5}">
            <direct-mapping>
              <src-attribute>Domain</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="email" type="ranked">
          <import-flow src-ma="{70843C90-BCF1-44D3-99CF-0592D1ED60AE}" cd-object-type="user"
id="{D542913E-652A-4F96-922C-EEC5FFA76832}">
            <direct-mapping>
              <src-attribute>mail</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="employeeID" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{38CCB645-477A-47F3-8BC6-32269D243E04}">
```

```
            <direct-mapping>
              <src-attribute>EmployeeID</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="firstName" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{73A6335C-4F67-453B-BDDF-D39EFD273447}">
            <direct-mapping>
              <src-attribute>FirstName</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="jobTitle" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{E1BDB8B0-AB5E-45FB-AEAF-A45528D8AACF}">
            <direct-mapping>
              <src-attribute>JobTitle</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="manager" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{544D2911-B9A2-4BA1-8730-3A7AE8ACE0B8}">
            <direct-mapping>
              <src-attribute>Manager</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="officeFax" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{EB01825A-E002-4620-8BA1-6C1E09C3C677}">
            <direct-mapping>
              <src-attribute>OfficeFax</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="officeLocation" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{05291213-4B20-4785-BFDC-0A7525B378CE}">
            <direct-mapping>
              <src-attribute>OfficeLocation</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="officePhone" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{25C6C531-BC6B-4D68-9232-0C9323FBE538}">
            <direct-mapping>
              <src-attribute>OfficePhone</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="photo" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{87F39CA0-1ACF-4728-A34B-0B29618C0048}">
            <direct-mapping>
              <src-attribute>Photo</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="postalCode" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{315781B3-BCD9-4AA3-8719-8A02E3944F9B}">
            <direct-mapping>
              <src-attribute>PostalCode</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
```

```
        <import-flows mv-attribute="lastName" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{C0ABC0A7-A8BF-43E3-811A-4CCD66E33B3F}">
            <direct-mapping>
              <src-attribute>LastName</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="employeeType" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{42A5E106-2638-449B-8EE6-0C7B6CDE0756}">
            <direct-mapping>
              <src-attribute>EmployeeType</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="city" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{A9FCB19D-0EB0-4463-97A2-5C2BCCF6B96D}">
            <direct-mapping>
              <src-attribute>City</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="costCenter" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{888E1FBC-F58E-4A27-8661-65601F34F93C}">
            <direct-mapping>
              <src-attribute>CostCenter</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="costCenterName" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{4F217757-AEAE-4A89-8A48-B17B94653471}">
            <direct-mapping>
              <src-attribute>CostCenterName</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="employeeEndDate" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{30B793E5-3227-4483-B9D1-C78796CE807F}">
            <direct-mapping>
              <src-attribute>EmployeeEndDate</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="employeeStartDate" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{29C9E5F4-87DE-4108-8F73-86671CF0FF49}">
            <direct-mapping>
              <src-attribute>EmployeeStartDate</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="mailNickname" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{4B9D52E5-0477-4D82-945A-9CCF406E3691}">
            <direct-mapping>
              <src-attribute>MailNickname</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="middleName" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{2CAC1A7A-9F5F-4B04-A974-D9470425E1E2}">
            <direct-mapping>
              <src-attribute>MiddleName</src-attribute>
```

```
            </direct-mapping>
          </import-flow>
        </import-flows>
        <import-flows mv-attribute="mobilePhone" type="ranked">
          <import-flow src-ma="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}" cd-object-
type="Person" id="{7023C0B5-7E42-446C-AAC7-4B8F5DA7DF9A}">
            <direct-mapping>
              <src-attribute>MobilePhone</src-attribute>
            </direct-mapping>
          </import-flow>
        </import-flows>
      </import-flow-set>
      <per-ma-options>
        <ma-options ma-id="{70843C90-BCF1-44D3-99CF-0592D1ED60AE}">
          <enable-recall>true</enable-recall>
        </ma-options>
        <ma-options ma-id="{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}">
          <enable-recall>true</enable-recall>
        </ma-options>
      </per-ma-options>
    </rm:SyncConfig-import-attribute-flow>
    <rm:SyncConfig-provisioning-type>scripted</rm:SyncConfig-provisioning-type>
    <rm:SyncConfig-mv-deletion>
      <mv-deletion-rule mv-object-type="person" id="{7A97B207-3E90-4462-8AC7-5FB30D000A28}"
type="declared">
        <src-ma>{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}</src-ma>
      </mv-deletion-rule>
      <mv-deletion-rule mv-object-type="group" id="{B9F82AB4-3FC3-4396-AEF8-4CEFD3E1A9B4}"
type="declared">
        <src-ma>{F2CC710F-99E1-45A2-8F9F-D6A5D1A3CAC4}</src-ma>
      </mv-deletion-rule>
    </rm:SyncConfig-mv-deletion>
    <rm:SyncConfig-extension>
      <assembly-name>MVExtension.dll</assembly-name>
      <application-protection>low</application-protection>
    </rm:SyncConfig-extension>
    <rm:SyncConfig-password-change-history-size>24</rm:SyncConfig-password-change-history-
size>
    <rm:SyncConfig-password-sync>
      <password-sync-enabled>0</password-sync-enabled>
    </rm:SyncConfig-password-sync>
  </rm:mv-data>
```

4 Security

4.1 Security Considerations for Implementers

None.

4.2 Index of Security Fields

None.

5 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs.

- Microsoft SharePoint Server 2010
- Microsoft SharePoint Server 2013
- Microsoft SharePoint Server 2016 Preview

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

<1> Section 2.2.25.6.22: In Microsoft SharePoint Server 2010 and SharePoint Server 2013, this XML element is deprecated.

6 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements or functionality.
- The removal of a document from the documentation set.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **Editorial** means that the formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the technical content of the document is identical to the last released version.

Major and minor changes can be described further using the following change types:

- New content added.
- Content updated.
- Content removed.
- New product behavior note added.
- Product behavior note updated.
- Product behavior note removed.
- New protocol syntax added.
- Protocol syntax updated.
- Protocol syntax removed.
- New content added due to protocol revision.
- Content updated due to protocol revision.
- Content removed due to protocol revision.
- New protocol syntax added due to protocol revision.
- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.
- Obsolete document removed.

Editorial changes are always classified with the change type **Editorially updated**.

Some important terms used in the change type descriptions are defined as follows:

- **Protocol syntax** refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.
- **Protocol revision** refers to changes made to a protocol that affect the bits that are sent over the wire.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
5 Appendix A: Product Behavior	Updated list of supported products.	Y	Content updated due to protocol revision.

7 Index

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V