SyncML Representation Protocol, Data Synchronization Usage

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1. Scope

The SyncML Initiative, Ltd. was a not-for-profit corporation formed by a group of companies who co-operated to produce an open specification for data synchronization and device management. Prior to SyncML, data synchronization and device management had been based on a set of different, proprietary protocols, each functioning only with a very limited number of devices, systems and data types. These non-interoperable technologies have complicated the tasks of users, manufacturers, service providers, and developers. Further, a proliferation of different, proprietary data synchronization and device management protocols has placed barriers to the extended use of mobile devices, has restricted data access and delivery and limited the mobility of the users.

The SyncML Initiative merged with the Open Mobile Alliance in November 2002. The SyncML legacy specifications were converted to the OMA format with the 1.1.2 versions of OMA SyncML Common, OMA Data Synchronization and OMA Device Management in May 2002. The relationship between these documents which had been created during the SyncML Initiative has been preserved and is depicted in **Figure 1: OMA SyncML Specification Structure and Relationships**.

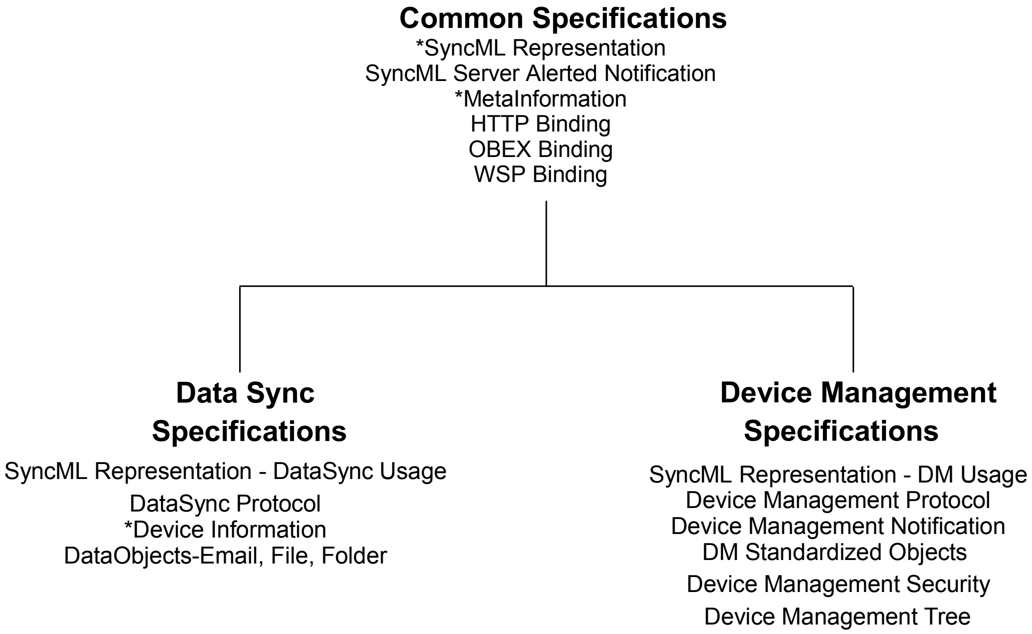

Common Specifications
*SyncML Representation
SyncML Server Alerted Notification
*MetaInformation
HTTP Binding
OBEX Binding
WSP Binding
Data Sync Specifications
SyncML Representation - DataSync Usage
DataSync Protocol
*Device Information
DataObjects-Email, File, Folder
Device Management Specifications
SyncML Representation - DM Usage
Device Management Protocol
Device Management Notification
DM Standardized Objects
Device Management Security
Device Management Tree

Figure 1: OMA SyncML Specification Structure and Relationships

The OMA SyncML Common Specifications Enabler Release includes the following documents:

- SyncML Representation: The XML-based representation protocol which specifies the common XML syntax and semantics used by all SyncML protocols. This defines the superset of the DS and DM representation protocols. (* includes DTD).
- The transport bindings: HTTP, OBEX, WSP. These specify the features REQUIRED for each transport to send and receive DS and DM protocol messages.
- The Meta Information associated with a SyncML command or data item or collection used by either DS or DM (* includes DTD)

- SyncML Server Alerted Notification: The logical structure and format of the notification messages used by all SyncML server alerted notifications, for both DS and DM.

The OMA Data Synchronization Specifications Enabler Release includes the following documents:

- SyncML Representation DataSync Usage: The subset of the Common Specifications SyncML Representation Specification necessary to define the Data Synchronization commands and protocol, with examples and commentary specific to DS.
- DataSyncProtocol: Specifies how SyncML Common messages conforming to the DTD are exchanged in order to allow an OMA DS client and server to exchange additions, deletions, updates and other status information.
- Device Information: Used to exchange device specific information, including hardware, firmware, software levels, available memory, and local databases supported. (* Includes DTD)
- Data Objects: Email, File, Folder: Each object is identified by a unique MIME media type (eg. **application/vnd.omads-email)**. The objects are either represented by or encapsulated in a mark-up language defined by xml. Meta or state data is included in the representation (eg. Read/Unread, Creation Date, Last Modified Date).

Although the SyncML Common specification defines transport bindings that specify how to use a particular transport to exchange messages and responses, the SyncML Common representation, synchronization and device management protocols are transport-independent. Each package in these protocols is completely self-contained, and could in principle be carried by any transport. The initial bindings specified are HTTP, WSP and OBEX, but there is no reason why SyncML Common could not be implemented using email or message queues, to list only two alternatives. Because the SyncML Common messages are self-contained, multiple transports could be used without either the server or client devices having to be aware of the network topology. Thus, a short-range OBEX connection could be used for local connectivity, with the messages being passed on via HTTP to an Internet-hosted synchronization server.

To reduce the data size, a binary coding of SyncML Common based on the WAP Forum's WBXML is defined. Messages may also be passed in clear text if desired. In this and other ways SyncML Common addresses the bandwidth and resource limitations imposed by mobile devices.

SyncML Common is both data type and data store independent. SyncML Common can carry any data type which can be represented as a MIME object. To promote interoperability between different implementations of OMA Data Synchronization, the specification includes the representation formats used for common PIM data.

2. References

2.1 Normative References

[DMREPU] "SyncML Representation Protocol, Device Management Usage", Open Mobile Alliance™, OMA-SyncML-DMRep-V1_1_2, URL:http://www.openmobilealliance.org

[DSDEVDTD] "OMA DS Device Information DTD", Open Mobile Alliance™, OMA-SUP-DS-DevInf-DTD-V1_2", URL:http://www.openmobilealliance.org, URL:http://www.openmobilealliance.org/syncml/technology.html

[DSPRO] "DS Protocol", Open Mobile Alliance™, OMA-TS-DS_Protocol-V1_2", URL:http:www.openmobilealliance.org

[IMCVCAL] "vCalendar – The electronic calendaring and scheduling exchange format – Version 1.0", URL:http://www.imc.org/pdi/vcal-10.doc

[IMCVCARD] "vCard - The electronic business card - Version 2.1", URL:http://www.imc.org/pdi/vcard-21.doc

[IOPPROC] "OMA Interoperability Policy and Process", Open Mobile Alliance™, OMA-IOP-Process-V1_3, URL:http//www.openmobilealliance.org

[ISO8601] "Data elements and interchange formats – Information interchange – Representation of dates and times ISO 8601-2000", URL://www.iso.ch/iso/en/ISOOnline.openerpage

[REPPRO] "SyncML Representation Protocol", Open Mobile Alliance™, OMA-SyncML-RepPro-V1_2, URL:http://www.openmobilealliance.org

[RFC1766] "Tags for the Identification of Languages", H. Alvestrand, March 1995, URL:http://www.ietf.org/rfc/rfc1766.txt

[RFC2045] "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", N. Freed & N. Borenstein, November 1996, URL:http://www.ietf.org/rfc/rfc2045.txt

[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL:http://www.ietf.org/rfc/rfc2119.txt

[RFC2234] "Augmented BNF for Syntax Specifications: ABNF", D. Crocker, Ed., P. Overell, November 1997, URL:http://www.ietf.org/rfc/rfc2234.txt

[RFC2279] "UTF-8, a transformation format of ISO 10646", F. Yergeau, January 1998, URL:http://www.ietf.org/rfc/rfc2279.txt

[RFC2426] "vCard MIME Directory Profile", F. Dawson, T. Howes, September, 1998, URL:http://www.ietf.org/rfc/rfc2426.txt

[RFC2445] "Internet Calendaring and Scheduling Core Object Specification (iCalendar)", F. Dawson, D. Stenerson, November 1998, URL:http://www.ietf.org/rfc/rfc2445.txt

[RFC822] "Standard for the format of ARPA Internet text messages", David H. Crocker, August 1982, URL:http://www.ietf.org/rfc/rfc822.txt

[SYNCMETA] "SyncML Meta Information," Open Mobile Alliance™, OMA-SyncML-Meta-V1_2, URL:http://www.openmobilealliance.org

[XML] "Extensible Markup Language (XML) 1.0", World Wide Web Consortium Recommendation, URL:http://www.w3.org/TR/REC-xml

2.2 Informative References

None.

3. Terminology and Conventions

3.1 Conventions

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

Any reference to components of the SyncML DTD or XML snippets is specified in this `typeface`.

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

3.2 Definitions

Application
A SyncML application that supports the OMA DS protocol. The application can either be the originator or recipient of the SyncML protocol commands. The application can act as an OMA DS client or an OMA DS server.

Capabilities exchange
The OMA DS capability that allows a client and server to exchange what device, user and application features they each support.

Client
An OMA DS Client refers to the protocol role when the application issues SyncML "request" messages. For example in data synchronization, the Sync SyncML Command in a SyncML Message.

Command
A SyncML Command is a protocol primitive. Each SyncML Command specifies to a recipient an individual operation that is to be performed. For example, the SyncML Commands supported by this specification include Add, Alert, Atomic, Copy, Delete, Exec, Get, Map, Replace, Search, Sequence and Sync.

Data
A unit of information exchange, encoded for transmission over a network.

Data collection
A data element which acts as a container of other data elements, (e.g., {c {{i1, data1}, ... {in, datan}}}). In OMA DS, data collections are synchronized with each other. See data element.

data element
A piece of data and an associated identifier for the data, (e.g., {i, data}).

Data element equivalence
When two data elements are synchronized. The exact semantics is defined by a given data synchronization model.

Data exchange
The act of sending, requesting or receiving a set of data elements.

Data format
The encoding used to format a data type. For example, characters or integers or character encoded binary data.

Data type
The schema used to represent a data object (e.g., text/calendar MIME content type for an iCalendar representation of calendar information or text/directory MIME content type for a vCard representation of contact information).

Data synchronization
The act of establishing an equivalence between two data collections, where each data element in one item maps to a data item in the other, and their data is equivalent.

Data synchronization protocol
The well-defined specification of the "handshaking" or workflow REQUIRED to accomplish synchronization of data elements on an originator and recipient data collection. The OMA DS specification forms the basis for specifying an open data synchronization protocol.

Message
A SyncML Message is the primary contents of a SyncML Package. It contains the SyncML Commands, as well as the related data and meta-information. The SyncML Message is an XML

document.

Operation A SyncML Operation refers to the conceptual transaction achieved by the SyncML Commands specified by a SyncML Package. For example in the case of data synchronization, "synchronize my personal address book with a public address book".

Originator The network device that creates a SyncML request.

Package A SyncML Package is the complete set of commands and related data elements that are transferred between an originator and a recipient. The SyncML package can consist of one or more SyncML Messages.

Parser Refers to an XML parser. An XML parser is not absolutely necessary to support SyncML. However, an OMA DS implementation that integrates an XML parser might be easier to enhance.

This document assumes that the reader has some familiarity with XML syntax and terminology.

Recipient The network device that receives a SyncML request, processes the request and sends any resultant SyncML response.

Representation protocol A well-defined format for exchanging a particular form of information. SyncML is a representation protocol for conveying data synchronization and device management operations.

Server An OMA DS Server refers to the protocol role when an application issues SyncML "response" messages. For example in the case of data synchronization, a Results Command in a SyncML Message.

Synchronization data Refers to the data elements within a SyncML Command. In a general reference, can also refer to the sum of the data elements within a SyncML Message or SyncML Package.

SyncML request message An initial SyncML Message that is sent by an originator to a recipient network device.

SyncML response message A reply SyncML Message that is sent by a recipient of a SyncML Request back to the originator of the SyncML Request.

3.3 Abbreviations

DTD	Document Type Definition
GUID	Global Unique Identifier
HTTP	HyperTest Transfer Protocol
IMEI	Internationl Mobile Equipment Identifier
LUID	Local Unique Idenitifer
MSC	Message Sequence Chart
MSG	Message
OBEX	OBject Exchange protocol
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
WAP	Wireless Application Protocol
WSP	Wireless Session Protocol

4. Introduction

OMA Data Synchronization (OMA DS) is a specification for a common data synchronization framework and XML-based format, or representation protocol, for synchronizing data on networked devices. OMA Data Synchronization is designed for use between mobile devices that are intermittently connected to the network and network services that are continuously available on the network. OMA Data Synchronization can also be used for peer-to-peer data synchronization. OMA Data Synchronization is specifically designed to handle the case where the network services and the device store the data they are synchronizing in different formats or use different software systems.

5. OMA Data Synchronization Usage

The SyncML representation protocol does not specify the data synchronization protocol or "sync engine", but rather specifies a common synchronization framework and format that accommodates different data synchronization models. The SyncML representation protocol specifies what the result of the various synchronization operations must be.

5.1 SyncML Data Synchronization Framework

OMA Data Synchronization not only defines a format, but also a conceptual data synchronization framework and data synchronization protocol. The framework is depicted in Figure 2. In the figure, the scope of the SyncML Data Synchronization Framework is shown by the dotted-line box. The Framework consists of the SyncML representation protocol, as well as a conceptual SyncML Adapter and SyncML Interface. This SyncML Data Synchronization Framework is useful for describing the particular system model associated with OMA Data Synchronization implementations.

The OMA data synchronization protocol is outside the SyncML Data Synchronization Framework, but is essential for providing interoperable data synchronization. The OMA data synchronization protocol is defined by another, companion OMA DS specification [DSPRO].

The application "A" depicts a networked service that provides data synchronization with other applications, in this case application "B", on some networked device. The service and device are connected over some common network transport, such as HTTP. Application "A" utilizes a data synchronization protocol, implemented as the "Sync Engine" process. The data synchronization protocol is manifested on the network by client applications accessing the "Sync Server" network resource. The "Sync Server Agent" manages the "Sync Engine" access to the network and communicates the data synchronization operations to/from the client application. The "Sync Server Agent" performs these capabilities through invocations to functions in the "SyncML I/F" or interface. The "SyncML I/F" is the application programming interface to the "SyncML Adapter". The "SyncML Adapter" is the conceptual process that the originator and recipient of SyncML formatted objects utilize to communicate with each other. The "SyncML Adapter" is also the framework entity that interfaces with the network transport, which is responsible for creating and maintaining a network connection between Application "A" and Application "B". Application "B" utilizes a "Sync Client Agent" to access the network and its "SyncML Adapter", through invocations of functions in the "SyncML I/F".

Actual server and client implementations might not be implemented in the discrete components identified by this conceptual framework. However, this framework is useful for a common discussion of the components that are necessary to implement a common data synchronization protocol.

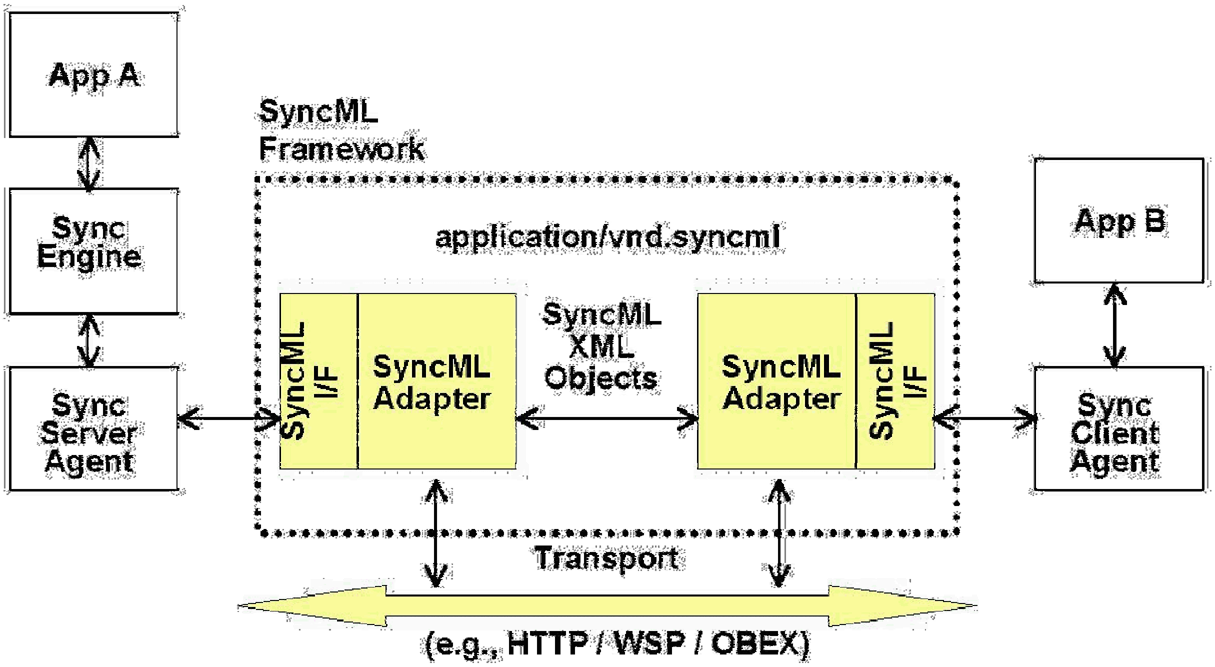


Figure 2: SyncML Framework

5.2 OMA DS Data Formats

OMA DS not only provides for a common set of commands, but also identifies a small set of common data formats. The data formats provide a common set of media types for exchanging common accepted information, such as contacts, calendars and messages. Support for these data formats is mandatory for conformance to this specification. In addition to these common formats, OMA DS allows for the identification of any other registered format. OMA DS utilizes the MIME content type framework for identifying data formats, called MIME media types.

5.3 Capabilities Exchange

OMA DS supports capabilities exchange. Capabilities exchange is the ability of an OMA DS Client and Server to determine what device, user and application features each supports. The capabilities exchange, from the OMA DS Server perspective, is achieved by using the Get command to retrieve the device information, user information and application information documents from the OMA DS Client. The capabilities exchange, from the OMA DS Client perspective, is achieved by using the Get command to retrieve the analogous documents from the OMA DS Server. These documents contain profile information about support for well-defined features. In addition, the Put command can be used to by the OMA DS Client to push capabilities exchange information to the OMA DS Server.

The capabilities exchange can also be used to establish or administer OMA data synchronization services between an OMA DS Client and Server.

Refer to [DSDEVDTD] for further details on the specification of the Device Information DTD.

5.4 Data Identifier Mapping

OMA DS does not require that two data stores being synchronized be of the same schema (i.e., aren't homogeneous). Specifically, OMA DS allows for both the data identifiers and the data formats to be different in the two data collections. However, in such cases in order to use OMA DS, the synchronizing applications would need to provide a mapping between data identifiers in one data store and those in another. For example, a document on the data synchronization server could be identified with a 16 byte, globally unique identifier (GUID). The corresponding version of this document on a mobile device could be identified by a small, two byte, and local unique identifier (LUID). Hence, to synchronize the data on the mobile device with the data on the data synchronization server, the synchronizing application would have to map the smaller identifiers of the mobile device to the larger identifiers used by data synchronization server; and visa versa. OMA DS includes the necessary mechanism to specify such an identifier mapping.

5.5 Refreshing Data

In addition to synchronization, OMA DS includes commands that are not normally thought of as synchronization operations, but are still necessary in a practical data synchronization protocol. For example, OMA DS provides the capability for refreshing the entire data on the OMA DS client with the equivalent synchronization data on the OMA DS server. This could be necessary if the OMA DS client and the OMA DS server versions are no longer "in sync" with each other due to a hardware or power failure in the mobile device, or if the version on the OMA DS client has become corrupted or erased from memory. This capability is provided by the OMA DS client issuing a "refresh" Alert command to the OMA DS server.

5.6 Soft and Hard Data Deletion

The SyncML `Delete` command provides the capability for a SyncML request to delete data from the recipient's data store. Two forms of deletion are supported. Normally, when a `Delete` command is specified, it conveys a request to completely delete the specified data from the recipient's data store. The deleted data SHOULD no longer be associated with the originator's synchronization data. This is the semantics of a "Hard Delete". In addition, SyncML provides support for a "Soft Delete" command.

The rationale for a "Soft Delete" is based on the possibility of limited storage resources in a client device. The data is deleted to free-up storage for other, higher priority data on the client device.

The operation of “Soft Delete” is defined in the command section SftDel (see 6.1.23).

On occasions, an exception can occur where a data element on the OMA DS client is "Soft Deleted" and the same data element is "Hard Deleted" on the OMA DS server. This condition will cause a "Soft-Delete Conflict" for that event when a two-way synchronization is attempted. This version of OMA DS does not specify how to negotiate the resolution of such "Soft-Delete Conflicts". However, it does provide status codes to identify Soft-Delete Conflict conditions and to also identify how the conflict might have been resolved.

5.7 Archiving Data

The SyncML `Delete` command provides the capability for a SyncML request to archive data on the recipient prior to deleting it from the device. This is indicated by the presence of the `Archive` element type in the `Delete` command. Some recipients might not support this feature, in which case, the `Archive` would generate an error condition (i.e., `(210) Delete` without Archive.).

5.8 Replacing Data

The SyncML `Replace` command provides the capability for the originator to replace existing data. The command can also be the cause for an "Update Conflict".

5.8.1 Field-level Replace

The SyncML Replace command also provides the capability for the originator to send an update to the recipient without having to transfer the entire item. This technique is also called Field-level changes. This feature is extremely useful for the data types in which relatively concise attributes (for example the "read" status of the e-mail) are more likely to change, than substantially larger attributes like the body of the message or the attachments.

Not all data types are equally suited for being used with Field-level replace. It is the responsibility of the sender to compose the partial items in the corresponding data format in such a manner that they are unambiguously interpreted by the receiver. Also it is the responsibility of the sender to compose the partial items in the corresponding data format ensuring that the format remains valid. If the sender cannot meet these criteria then it MUST send a replace for the entire item instead of a field-level replace.

Example:

It is ambiguous to send the field-level change containing the following vCard

```
BEGIN:VCARD
VERSION:2.1
N:Doe;John;;;
TEL;HOME:(321) 654-987
END:VCARD
```

In this case if the receiving side supports more than one HOME phone number, it will have an ambiguity understanding which one was changed.

Example 2:

It is improper to send the field-level change containing the following vCard

```
BEGIN:VCARD
TITLE:Worker
END:VCARD
```

The vCard format mandates the VERSION and N attributes to be present within the item.

On occasions, an exception can occur where the same data element on both the OMA DS client and the OMA DS server have been updated or replaced. For example, the start and end date/time for the same event might have been changed to different values on the OMA DS client compared to the description on the OMA DS server. This condition will cause an "Update Conflict" for that event when a two-way synchronization is attempted. This version of OMA DS does not specify how to negotiate the resolution of such Update Conflicts. However, it does provide status codes to identify Update Conflict conditions and to also identify how the conflict might have been resolved.

5.9 Searching For Data

The SyncML `Search` command provides the capability for searching a recipient data store for particular data. This command provides support for any registered search grammar. The specific search grammar is identified by the `Type` element in the `Meta` element type within the Search command.

The SyncML `Search` command can be used to select items within a data store to be used as the source for a subsequent SyncML `Sync` Command.

In addition, SyncML enables a search or filter to be specified on the Target LocURI element within the Sync command. With this capability, OMA DS clients can specify filter constraints on the database records for a Sync command. For example, a mobile client can specify that the synchronization with a server calendar database is restricted to today's events.

5.10 Localization

The SyncML representation protocol allows an originator to specify the desired localization for the synchronization operation and synchronization data for any registered language. The xml:lang attribute can be specified on any element type to identify the language used in the element type's content model. In addition, a Get and Search command can specify the desired language for results by specifying the Lang element type in the Get or Search command.

The default character set for SyncML representation protocol is UTF-8, as defined in [RFC2279].

5.11 MIME Usage

There are two MIME content types for the OMA Data Synchronization Message. The MIME content type of application/vnd.syncml+xml identifies the clear-text XML representation for the SyncML Message. The MIME content type of application/vnd.syncml+wbxml identifies the WBXML binary representation for the SyncML Message. Section 8 of this specification specifies the MIME content type registration for these two MIME media types.

One of these two MIME content types MUST be used for identifying OMA Data Synchronization Messages within transport and session level protocols that support MIME content types.

5.12 Target and Source Addressing

The Target and Source element types are used in OMA DS to specify target and source routing addresses, respectively, within the LocURI element type. The LocURI SHOULD be either a location URI or location URN, but in certain cases can also be a locally unique identifier (see the table below). In addition, an OPTIONAL display name (i.e., LocName) can be specified within the Target and Source element types to provide a display name for the LocURI value.

In addition, the TargetParent and SourceParent element types MAY be used to provide parent information of the child that is mentioned in the Target or Source LocURI of the sync commands (Add, Replace, Move). Usage of SourceParent and TargetParent has meaning only when synchronizing objects in a datastore with hierarchical structure.

The semantics of the LocURI value is context specific. That is, the location routing address has usage that is specific to the command in which it appears. For instance, in an Alert, the LocURI value in the Target element type addresses a database that is the target of the alert message. Or for another instance, in a MapItem, the LocURI value addresses the identifier for an individual item in a local database.

Where a URI is specified, either an absolute or relative URI value MUST be used. The only time a relative URI MUST be used is when the information in the SyncML message is sufficient for a recipient to construct the absolute URI. For example, the relative URI in the Target element in an Alert command can be converted to the proper absolute URI by prefixing the value from the Target element type found in the SyncHdr.

The following table specifies what the expected value and usage is in each of the contexts for Target, Source, TargetParent and SourceParent element types within a SyncML document.

Element	Contextual Address Requirement
SyncHdr	
Target and Source	Specifies the address of either the data synchronization server or the client. When addressing the: Server - MUST use LocURI element type to specify the unique identifier (e.g. absolute URI form of network address) associated with the server within its domain. Client - MUST use LocURI element type to specify locally unique identifier (e.g. absolute URI form of network address or IMEI URN) associated with the client within its domain.
RespURI	Specifies the address to be used in the Target of the response message. The value is an absolute URI. CGI script parameter can be appended to the URI to perform selection filtering such as specifying a date/time after which the response could be performed.
Sync	
Target and Source	Specifies the address of either the server database or the local mobile client database. A relative URI can be specified, if the proper absolute URI can be constructed from prefixing the respective Target or Source value from the SyncHdr to this relative URI. When addressing the: Server Database - MUST use LocURI element type to specify either the absolute or relative URI for the server database. Client Database - MUST use LocURI element type to specify either the absolute or relative URI for the client database. For a LocURI value, CGI script parameters MAY be appended to the URI to perform selection filtering on the server target.
Search	
Target	If present, specifies the address on the recipient where the search results are to be temporarily stored. A relative URI can be specified, if the proper absolute URI can be constructed from prefixing the respective Target or Source value from the SyncHdr to this relative URI. When addressing the: Server - MUST use LocURI element type to specify the local URI where the search results are to be stored. Client - MUST use LocURI element type to specify either the absolute or relative URI where the search results are to be stored. For a LocURI value, CGI script parameters MAY be appended to

	the URI to perform selection filtering on the server target.
Source	Specifies one or more addresses on the recipient that are to be searched. When addressing the: Server - MUST use LocURI element type to specify the absolute or relative URI of the databases to be searched. Client - MUST use LocURI element type to specify the absolute or relative URI of the databases to be searched.
Map	
Target	Specifies the recipient database for the Map definition. A relative URI can be specified, if the proper absolute URI can be constructed from prefixing the respective Target or Source value from the SyncHdr to this relative URI. When addressing the: Server - MUST use LocURI element type to specify the absolute or relative URI of the server database. Client - MUST use LocURI element type to specify the mobile client database.
Source	Specifies the originator database for the Map definition. When addressing the: Server - MUST use LocURI element type to specify the absolute or relative URI of the server database. Client - MUST use LocURI element type to specify the mobile client database.
MapItem	
Target	Specifies the recipient item identifier. When addressing the: *Server* - MUST use LocURI element type to specify the locally unique identifier of the server database item. *Client* - MUST use LocURI element type to specify the locally unique identifier of the mobile client item.
Source	Specifies the originator item identifier. When addressing the: *Server* - MUST use LocURI element type to specify the locally unique identifier of the server database item. *Client* - MUST use LocURI element type to specify the locally unique identifier of the mobile client database item.
Item in an Alert, Exec, Get, Put Commands	

Target and Source	Specifies the address of the database item that is the argument of the SyncML command. When addressing the: *Server* - MUST use LocURI element type to specify the relative URI or URN for the server database. *Client* - MUST use LocURI element type to specify the relative URI of the mobile client database. To address individual items within a database using the Get or Put command, URI addressing filtering techniques MUST be used, unless the item has previously been synchronized. In this case, the locally unique identifier (LUID) may be used. See the GET command for examples.
Item in Add, Move, Replace Commands	
SourceParent	Specifies parent information of the child that is mentioned in the Source or Target LocURI of the sync command if the objects have hierarchical nature. When addressing the server (client sends to server) – MUST use LocURI element to specify the locally unique identifier for the parent of the client side's item. When addressing the client (server sends to client) – MUST use LocURI element to specify the temporary global unique identifier for the parent of the server side's item. The server MUST only send SourceParent if the client's unique identifier for the parent of the server side's item is unknown. In all other cases, the server MUST use TargetParent.
TargetParent (*used only by the servers*)	Specifies parent information of the child that is mentioned in the Target LocURI of the sync command if the objects have hierarchical nature. When addressing the client (server sends to client) – MUST use the LocURI element to specify the client's unique identifier for the parent of the server side's item.
Item in Add, Copy, Delete, Move, Replace, Results, Status Commands	
Target and Source	Specifies the address of the database item that is the argument of the SyncML command. When addressing the: *Server* - MUST use LocURI element type to specify the absolute URI, relative URI, URN or locally unique identifier for the server database item. *Client* - MUST use LocURI element type to specify the absolute URI, relative URI, URN or locally unique identifier for the client database item.

The Target and Source addresses are referenced in the TargetRef and SourceRef element types, respectively. When present, the TargetRef element type contains the value that was in the Target element type in a corresponding command. Respectively, the SourceRef element type contains the value that was in the Source element type in a corresponding command. For example, the TargetRef and SourceRef in a Status contain the respective Target and Source values from the command corresponding to the Status.

5.13 Data Sync Record and Field Level Filtering

Server data stores frequently contain much more data than can fit into small devices. Other aspects of the protocol enable clients and servers to indicate data store capacity and therefore avoid data overflow conditions, however it is often the case that small devices only want to synchronize a particular, prioritised subset of the data that resides in the server's data store (referred to from this point forth as record filtering). Devices could also allow users to override the level of support for certain properties previously defined in the device info structure (referred to from this point forth as field filtering).

Support for receiving filters MUST be indicated in the device info for each data store. Support MUST be indicated by the inclusion of the Filter-Rx element within the Datastore element. The Filter-Rx element MUST contain a CTType and a VerCT element. The CTType element specifies the filtering grammar supported. For every Filter-Rx element a corresponding FilterCap element MUST be included in the Datastore element specifying any keywords or property names that can be filtered on.

A filter is specified by including the Filter element for the Target of a data store in an Alert command. When a Filter element is present, the Filter Meta Type element MUST be included and MUST correspond to the mime type the filter applies to. Within the Filter element, the Record, Field, and FilterType elements MAY be included and all MAY be present.
Note: in the case of a data store which contains multiple mime types, the other mime types than the one defined in the Filter Meta Type element are synchronized without any restriction.

The Record element MUST contain an Item containing a Meta Type element representing the filter type used, and one Data element representing the query data. The Data element MUST be a logical expression whereby the expression MUST only contain values defined in the FilterCap element.

The Field element MUST contain an Item containing a Meta Type element representing the device information mime type and one Data element containing one or more Property elements. The mark-up characters of the Data element content MUST be properly escaped according to [XML] specification rules or the CDATA sections MUST be used. The Property elements override the corresponding property in the CTCap element for the current synchronisation session. Only the properties that differ from the properties specified in the CTCap element MAY be specified.

If WBXML encoding is used, no more than one property MAY be specified in the Data element. Specifying more than one property in WBXML document violates the rules for well-formed WBXML documents.

The FilterType element MUST contain a keyword that indicates the type of behavior that the sender is requesting. If the FilterType element is not present, then the FilterType value of "EXCLUSIVE" MUST be assumed.

Note: the use of an EXCLUSIVE filter type is possible when the filter request only contains a Field level filtering, but no Record level filtering. Nevertheless, this case does not imply the deletion of the fields outside the filter criteria (i.e. the fields that are not anymore in the filter sender's capabilities, due to the restriction of the Field level filtering request).

If an implementation receives a filter record request for a data store that does not support filtering, a status code of 406 (OPTIONAL feature not supported) MUST be returned for the command containing the Filter element. If a filter record request specifying a filter type that is not supported by the data store is received, a status code 415 (unsupported media type or format) MUST be returned for the command containing the Filter element. If a filter record request is received which is syntactically incorrect or contains a query that is not supported then a status code of 422 (bad CGI or filter query) MUST be returned for the command containing the Filter element. If any of those error conditions occur, the sender of the filter MAY attempt to resend a new query. If the second query fails as well, a sender SHOULD either remove the filter query or terminate the synchronization.

If an implementation received a filter field request for a data store containing properties not previously defined in the corresponding CTCap element, then a status code of 400 (bad request) SHOULD be returned. Otherwise, the recipient of the filter field request MUST override any properties previously retrieved in the CTCap element in the device info with the properties present in the filter field request. The properties MUST only be overridden for the current synchronization session only.

5.13.1 Filter Behavior Definition

Filtering allows an implementation (most often a client) to constrain the set of items in a data store it wishes to synchronize against and to further constrain the data returned.

The filter only applies to the recipient, that is, an implementation that sends a filter for a synchronisation session is not constrained in the set of items it might send. Filtering serves a different purpose than the Search command in that Sync using a Filter will allow synchronization with a subset of the data in the data store, whereas the Search will not.

When a Filter has been included within a Sync command, the set of data that is defined by the Filter MUST be fully synchronized during a normal synchronization operation.

If a subsequent Sync command is sent (in a subsequent synchronization session) for the same datastore but with a different Filter command, the set of data that is defined by the new Filter command MUST be fully synchronized during a normal synchronization operation. The recipient of the Filter command MUST not send new items that are part of the previous filter if those items are not part of the new filter.

A recipient MAY choose how to insure that this expectation is met. For example, it might require requesting a slow sync, or it might require re-sending records that have been previously synchronized with a different set of fields.

5.13.2 Filter Query Syntax

The filter query is a logical expression contained in the Filter Record element and is applied to each item in the recipient's datastore. Often, the values of properties in the data items are compared to literal values supplied by the requestor. Items for which the expression evaluates to true are the set of items for that synchronization session. The filter query is expressed according to a particular grammar. The Record Item Meta Type indicates the grammar of the filter query supplied in the Data element. This enables the protocol to support additional filter grammars without sacrificing interoperability. The list of grammar types an implementation is capable of receiving MUST be indicated through the use of the device info Filter-Rx element.

Comparison items MUST be valid property names or keywords specified in the FilterCap element for the particular filter query grammar being used and all comparison operators MUST be supported for each comparison item.. Literal values used in comparisons MUST be valid for the property or keyword according to the content type being used for the query. Comparisons are performed using the character encoding specified in the content type, where appropriate.

A grammar MAY provide logical operators for conjoining sub-expressions (e.g. AND, OR, NOT) to create arbitrarily complex expressions. A grammar MAY provide mechanisms for selecting items based on the presence of properties.

5.13.2.1 Content type requirements

If an implementation supports receiving filters on a given data store, all expressions that test the values of certain base media object properties for that data store, regardless of the query grammar used, are OPTIONAL. If the expression is unsupported by the recipient, one of the previously listed status codes MUST be returned to the sender. The sender SHOULD then modify the expression based on the device info obtained from the recipient. If no expression can be agreed upon between the sender and the recipient then it is up to the sender to determine if the synchronization can be sent without any Filter element or if the synchronization SHOULD be aborted.

Filtering for all contents types is OPTIONAL and MAY be supported.

5.13.2.1.1 Contacts Media Object Filter

Filtering for vCard 2.1 [IMCVCARD] and vCard 3.0 [RFC2426] objects can be specified using both `Record` and `Field` elements. In the case of `Record` elements, the set of recommended keywords to support are as follows:

```
ct-filter-keyword = "CATEGORIES" | "GROUP"
```

If one chooses to filter based on a property name, some properties like Name ("N") might have several fields. Individual fields could be indicated using a subscript notation. Thus, "N[1]" refers to the family name and "N[2]" refers to the given name.

5.13.2.1.2 Calendar Media Object Filter

Filtering for vCalendar 1.0 [IMCVCAL] and iCalendar 2.0 [RFC2445] objects can be specified using both `Record` and `Field` elements. In the case of `Record` elements, the set of recommended keywords to support are as follows:

```
ct-filter-keyword = "SINCE" | "BEFORE" | "STATUS"
```

The format of the "SINCE" and "BEFORE" keywords MUST be a date-time or date format as specified below.

```
date-time     = date "T" time
date          = date-value
date-value    = date-fullyear date-month date-mday
date-fullyear = 4DIGIT
date-month    = 2DIGIT ;01-12
date-mday     = 2DIGIT ;01-28, 01-29, 01-30, 01-31 (based on month/year)
time          = time-hour time-minute time-second time-utc
time-hour     = 2DIGIT       ;00-23
time-minute   = 2DIGIT       ;00-59
time-second   = 2DIGIT       ;00-59
time-utc      = "Z"
```

The "SINCE" keyword represents items that are within or later than the specified date while the "BEFORE" keyword represents items that are earlier than the specified date.

Implementations that support receiving filters for calendar media objects are responsible for expanding recurrence rules ("RRULE" properties) to determine if any instances match the filter conditions. Also, when specifying a date-time format, the use of UTC MUST be used in order to avoid time zone ambiguities. Implementations that cannot provide a UTC date-time value MUST provide a date value instead.

5.13.2.2 CGI Syntax

This section specifies a CGI-like filtering syntax. When using this syntax, the `Filter Item Meta Type` element MUST be 'syncml:filtertype-cgi'. All implementations that support receiving filter requests MUST support the "syncml:filtertype-cgi" grammar.

The format for the CGI scripting is defined here in an ABNF notation [RFC2234] and the grammar defined here is largely the same as the grammar defined in the OMA DS 1.1.2 specification. If the CGI syntax is supported for a data store, then all of the logical CGI scripting primitives in the following table MUST be supported. CGI syntax queries may contain at most 1 type of logical separator, but they MAY contain several logical separators of the same type. For example, they MAY contain several "&OR;" logical operators but a query cannot contain both an "&AND;" and an "&OR;" logical operator in the same expression. The SPACE character MUST be specified by the hexadecimal encoding as stated by the format specification for Uniform Resource Identifiers.

Since the use of lexographic comparison operators is locale specific (for example the use of the “&LT;” operator), devices SHOULD NOT use these operators when specifying a filter for free form text properties. Instead, the following logical operators SHOULD be used in place: “&EQ;”, “&iEQ;”, “&NE;”, “&iNE;”, “&CON;”, “&iCON;”.

Queries using value-based properties (properties that may only contain specific pre-defined values) SHOULD only use the following operators: “&EQ;”, “&iEQ;”, “&NE;”, “&iNE;”.

```
VCHAR = %x20-7E   ;Visible latin characters within UTF-8 or SPACE character
string-value = 1*VCHAR  ;Case sensitive string value
log-equalitycomp = "&EQ;"  ;Equal To (case sensitive)
/                  "&iEQ;" ;Equal To (case insensitive)
/                  "&NE;"  ;Not Equal To (case sensitive)
/                  "&iNE;" ;Not Equal To (case insensitive)

log-op = log-equalitycomp
/ "&GT;"                ;Greater Than (case sensitive)
/ "&iGT;"               ;Greater Than (case insensitive)
/ "&GE;"                ;Greater Than Or Equal To (case sensitive)
/ "&iGE;"               ;Greater Than Or Equal To (case insensitive)
/ "&LT;"                ;Less Than (case sensitive)
/ "&iLT;"               ;Less Than (case insensitive)
/ "&LE;"                ;Less Than Or Equal To (case sensitive)
/ "&iLE;"               ;Less Than Or Equal To (case insensitive)
/ "&CON;                ;Contains the value (case sensitive)
/ "&iCON;               ;Contains the value (case insensitive)
/ "&NCON;               ;Does Not Contain the value (case sensitive)
/ "&iNCON;              ;Does Not Contain the value (case insensitive)


log-sep = "&OR;"        ;Logical OR
/         "&AND;"       ;Logical AND
luid-expression = "&LUID;" log-equalitycomp string-value
ct-no-value = “&NULL;”   ; No property value for the item
ct-filter-keyword = string-value   ; Valid content-type specific filter keywords
ct-filter-value = string-value  ; Valid content-type specific property value
ct-expression = ct-filter-keyword (log-op ct-filter-value | log-equalitycomp ct-no-
value)
```

```
filter-expression =  ct-expression | luid-expression filter-query = filter-
expression *(log-sep filter-expression)
```

5.13.3 Indicating Filter Support

Implementations that support filtering MUST indicate their support in the device info. For each data store, a device indicates the list of filter grammars it is capable of receiving in the `Filter-Rx` element.

5.13.3.1 Minimum Requirements for Filtering support

Implementations that support filtering MUST support receiving the “syncml:filtertype-cgi” grammar. Specifically, they MUST include at least one `Filter-Rx` element specifying the receiving of the “syncml:filtertype-cgi” grammar.

5.13.4 Handling Data Outside Filter Criteria

The following outlines how to handle synchronizing data outside the filter criteria

1. When using an EXCLUSIVE filter type, the server not only sends all of its changes inside the filter criteria to the client, but the server MUST also send Deletes for all client items that are outside the filter criteria. If the client supports the OPTIONAL Soft Delete, the server MAY send Soft Deletes; otherwise, the server MUST send Hard Deletes. In any case, the server keeps these data items in its data store.

   The scenario below illustrates a sample behaviour of the EXCLUSIVE filter:

   a. First synchronization:

      i. A two way slow sync has been negotiated with the client sending an EXCLUSIVE filter query

      ii. The client sends all of its data

      iii. The server sends all of its data within the filter criteria and Soft or Hard Deletes for any client data item outside the filter criteria

   b. Subsequent synchronizations:

      i. A two way sync has been negotiated with the client sending an EXCLUSIVE filter query

      ii. The client sends all of its changes

      iii. The server sends all of its changes within the filter criteria and Soft or Hard Deletes for any client data item outside the filter criteria

2. When using an INCLUSIVE filter type, before the client sends any of its changes to the server, the client MAY choose to send Soft Deletes for all items that were outside the filter criteria after the previous synchronization.

   The scenario below illustrates a sample behaviour of the INCLUSIVE filter with the use of the Soft Delete mechanism (note that this is only an example, and that the use of the Soft Delete is unrelated to an INCLUSIVE filter; the client is allowed to keep a part of -or all- its data items outside the filter criteria in its data store with an INCLUSIVE filter):

   a. First synchronization:

      i. A two way slow sync has been negotiated with the client sending An INCLUSIVE filter query

      ii. The client sends all of its data

iii. The server sends all of its data within the filter criteria and also the data regarding the items that it assumes to exist in the client's data store.

iv. After the sync has completed, the client deletes or archives all data outside of the filter query from the client database and marks them so that soft deletes can be sent in the next synchronization

b. Subsequent synchronizations:

i. A two way sync has been negotiated with the client sending an INCLUSIVE filter query

ii. The client sends Soft Deletes for all client data outside of the filter query (that has either been deleted or archived) and also sends all of its changes

iii. The server sends all of its changes within the filter criteria

iv. After the sync has completed, the client deletes or archives all data outside of the filter query from the client database and marks them so that soft deletes can be sent in the next synchronization. Note that if a client chooses to delete the items outside of the filter query instead of archiving them, it MUST do so immediately after a synchronization in order to prevent the user from modifying the items between synchronizations and thus potentially losing changes made by users.

5.13.5 Examples

The following examples are provided to further illustrate the usage of filtering in OMA DS 1.2.

5.13.5.1 Contact Media Objects

5.13.5.1.1 Example 1

In this scenario, the client wishes to sync only Contact items that fall into the “business” or “personal” group.

1. During the initial sync, the client and server exchange their device info.

2. The client analyses the server’s device info, and the client notes that the server supports receiving filters on the Contacts data store for queries using the “syncml:filtertype-cgi” grammar.

   a. The server includes in its device info the `Filter-Rx` and `FilterCap` elements that it supports.

   b. The client doesn’t require filtering on any additional fields, so it determines that this server supports the filter it wishes to send.

```
<Datastore>
  <SourceRef>./contacts</SourceRef>
  <DisplayName>Contacts DB</DisplayName>
  ...
  <Filter-Rx>
    <CTType>syncml:filtertype-cgi</CTType>

    <VerCt>1.0</VerCT>
  </Filter-Rx>
  <CTCap>
    ...
  </CTCap>
  <FilterCap>
    <CTType>syncml:filtertype-cgi</CTType>
    <VerCt>1.0</VerCt>
    <FilterKeyword>GROUP</FilterKeyword>
    <PropName>CATEGORIES</PropName>
  </FilterCap>
</Datastore>
```

3. The client sends an `Alert` for the Contacts data store with a filter.

    a. It includes the `Filter Meta Type` element to indicate the content type desired (vCard in this example).

    b. It includes a `Filter Record` element with a `Meta Type` value of “syncml:filtertype-cgi” to indicate the grammar being used.

    c. The filter query in the `Item Data` element contains a value of “GROUP&iCON;business&OR; GROUP &iCON;personal” to constrain the items synchronized to those that fall into the “business” or “personal” group (case insensitive).

```
<Alert>
  <Data>200</Data>
  <Item>
    <Target>
      <LocURI>./contacts</LocURI>
      <Filter>
         <Meta><Type>text/x-vcard</Type></Meta>
        <Record>
          <Item>
            <Meta><Type>syncml:filtertype-cgi</Type></Meta>
            <Data> GROUP&iCON;business&OR;GROUP&iCON;personal</Data>
          </Item>
         </Record>
      </Filter>
    </Target>
    <Source>
      <LocURI>dev-contacts</LocURI>
    </Source>
  </Item>
</Alert>
```

4. The server receives the `Alert` with the `Filter Record` element.

    a. It determines that it supports the filter operation for the data store, content type, filter grammar, and properties.

    b. It replies with a status code of 200 for the `Alert`, indicating that it can satisfy the request to sync with filtering.

5. The synchronization process continues normally.

    a. The client sends all of its changes to the server (the filter constraint is not imposed on it in this scenario).

    b. The server sends changes only for items that satisfy the filter query.

5.13.5.1.2 Example 2

In this scenario, the client wishes to sync only Contact items that fall into the “business” or “personal” group. Additionally the client has indicated in its device info that it supports the PHOTO property, but it does not wish to receive the PHOTO property from the server for this synchronization request.

1. During the initial sync, the client and server exchange their device info.
2. The client analyses the server's device info, and the client notes that the server supports receiving filters on the Contacts data store for queries using the "syncml:filtertype-cgi" grammar.
    a. The server includes in its device info the `Filter-Rx` and `FilterCap` elements that it supports.
    b. The client doesn't require filtering on any additional fields, so it determines that this server supports the filter it wishes to send.
3. The client sends an `Alert` for the Contacts data store with a filter.
    a. It includes the `Filter Meta Type` element to indicate the content type desired (vCard in this example).
    b. It includes a `Filter Record` element with a `Meta Type` value of "syncml:filtertype-cgi" to indicate the grammar being used.
    c. The filter query in the `Item Data` element contains a value of "GROUP&iCON;business&OR;GROUP&iCON;personal" to constrain the items synchronized to those that fall into the "business" or "personal" group (case insensitive).
    d. It includes a `Filter Field` element containing a Property element set to "PHOTO" containing a MaxSize element set to 0 (zero).

```
<Alert>
  <Data>200</Data>
  <Item>
    <Target>
      <LocURI>./contacts</LocURI>

      <Filter>
        <Meta><Type>text/x-vcard</Type></Meta>
        <Record>
          <Item>
            <Meta><Type>syncml:filtertype-cgi</Type></Meta>
            <Data> GROUP&iCON;business&OR;GROUP&iCON;personal</Data>
          </Item>
        </Record>
        <Field>
          <Item>
            <Meta><Type>application/vnd.syncml-devinf+xml</Type></Meta>
            <Data><![CDATA[
              <Property>
                <PropName>PHOTO</PropName>
                <MaxSize>0</MaxSize>
                <NoTruncate/>
              </Property>
            ]]></Data>
          </Item>
        </Field>
      </Filter>
    </Target>
    <Source>
      <LocURI>dev-contacts</LocURI>
    </Source>
  </Item>
</Alert>
```

4. The server receives the `Alert` with the `Filter Record` and `Field` elements.

   a. It determines that it supports the filter operations for the data store, content type, filter grammar, and properties.

   b. It replies with a status code of 200 for the Alert, indicating that it can satisfy the request to sync with filtering.

5. The synchronization process continues normally.

   a. The client sends all of its changes to the server (the filter constraint is not imposed on it in this scenario).

   b. The server sends changes only for items that satisfy the filter query. The server does not send any PHOTO properties since the client has requested that it wishes to receive only 0 bytes of this property for this synchronization request and the value should SHOULD not be truncated.

5.13.5.2 Calendar Media Objects

5.13.5.2.1 Example 1

In this scenario, the client wishes to synchronize calendar items that fall within a two week window of time (starting with the current date).

1. During the initial sync, the client and server exchange their device info.

2. The client analyses the server's device info, and the client notes that the server supports receiving filters on the Calendar data store for queries using the "syncml:filtertype-cgi" grammar.

   a. The server includes in its device info the `Filter-Rx` and `FilterCap` elements that it supports. This includes the SINCE and BEFORE keywords.

   b. The client doesn't require filtering on any additional fields, so it determines that this server supports the filter it wishes to send.

```
<Datastore>
  <SourceRef>./calendar/events</SourceRef>
  <DisplayName>Calendar Agenda DB</DisplayName>
  ...
  <Filter-Rx>
    <CTType>syncml:filtertype-cgi</CTType>
    <VerCt>1.0</VerCT>
  </Filter-Rx>
  <CTCap>
    ...
  </CTCap>
  <FilterCap>
    <CTType>syncml:filtertype-cgi</CTType>
    <VerCt>1.0</VerCt>
    <FilterKeyword>BEFORE</FilterKeyword>
    <FilterKeyword>SINCE</FilterKeyword>
  </FilterCap>
</Datastore>
```

3. The client sends an `Alert` for the Calendar data store with a filter.

   a. It includes the `Filter Meta Type` element to indicate the content type desired (iCalendar in this example).

   b. It includes a `Filter Record` element with a `Meta Type` value of "syncml:filtertype-cgi" to indicate the grammar being used.

   c. The filter query in the `Item Data` element contains a value of "SINCE&EQ;20030606T000000Z&AND;BEFORE&EQ;20030620T000000Z" to constrain the items synchronized to those that occur between June 6, 2003 and June 19, 2003 inclusive, using the "SINCE" and "BEFORE" keywords.

```
<Alert>
  <Data>200</Data>
  <Item>
    <Target>
      <LocURI>./calendar/events</LocURI>

      <Filter>
         <Meta><Type>text/x-vcalendar</Type></Meta>
         <Record>
            <Item>
              <Meta><Type>syncml:filtertype-cgi</Type></Meta>

<Data>SINCE&EQ;20020707T000000Z&AND;BEFORE&EQ;20020728T000000Z</Data>

            </Item>
          </Record>
        </Filter>
      </Target>
     <Source>
      <LocURI>dev-agenda</LocURI>
    </Source>
  </Item>
</Alert>
```

4. The server receives the `Alert` with the `Filter Record` element.

   a. It determines that it supports the filter operation for the data store, content type, filter grammar, and properties.

   b. It replies with a status code of 200 for the `Alert`, indicating that it can satisfy the request to sync with filtering.

5. The synchronization process continues normally.

   a. The client sends all of its changes to the server (the filter constraint is not imposed on it in this scenario).

   b. The server sends changes only for items that satisfy the filter query.

5.13.5.2.2 Example 2

In this scenario, the client wishes to synchronize task items (iCalendar vTODO components) that have not been completed and are due within the next 2 weeks (using the DUE iCalendar property). The client also wishes to limit the size of the DESCRIPTION property to 100 bytes and only receive ATTACH properties that are less than 1000 bytes.

1. During the initial sync, the client and server exchange their device info.

2. The client analyses the server's device info, and the client notes that the server supports receiving filters on the Calendar data store for queries using the "syncml:filtertype-cgi" grammar.

   a. The server includes in its device info the `Filter-Rx` and `FilterCap` elements that it supports. This includes the STATUS and DUE keywords.

   b. The client doesn't require filtering on any additional fields, so it determines that this server supports the filter it wishes to send.

```
<Datastore>
  <SourceRef>./calendar/tasks</SourceRef>
  <DisplayName>Task DB</DisplayName>
  ...
  <Filter-Rx>
    <CTType>syncml:filtertype-cgi</CTType>
    <VerCt>1.0</VerCT>
  </Filter-Rx>
  <CTCap>
    ...
  </CTCap>
  <FilterCap>
    <CTType>syncml:filtertype-cgi</CTType>
    <VerCt>1.0</VerCt>
    <PropName>DUE</PropName>
    <PropName>STATUS</PropName>
  </FilterCap>
</Datastore>
```

3. The client sends an `Alert` for the Calendar data store with a filter.

    a. It includes the `Filter  Meta Type` element to indicate the content type desired (iCalendar in this example).

    b. It includes a `Filter Record` element with a `Meta Type` value of “syncml:filtertype-cgi” to indicate the grammar being used.

    c. The filter query in the `Item Data` element contains a value of “DUE&LE;20030620T000000Z&AND;STATUS&NE;COMPLETED” to constrain the items synchronized to those that are due before June 20, 2003 and have not been completed.

    d. It includes a `Filter Field` element containing a Property element set to “DESCRIPTION” containing a MaxSize element set to 100 and a second property element set to “ATTACH” containing a MaxSize of 1000 with the NoTruncate tag present.

```
<Alert>
  <Data>200</Data>
  <Item>
    <Target>
      <LocURI>./calendar/tasks</LocURI>
      <Filter>
        <Meta><Type>text/x-vcalendar</Type></Meta>
        <Record>
          <Item>
            <Meta><Type>syncml:filtertype-cgi</Type></Meta>
            <Data>DUE&LE;20030728T000000Z&AND;STATUS&NE;COMPLETED</Data>
          </Item>
        </Record>
        <Field>
          <Item>
            <Meta><Type>application/vnd.syncml-devinf+xml</Type></Meta>
            <Data><![CDATA[
              <Property>
                <PropName>DESCRIPTION</PropName>
                <MaxSize>100</MaxSize>
              </Property>
              <Property>
                <PropName>ATTACH</PropName>
                <MaxSize>1000</MaxSize>
                </NoTruncate>
              </Property>
            ]]></Data>
          </Item>
        </Field>

      </Filter>
    </Target>
    <Source>
      <LocURI>dev-tasks</LocURI>
    </Source>
  </Item>
</Alert>
```

4. The server receives the `Alert` with the `Filter Record` element.

   a. It determines that it supports the filter operation for the data store, content type, filter grammar, and properties.

   b. It replies with a status code of 200 for the `Alert`, indicating that it can satisfy the request to sync with filtering.

5. The synchronization process continues normally.

   a. The client sends all of its changes to the server (the filter constraint is not imposed on it in this scenario).

   b. The server sends changes only for items that satisfy the filter query. The server has truncated the DESCRIPTION properties to 100 bytes and has also not sent any ATTACH properties that are larger than 1000 bytes.

6. Mark-up Language Description

Examples in this section make use of XML snippets. They are not intended to be complete XML documents. They are only provided to illustrate an example usage of the element type in question.

Restrictions listed in this document are in addition to the restrictions listed in [REPPRO].

6.1 Common Use Elements

The following are common element types used by numerous other SyncML element types.

The formal static conformance requirements for the SyncML data description elements are found in Appendix A.

The following table further elucidates the static conformance requirements for the SyncML data description elements for devices conforming to this specification.

Command	Support of Synchronization Server		Support of Synchronization Client	
	Sending	Receiving	Sending	Receiving
Archive	MAY	MAY	MAY	MAY
Chal	MUST	MUST	MAY	MUST
Cmd	MUST	MUST	MUST	MUST
CmdID	MUST	MUST	MUST	MUST
CmdRef	MUST	MUST	MUST	MUST
Cred	MUST	MUST	MUST	MUST
Field	MAY	MAY	MAY	MAY
Filter	MAY	MAY	MAY	MAY
FilterType	MAY	MAY	MAY	MAY
Final	MUST	MUST	MUST	MUST
Lang	MAY	MAY	MAY	MAY
LocName	MAY	MAY	MAY	MAY
LocURI	MUST	MUST	MUST	MUST
MoreData	MUST	MUST	MAY	MAY
MsgID	MUST	MUST	MUST	MUST
MsgRef	MUST	MUST	MUST	MUST
NoResp	MAY	MUST	MAY	MUST
NoResults	MAY	MAY	MAY	MAY

NumberOfChanges	MAY	MUST	MAY	MAY
Record	MAY	MAY	MAY	MAY
RespURI	MAY	MUST	MAY	MUST
SessionID*	MUST	MUST	MUST	MUST
SftDel	MAY	MAY	MAY	MAY
Source	MUST	MUST	MUST	MUST
SourceParent	MAY	MAY	MAY	MAY
SourceRef	MUST	MUST	MUST	MUST
Target	MUST	MUST	MUST	MUST
TargetParent**	MAY	MUST NOT	MUST NOT	MAY
TargetRef	MUST	MUST	MUST	MUST
VerDTD	MUST	MUST	MUST	MUST
VerProto	MUST	MUST	MUST	MUST

*The maximum length of a SessionID is 4 bytes. Note, for a client having an 8 bit incrementing SessionID counter is enough for practical implementations.

**TargetParent is never sent by a client

6.1.1 Archive

Restrictions: If the element type is present in a `Delete` command that contains a sequence of `Item` element types, then it applies to all of the data items.

If this element type is not specified, then the deleted data need not be archived by the recipient prior to being deleted.

If the recipient does not support this function then the response status code 210 (`Delete` without `Archive`) MUST be returned if the delete was successful. See `Delete` for other possible error codes.

Example:

```
<Delete>
  <CmdID>1234</CmdID>
  <Archive/>
  <Item>
    <Target><LocURI>./11</LocURI></Target>
  </Item>
</Delete>
```

6.1.2 Chal

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example: The following is an example of an OMA DS "Basic" authentication challenge. The password and userid are requested to be Base64 character encoded. The type and format of the authentication scheme are specified by the meta-information in the `Meta` element type.

```
<Status>
  <MsgRef>0</MsgRef>
  <Cmd>SyncHdr</Cmd>
  <TargetRef>http://www.datasync.org/servlet/syncit</TargetRef>
  <SourceRef>IMEI:001004FF1234567</SourceRef>
  <Chal>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-basic</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
  </Chal>
  <Data>401</Data>
</Status>
```

The following is an example of an OMA DS "MD5 digest" authentication challenge. The MD5 Digest is requested to be Base64 character encoded. The type and format of the authentication scheme, as well as the next nonce are specified by the meta-information in the `Meta` element type.

```
<Status>
  <MsgRef>0<MsgRef>
  <Cmd>SyncHdr</Cmd>
  <TargetRef>http://www.datasync.org/servlet/syncit</TargetRef>
  <SourceRef>IMEI:001004FF1234567</SourceRef>
  <Chal>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
      <NextNonce xmlns='syncml:metinf'>ZG9iZWhhdmUNCg==</NextNonce>
    </Meta>
   </Chal>
  <Data>401</Data>
</Status>
```

6.1.3 Cmd

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<Status>
  <CmdID>4321</CmdID>

  <MsgRef>1</MsgRef>
  <CmdRef>1234</CmdRef>
  <Cmd>Add</Cmd>
  <TargetRef>./mail/bruce1</TargetRef>
  <Data>401</Data>
  <Item>
    <Meta>
      <NextNonce xmlns='syncml:metinf'>F00BAC==</NextNonce>
    </Meta>
  </Item>
</Status>
```

6.1.4 CmdID

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<Add>
  <CmdID>1234</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Source><LocURI>./12</LocURI></Source>
    <Meta>
      <Type xmlns='syncml:metinf'>text/directory;profile=vCard</Type>
    </Meta>
    <Data>BEGIN:VCARD
VERSION:3.0
FN:Smith;Bruce
N:Bruce Smith
TEL;TYPE=WORK;VOICE:+1-919-555-1234
END:VCARD
    </Data>
  </Item>
</Add>
```

6.1.5 CmdRef

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<Status>
  <CmdID>4321</CmdID>

  <MsgRef>1</MsgRef>
  <CmdRef>1234</CmdRef>
  <Cmd>Add</Cmd>
  <TargetRef>./mail/bruce1</TargetRef>
  <Data>401</Data>
  <Item>
    <Meta>
      <NextNonce xmlns='syncml:metinf'>ZG9iZWhhdmUNCg==</NextNonce>
    </Meta>
  </Item>
</Status>
```

6.1.6 Cred

Restrictions: If the authentication scheme is ‘`syncml:auth-md5`’, namely MD5 Digest scheme, the digest supplied in the Cred element MUST be computed as follows:

Let H = the MD5 Hashing function.
Let Digest = the output of the MD5 Hashing function.
Let B64 = the base64 encoding function.
Digest = H(B64(H(username:password)):nonce)

MD5 authentication scheme provides a safe way for prevention of replay attacks to transmit the credential in MD5 digest to the recipient. It is recommended that the password is neither sent as part of the Cred element, nor is it required to be known explicitly by the recipient if it stores a pre-computed hash of the 'username:password' string.

Example: The following is an example of a MD5 digest scheme where the user name is “Bruce2”, the password is “OhBehave”, and the nonce is “Nonce”.

```
<Cred>
  <Meta>
    <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
    <Format xmlns='syncml:metinf'>b64</Format>
  </Meta>
  <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
</Cred>
```

6.1.7 Field

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example: The following is an example of a `Field` element used within a `Filter` element to define the characteristics of the subset of data to be synchronized. The `Filter Field` element contains a Property element set to “PHOTO” containing a MaxSize element set to 0 (zero). This indicates to the server that it SHOULD NOT send any PHOTO properties since the client has requested that it wishes to receive only 0 bytes of this property for this synchronization request and the value SHOULD NOT be truncated.

```
<Filter>
………
        <Field>
          <Item>
             <Meta><Type>application/vnd.syncml-devinf+xml</Type></Meta>
             <Data><![CDATA[
               <Property>
                 <PropName>PHOTO</PropName>
                 <MaxSize>0</MaxSize>
                 <NoTruncate/>
               </Property>
             ]]></Data>
          </Item>
       </Field>
………
<Filter/>
```

6.1.8 Filter

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example: The following is an example of a `Filter` element which

1. uses the `Record` element with a `Meta Type` value of “syncml:filtertype-cgi” to indicate the grammar being used.
2. `uses the Item Data` element to constrain the items synchronized to those that fall into the “business” or “personal” group (case insensitive) with the cgi expression “GROUP&iCON;business&OR; GROUP &iCON;personal”.

```
<Filter>
        <Record>
          <Item>
            <Meta><Type>syncml:filtertype-cgi</Type></Meta>
            <Data>GROUP&iCON;business&OR;GROUP&iCON;personal</Data>
          </Item>
        </Record>
</Filter>
```

6.1.9 FilterType

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example: The following is an example of a Filter element which uses the EXCLUSIVE FilterType keyword.

```
<Filter>
    <FilterType>EXCLUSIVE</FilterType>
        <Record>
          <Item>
            <Meta><Type>syncml:filtertype-cgi</Type></Meta>
            <Data>GROUP&iCON;business&OR;GROUP&iCON;personal</Data>
          </Item>
        </Record>
</Filter>
```

6.1.10 Final

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<SyncML xmlns=’SYNCML:SYNCML1.2’>
  <SyncHdr>...blah, blah...</SyncHdr>
  <SyncBody>
    ...blah, blah...
    <Final/>
  </SyncBody>
</SyncML>
```

6.1.11 Lang

Restrictions: The value of the element type MUST be a valid [RFC1766] formatted International language identifier. The semantics for this element type are quite different than the `xml:lang` attribute defined in [XML], which indicates the International language identifier for the content information of any element type. This element type MUST NOT be used to specify the actual language of element types in a SyncML document. The `xml:lang` attribute MUST be used for this latter purpose.

Example:

```
<Get>
  <CmdID>5</CmdID>
  <Lang>en-US</Lang>
  <Item>
    <Target><LocURI>./F123456F</LocURI></Target>
    <Source><LocURI>./10</LocURI></Target>
  </Item>
</Get>
```

6.1.12 LocName

Restrictions: A target- or source-specific display name to be associated with the associated `LocURI` value in the `Target` or `Source` element type.

6.1.13 LocURI

Restrictions: Section 4.12, "Target and Source Addressing" provides restrictions on the values for the `LocURI` element type.

Example:

```
<SyncHdr>
  <VerDTD>1.2</VerDTD>
  <VerProto>SyncML/1.2</VerProto>
  <SessionID>1</SessionID>
  <MsgID>1</MsgID>
  <Target>
  <LocURI>http://www.datasync.org/servlet/syncit/</LocURI>
  </Target>
  <Source><LocURI>IMEI:001004FF1234567</LocURI></Source>
</SyncHdr>
```

6.1.14 MoreData

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<Add>
  <CmdID>15</CmdID>
  <Meta>
    <Type>text/x-vcard</Type>
    <Size>3000</Size>
  </Meta>

  <Item>
    <Source><LocURI>2</LocURI></Source>
    <Data>BEGIN:VCARD
VERSION:2.1
FN:Bruce Smith
N:Smith;Bruce
TEL;WORK;VOICE:+1-919-555-1234
TEL;WORK;FAX:+1-919-555-9876
NOTE: here starts a huge note field, or icon etc...

    </Data>
    <MoreData/>
  </Item>
</Add>
```

6.1.15 MsgID

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<SyncHdr>
  <VerDTD>1.2</VerDTD>
  <VerProto>1.2</VerProto>
  <SessionID>1</SessionID>
  <MsgID>1</MsgID>
  <Target><LocURI>http://www.syncml.host.com/</LocURI></Target>
  <Source><LocURI>IMEI:001004FF1234567</LocURI></Source>
</SyncHdr>
```

6.1.16 MsgRef

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<Status>
  <CmdID>4321</CmdID>
  <MsgRef>1</MsgRef>
  <CmdRef>1234</CmdRef>
  <Cmd>Add</Cmd>
  <Data>200</Data>
</Status>
```

6.1.17 NoResp

Restrictions: When specified, the recipient MUST NOT return a Status command for the associated SyncML command. If specified on the `SyncHdr` element type, the recipient MUST NOT return any Status for any of the commands in the current SyncML message.

Example:

```
<Replace>
```

```
  <CmdID>1</CmdID>
  <NoResp/>
  <Item>
    <Source><LocURI>./127</LocURI></Source>
    <Meta>
      <Type xmlns='syncml:metinf'>text/directory profile=vCard</Type>
    </Meta>
    <Data>BEGIN:VCARD
VERSION:2.1
FN:Bruce Smith
N:Smith;Bruce
TEL;TYPE=WORK;VOICE;MSG:+1-919-555-9999
ADR:;;123 Main St.;Anywhere;CA;;US
END:VCARD
    </Data>
  </Item>
</Replace>
```

6.1.18 NoResults

Restrictions: The indicator is used to force the results of a Search command to remain on the recipient system in a temporary repository specified by the `Source` element type within the command.

If the recipient does not support local temporary repositories, the (`406`) `Optional feature not supported` exception condition will be created.

Example:

```
<Search>
  <CmdID>3</CmdID>
  <NoResults/>
  <Source><LocURI>./bruce1/emp_tabl.db</LocURI></Source>
  <Meta><Type xmlns='syncml:metinf'>application/sql</Type></Meta>
  <Data>SELECT EQ * WHERE "FN" EQ "Bruce Smith"</Data>
</Search>
```

6.1.19 NumberOfChanges

Restrictions: The element type MUST be specified by the server, but only if the client has indicated that it supports NumberOfChanges. It MAY be specified by the client. If synchronizations are carried out on more than one datastore (e.g. Contacts & Calendar), then <NumberOfChanges> MUST be specified for each datastore.

The <NumberOfChanges> element MUST only be specified in the <Sync> command.

Example:

```
<Sync>
 <CmdID>5</CmdID>
  <Target><LocURI>contacts</LocURI></Target>
  <Source><LocURI>C:\System\data\Contacts.cdb</LocURI></Source>
  <NumberOfChanges>20</NumberOfChanges>

  ...

</Sync>
```

6.1.20 Record

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example: The following is an example of a `Record` element used within a `Filter` element to define the characteristics of the subset of data to be synchronized.

1. The `Meta Type` value of "syncml:filtertype-cgi" indicates the grammar being used.
2. `The Item Data` element constrains the items synchronized to those that fall into the "business" or "personal" group (case insensitive) with the cgi expression "GROUP&iCON;business&OR; GROUP &iCON;personal".

```
<Filter>
        <Record>
          <Item>
            <Meta><Type>syncml:filtertype-cgi</Type></Meta>
            <Data>GROUP&iCON;business&OR;GROUP&iCON;personal</Data>
          </Item>
        </Record>
</Filter>
```

6.1.21 RespURI

Restrictions: CGI scripting can be used to convey "hints" to the recipient about when a response could be attempted. The script parameter "after" is used for this purpose. The value of the parameter is an UTC based, ISO 8601 basic format, complete representation for a date and time of day value (e.g., 20000502T224952Z for May 02, 2000 at 22 hours, 49 minutes and 52 seconds UTC) [ISO8601. Additional script parameter can be prefixed or appended to this OMA DS specific CGI script parameter. See Section 5.13.2.2.

Example: In the following example, a response URI is specified with the application specific CGI script parameter of user, which is prefixed to the OMA DS script parameter of `after`.

```
<SyncHdr>
  <VerDTD>1.2</VerDTD>
  <VerProto>SyncML/1.2</VerProto>
  <SessionID>1</SessionID>
  <MsgID>1</MsgID>
  <Target>
    <LocURI>IMEI:001004FF1234567</LocURI>
    <LocName>Bruce's Mobile Device</LocName>
  </Target>
  <Source>
    <LocURI>http://www.datasync.org/servlet/syncit/bruce1</LocURI>
  </Source>
  <RespURI>http://www.datasync.org/servlet/syncit/bruce1?user=jsmith&after
=20000512T133000Z</RespURI>
</SyncHdr>
```

6.1.22 SessionID

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<SyncML xmlns='SYNCML:SYNCML1.2'>
  <SyncHdr>
    <VerDTD>1.2</VerDTD>
    <VerProto>SyncML/1.2</VerProto>
    <SessionID>1</SessionID>
    <MsgID>3</MsgID>
    <Target>
      <LocURI>IMEI:001004FF1234567</LocURI>
    </Target>
    <Source>
      <LocURI>http://www.datasync.org/servlet/syncit/</LocURI>
    </Source>
  </SyncHdr>
  <SyncBody>
  ...blah, blah...
  </SyncBody>
</SyncML>
```

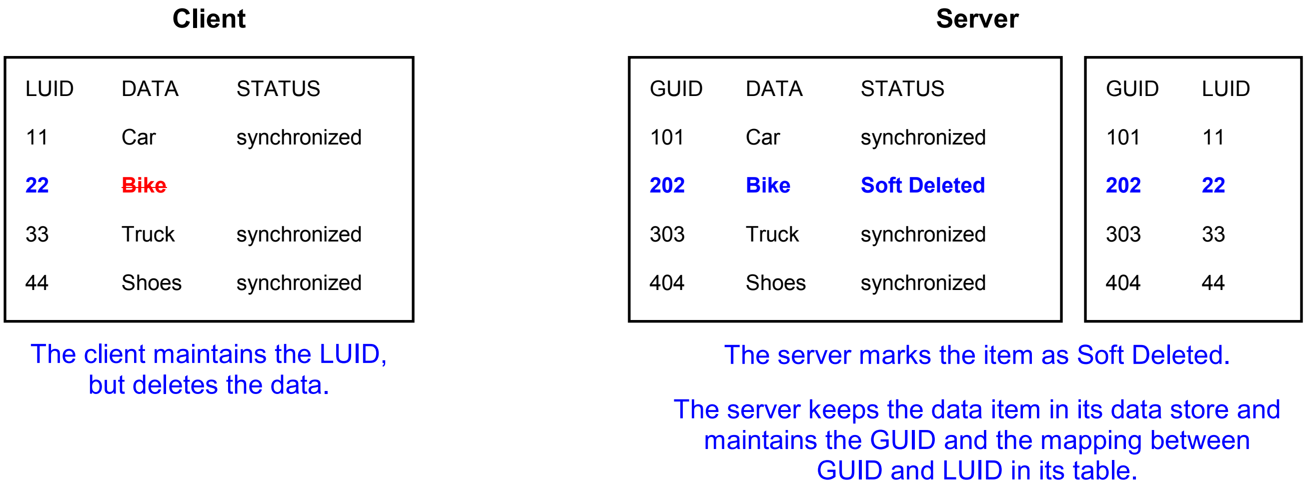
6.1.23 SftDel

Restrictions: The data item is deleted from the client data store but not from the set of synchronization data. The "Soft Delete" can be specified by an OMA DS server to free up storage resources in the OMA DS client prior to a synchronization operation. If not present, then the semantics of the Delete command are a "Hard Delete" of the data item. In addition, the OMA DS client can specify the "Soft Delete" to free up storage resources in the OMA DS client prior to a synchronization operation with the OMA DS server. Thus, the Soft Delete command is asymmetrical and depends on the side that sends the command. Nevertheless the deletion of the data always happens in the client's data store, whatever the side (client/server) which sends the command.

The OMA DS client MUST maintain the LUID (Local Unique Identifier) associated with the soft-deleted item so that server(s) can re-use the LUID if the item is modified by a server. The client can also use the LUID in order to retrieve a soft deleted item using an INCLUSIVE filtering by LUID request (see the example below in "Recovering a soft deleted item").

The OMA DS server MUST NOT delete the map items associated with the "Soft Deleted" items.

Example below: State of the data stores and the mapping table after the "Bike" item was Soft Deleted, either by the client, or by the server.



Client

LUID	DATA	STATUS
11	Car	synchronized
22	~~**Bike**~~	
33	Truck	synchronized
44	Shoes	synchronized

Server

GUID	DATA	STATUS
101	Car	synchronized
202	**Bike**	**Soft Deleted**
303	Truck	synchronized
404	Shoes	synchronized

GUID	LUID
101	11
202	**22**
303	33
404	44

The client maintains the LUID, but deletes the data.

The server marks the item as Soft Deleted.

The server keeps the data item in its data store and maintains the GUID and the mapping between GUID and LUID in its table.

Figure 3: State of the data stores and the mapping table after an item was Soft Deleted.

Recovering a soft deleted item:

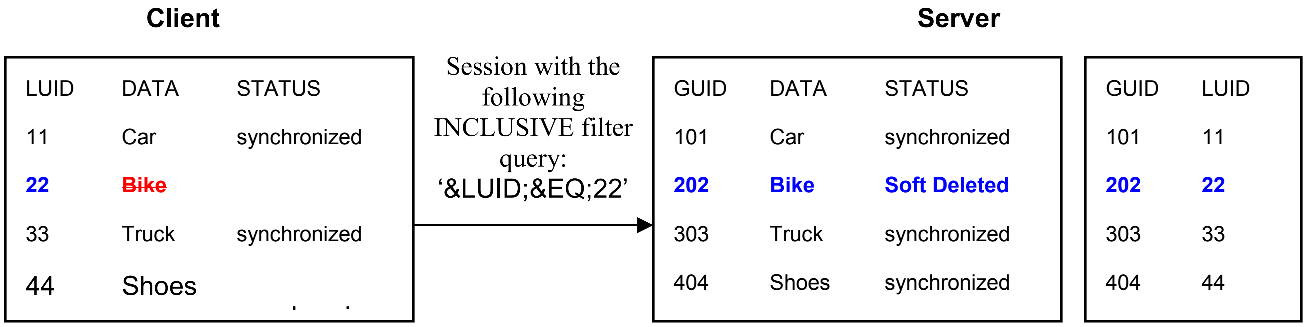
The duration of the Soft Delete and the way to recover a soft deleted item are not defined in the current release and are implementation-specific.

However, it is recommended to consider that, at least, a soft deleted item is sent back to the client:

- During a Slow Sync;
- When an INCLUSIVE filtering by LUID request including the soft deleted item is defined by the client (see the example below).

When a soft deleted item is sent back to the client, the server sends a Replace command to the client with the old maintained LUID.

Example below: Recovering the "Bike" item using an INCLUSIVE filter by LUID.



Client

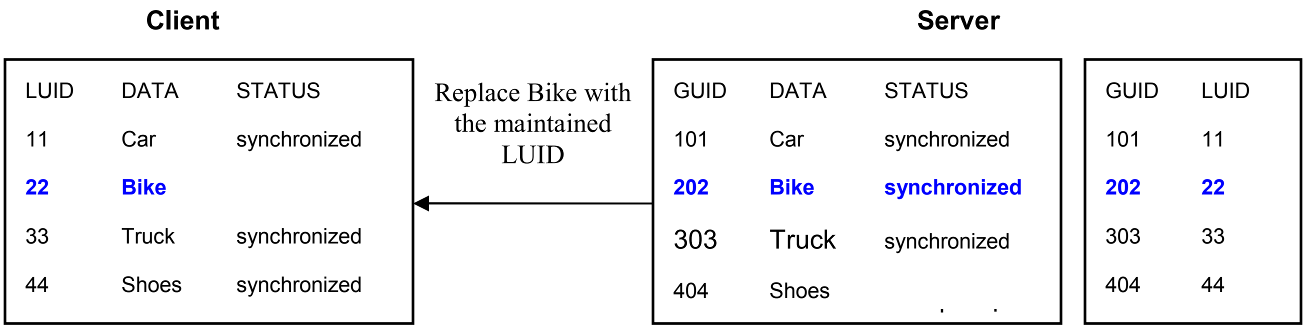
LUID	DATA	STATUS
11	Car	synchronized
22	~~**Bike**~~	
33	Truck	synchronized
44	Shoes	

Session with the following INCLUSIVE filter query: '&LUID;&EQ;22'

Server

GUID	DATA	STATUS
101	Car	synchronized
202	**Bike**	**Soft Deleted**
303	Truck	synchronized
404	Shoes	synchronized

GUID	LUID
101	11
202	**22**
303	33
404	44



LUID	DATA	STATUS
11	Car	synchronized
22	**Bike**	
33	Truck	synchronized
44	Shoes	synchronized

GUID	DATA	STATUS
101	Car	synchronized
202	**Bike**	**synchronized**
303	Truck	synchronized
404	Shoes	

GUID	LUID
101	11
202	**22**
303	33
404	44

Figure 4: Recovering example of only the soft deleted item using an INCLUSIVE filtering by LUID request.

If the OMA DS client does not support the "Soft Delete", then, a `(406) Optional feature not supported` MUST be returned in the Status command.

In a two-way synchronization, if the OMA DS client specifies a "Soft Delete" for an item that has already been "Hard Deleted" on the OMA DS server, then a (423) `Soft-delete conflict` MUST be returned in the Status command.

Example:

```
<Delete>
  <CmdID>3456</CmdID>
  <SftDel/>
  <Item>
    <Target><LocURI>./11</LocURI></Target>
  </Item>
</Delete>
```

6.1.24 Source

Restrictions: Section 4.11, "Target and Source Addressing" provides semantics on the content of the `Source` element type.

When specified in the `Map` element type, the `Source` element type specifies the routing information of the database that originated the map definition. When specified in the `MapItem` element type, the `Source` element type specifies the identifier of the client item.

When specified in the `Search` element type, the `Source` element type specifies the source routing information of the database that the `Search` command is to be executed against.

When specified in the `Sync` element type, the `Source` element type specifies the source routing information of the database originating the data synchronization request.

Example: The following is an example of the usage in a `SyncHdr` element type.

```
<SyncHdr>
  <VerDTD>1.2</VerDTD>
  <VerProto>SyncML/1.2</VerProto>
  <SessionID>1</SessionID>
  <MsgID>3</MsgID>
  <Target><LocURI>http://www.syncml.org/servlet/syncit/</LocURI></Target>
  <Source>
    <LocURI>IMEI:001004FF1234567</LocURI>
    <LocName>Bruce’s Mobile Device</LocName>
  </Source>
</SyncHdr>
```

The following is an example of the usage in an `Item` element type.

```
<Replace>
  <CmdID>4567</CmdID>
  <Item>
    <Target><LocURI>./bruce1/pnab</LocURI></Target>
    <Source><LocURI>./contacts</LocURI></Source>
    <Meta>
      <Type xmlns=’syncml:metinf’>text/directory profile=vCard</Type>
    </Meta>
    <Data>BEGIN:VCARD
VERSION:3.0
FN:Bruce Smith
N:Smith;Bruce
TEL;TYPE=WORK;VOICE;MSG:+1-919-555-9999
END:VCARD</Data>
  </Item>
</Replace>
```

The following is an example of the usage in a `Map` and `MapItem` element type.

```
<Map>
  <CmdID>3456</CmdID>
  <Target>
    <LocURI>http://www.datasync.org/servlet/syncit?USER=jsmith&db=Employee
_Table.db</LocURI>
  </Target>
  <Source><LocURI>./tables</LocURI></Source>
  <MapItem>
    <Target><LocURI>./0123456789ABCDEF</LocURI></Target>
    <Source><LocURI>./12</LocURI></Source>
  </MapItem>
</Map>
```

6.1.25 SourceParent

Restrictions:

`SourceParent` provides parent information of the child that is mentioned in the `Source LocURI` or `Target LocURI` of the sync commands such as `Move, Add and Replace`. `SourceParent` MUST be specified in `Add, Replace` or `Move`, if and only if the objects have hierarchical nature, i.e. have a parent and child relation. `SourceParent` has meaning only when synchronizing objects in a datastore with hierarchical structure.

In case the parent container is root then the value of the `SourceParent` MUST be indicated by ‘/’, without the quotes.

The semantics of the `SourceParent` element differs depending on who the sending side is:

- If client sends the SourceParent element then it represents the client side’s ID of an item.
- If server sends the SourceParent element then it represents a temporary ID (GUID) of the item that was previously sent by the server to the client and for which the Map was not yet received by the server.

In the case of moving a child on the server that was already synced with the client to a new parent, which hasn’t been synced, the server MUST use `SourceParent`. In such situations the new parent has to be added before the `Move` can be performed. This scenario is further illustrated by the example

Example:

```
<Add>
  <CmdID>12345</CmdID>
    <Item>
    <Source><LocURI>1002345/</LocURI></Source>
    <Data>
     ...
    </Data>
  </Item>
</Add>

<!-- Since this is an add from the server to the client, client will
assign an id on its own to the folder added by the server. The mapping of
the client’s id with server TempGUID ‘1002345’  MUST be maintained by the
client till the end of Package 4 -->

<Move>
  <CmdID>1234</CmdID>
  <Meta><Type xmlns='syncml:metinf'>text/plain</Type></Meta>
  <Item>
    <Target><LocURI>110</LocURI></Target>
    <SourceParent><LocURI>1002345</LocURI></SourceParent>
  </Item>
</Move>

<!-- Since server hasn’t received the mapping yet, server will use the
same TempGUID ‘1002345’ when addressing the NEW Parent folder in the
SourceParent of the Move Command -->
```

6.1.26 SourceRef

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<Status>
  <CmdID>4321</CmdID>
  <MsgRef>1</MsgRef>
  <CmdRef>1234</CmdRef>
  <Cmd>Add</Cmd>
  <TargetRef>./01234567890ABCDEF</TargetRef>
  <SourceRef>./12</SourceRef>
  <Data>200</Data>
</Status>
```

6.1.27 Target

Restrictions: Section 4.11, "Target and Source Addressing" provides semantics on the content of the `Target` element type.

When specified in the `Map` element type, the Target element type specifies the routing information of the database that is to maintain the map definition.

When specified in the MapItem element type, the Target element type specifies the identifier of the server item.

When specified in the Search element type, the Target element type specifies the target routing information where the search results are to be temporarily stored. In this case, the results will be specified as the source for a subsequent SyncML command.

When specified in the Sync element type, the Target element type specifies the source routing information of the database receiving the data synchronization request.

Example: The following is an example of the usage in a SyncHdr element type.

```
<SyncHdr>
  <VerDTD>1.2</VerDTD>
  <VerProto>SyncML/1.2</VerProto>
  <SessionID>1</SessionID>
  <MsgID>3</MsgID>
  <Target><LocURI>http://www.syncml.org/servlet/syncit/</LocURI></Target>
  <Source>
    <LocURI>IMEI:001004FF1234567</LocURI>
    <LocName>Bruce’s Mobile Device</LocName>
  </Source>
</SyncHdr>
```

The following is an example of the usage in an Item element type.

```
<Replace>
  <CmdID>2</CmdID>
  <Item>
    <Target><LocURI>./bruce1/pnab</LocURI></Target>
    <Source><LocURI>./contacts</LocURI></Source>
    <Meta>
      <Type xmlns=’syncml:metinf’>text/directory profile=vCard</Type>
    </Meta>
    <Data>BEGIN:VCARD
VERSION:3.0
FN:Bruce Smith
N:Smith;Bruce
TEL;TYPE=WORK;VOICE;MSG:+1-919-555-9999
END:VCARD</Data>
  </Item>
</Replace>
```

The following is an example of the usage in a Map and MapItem element type.

```
<Map>
  <CmdID>3456</CmdID>
  <Target>
    <LocURI>http://www.datasync.org/servlet/syncit?USER=jsmith&db=Employee
_Table.db</LocURI>
    </Target>
  <Source><LocURI>./tables</LocURI></Source>
  <MapItem>
    <Target><LocURI>./0123456789ABCDEF</LocURI></Target>
    <Source><LocURI>./12</LocURI></Source>
  </MapItem>
```

```
</Map>
```

6.1.28 TargetParent

Restrictions:

TargetParent provides parent information of the child that is mentioned in the Target LocURI or Source LocURI of the sync commands such as Add, Move and Replace. TargetParent MUST be specified in Add, Replace and Move, if and only if the objects have hierarchical nature, i.e. have a parent and child relation. Usage of TargetParent has no meaning if objects have a flat structure. TargetParent has meaning only when synchronizing objects with hierarchical structure.

In case the parent container is a root then the value of the TargetParent MUST be indicated by '/', without the quotes.

TargetParent element always represents a LUID, i.e. the ID of client that was previously sent by the client using Map operation. TargetParent MUST be used by servers only.

Example: the server requests the client to move the item having the LUID '110'.

```
<Move>
  <CmdID>1234</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Meta><Type xmlns='syncml:metinf'>text/plain</Type></Meta>
  <Item>
    <Target><LocURI>110</LocURI></Target>
    <TargetParent><LocURI>1234</LocURI></TargetParent>
  </Item>
</Move>
```

6.1.29 TargetRef

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<Status>
  <CmdID>4321</CmdID>
  <MsgRef>1</MsgRef>
  <CmdRef>1234</CmdRef>
  <Cmd>Add</Cmd>
  <TargetRef>./01234567890ABCDEF</TargetRef>
  <SourceRef>./12</SourceRef>
  <Data>200</Data>
</Status>
```

6.1.30 VerDTD

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<SyncHdr>
  <VerDTD>1.2</VerDTD>
  <VerProto>SyncML/1.2</VerProto>
  <SessionID>1</SessionID>
  <MsgID>1</MsgID>
  <Target>
    <LocURI>IMEI:001004FF1234567</LocURI>
    <LocName>Bruce's Mobile Phone</LocName>
  </Target>
  <Source>
    <LocURI>http://www.datasync.org/servlet/syncit/bruce1</LocURI>
  </Source>
</SyncHdr>
```

6.1.31 VerProto

Restrictions: Major revisions of the specification create incompatible changes that will require a new SyncML synchronization engine. Minor revisions involve changes that do not impact basic compatibility of the synchronization engine. When the SyncML workflow conforms to this revision of the OMA data synchronization protocol specification the value MUST be 1.2.

Example:

```
<SyncHdr>
  <VerDTD>1.2</VerDTD>
  <VerProto>SyncML/1.2</VerProto>
  <SessionID>1</SessionID>
  <MsgID>1</MsgID>
  <Target>
    <LocURI>IMEI:001004FF1234567</LocURI>
    <LocName>Bruce's Mobile Phone</LocName>
  </Target>
  <Source>
    <LocURI>http://www.datasync.org/servlet/syncit/bruce1</LocURI>
  </Source>
</SyncHdr>
```

6.2 Message Container Elements

The following element types provide the basic container support for the SyncML message.

The formal static conformance requirements for the SyncML data description elements are found in Appendix A.

The following table further elucidates the static conformance requirements for the SyncML data description elements for devices conforming to this specification.

Command	Support of Synchronization Server		Support of Synchronization Client	
	Sending	Receiving	Sending	Receiving
SyncML	MUST	MUST	MUST	MUST

SyncHdr	MUST	MUST	MUST	MUST
SyncBody	MUST	MUST	MUST	MUST

6.2.1 SyncML

Restrictions: Within transports that support MIME content-type identification, this object MUST be identified as `application/vnd.syncml+xml` (for clear-text, XML representation) or `application/vnd.syncml+wbxml` (for binary, WBXML representation).

Example:

```
<SyncML xmlns=’SYNCML:SYNCML1.2’>
  <SyncHdr>
    <VerDTD>1.2</VerDTD>
    <VerProto>SyncML/1.2</VerProto>
    <SessionID>1</SessionID>
    <MsgID>1</MsgID>
    <Target>
      <LocURI>http://www.datasync.org/servlet/syncit</LocURI>
    </Target>
    <Source>
      <LocURI>IMEI:001004FF1234567</LocURI>
    </Source>
  </SyncHdr>
  <SyncBody>
    ...blah, blah...
  </SyncBody>
</SyncML>
```

6.2.2 SyncHdr

Restrictions: If specified, the OPTIONAL `NoResp` element type indicates the recipient MUST NOT return any `Status` commands for any of the commands in the current SyncML message.

Example:

```
<SyncML xmlns=’SYNCML:SYNCML1.2’>
  <SyncHdr>
    <VerDTD>1.2</Version>
    <VerProto>SyncML/1.2</VerProto>
    <SessionID>1</SessionID>
    <MsgID>1</MsgID>
    <Target>
      <LocURI>http://www.datasync.org/servlet/syncit</LocURI>
    </Target>
    <Source>
      <LocURI>IMEI:001004FF1234567</LocURI>
    </Source>
  </SyncHdr>
  <SyncBody>
    ...blah, blah...
  </SyncBody>
```

```
</SyncML>
```

6.2.3 SyncBody

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<SyncML xmlns='SYNCML:SYNCML1.2'>
  <SyncHdr>
    <VerDTD>1.2</VerDTD>
    <VerProto>SyncML/1.2</VerProto>
    <SessionID>1</SessionID>
    <MsgID>1</MsgID>
    <Target><LocURI>IMEI:001004FF1234567</LocURI></Target>
    <Source>
      <LocURI>http://www.datasync.org/servlet/syncit</LocURI>
    </Source>
    <Cred>
      <Meta>
        <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
        <Format xmlns='syncml:metinf'>b64</Format>
      </Meta>
      <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
    </Cred>
  </SyncHdr>
  <SyncBody>
    <Get>
      <CmdID>1234</CmdID>
      <Item>
        <Target><LocURI>./devinf12</LocURI></Target>
      </Item>
    </Get>
  </SyncBody>
</SyncML>
```

6.3 Data Description Elements

The following element types are used as container elements for data exchanged in a SyncML Message.

The formal static conformance requirements for the SyncML data description elements are found in Appendix A.

The following table further elucidates the static conformance requirements for the SyncML data description elements for devices conforming to this specification.

Command	Support of Synchronization Server		Support of Synchronization Client	
	Sending	Receiving	Sending	Receiving
Data	MUST	MUST	MUST	MUST
Item	MUST	MUST	MUST	MUST

Meta	MUST	MUST	MUST	MUST

6.3.1 Data

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example: The following is an example of an Item with data that does not contain any mark-up.

```
<Item>
  <Data>John Smith, +1-919-555-1234</Data>
</Item>
```

The following is an example of an Item with data that does contain meta-information mark-up data.

```
<Meta>
  <Format xmlns=’syncml:metinf’>xml</Format>
  <Type xmlns=’syncml:metinf’>application/vnd.syncml-devinf+xml</Type>
</Meta>
<Item>
  <Data>
    <DevInf xmlns=’syncml:devinf’>
      <Man>IBM</Man>
      <Mod>WorkPad</Mod>
      <DevTyp>pda</DevTyp>
      <DevID>J. Smith</DevID>
      <FwV>PalmOSv3.0</FwV>
      <OEM>Palm, Inc.</OEM>
    </DevInf>
  </Data>
</Item>
```

6.3.2 Item

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<Add>
  <CmdID>1</CmdID>
  <Cred>
    <Meta>
      <Type xmlns=’syncml:metinf’>syncml:auth-md5</Type>
      <Format xmlns=’syncml:metinf’>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Source><LocURI>./15</LocURI></Source>
    <Meta>
      <Type xmlns='syncml:devinf'>text/directory profile=vCard</Type>
    </Meta>
    <Data>BEGIN:VCARD
VERSION:3.0
FN:Smith;Bruce
N:Bruce Smith
TEL;TYPE=WORK;VOICE:+1-919-555-1234
END:VCARD
    </Data>
  </Item>
</Add>
```

6.3.3 Meta

Restrictions:

When specified in the Map, then the scope of the meta-information includes all the contained MapItem element types.

When specified in the Search, the element type specifies the Meta information, e.g. the type of search grammar.

Example:

```
<Meta>
  <Format xmlns=’syncml:metinf’>xml</Format>
  <Type xmlns=’syncml:metinf’>application/vnd.syncml-devinf+xml</Type>
</Meta>
<Item>
  <Data>
    <DevInf xmlns=’syncml:devinf’>
      <Man>IBM</Man>
      <Mod>WorkPad</Mod>
      <DevTyp>pda</DevTyp>
      <DevID>J. Smith</DevID>
      <FwV>PalmOSv3.0</FwV>
      <OEM>Palm, Inc.</OEM>
    </DevInf>
  </Data>
</Item>
```

6.4 Protocol Management Elements

The formal static conformance requirements for the SyncML protocol management elements are found in Appendix A.

The following table further elucidates the static conformance requirements for the SyncML protocol management elements for devices conforming to this specification.

Command	Support of Synchronization Server		Support of Synchronization Client	
	Sending	Receiving	Sending	Receiving
Status	MUST	MUST	MUST	MUST

6.4.1 Status

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example:

```
<SyncBody>
  <Status>
    <CmdID>8765</CmdID>
    <MsgRef>1</MsgRef>
    <CmdRef>1234</CmdRef>
    <Cmd>Add</Cmd>
    <TargetRef>./bruce1</TargetRef>
    <SourceRef>IMEI:001004FF1234567</SourceRef>
    <Data>401</Data>
  </Status>
</SyncBody>
```

6.5 Protocol Command Elements

The formal static conformance requirements for the SyncML protocol command elements are found in Appendix A.

The following table further elucidates the static conformance requirements for the SyncML protocol command elements for devices conforming to this specification.

Command	Support of Synchronization Server		Support of Synchronization Client	
	Sending	Receiving	Sending	Receiving
Add	MUST	MUST	SHOULD	MUST
Alert	MUST	MUST	MUST	MUST
Atomic	MAY	MAY	MAY	MAY
Copy	MAY	MUST	MAY	MAY
Delete	MUST	MUST	MUST	MUST
Exec	MAY	SHOULD	MAY	MAY
Get*	MUST	MUST	SHOULD	MUST
Map	MAY	MUST	MUST	MAY
MapItem	MAY	MUST	MUST	MAY
Move	MAY	MAY	MAY	MAY
Put*	MUST	MUST	MUST	MUST
Replace	MUST	MUST	MUST	MUST

Result*	MUST	MUST	MUST	SHOULD
Search	MAY	MAY	MAY	MAY
Sequence	MAY	MUST	MAY	MAY
Status	MUST	MUST	MUST	MUST
Sync	MUST	MUST	MUST	MUST

*Minimum requirement for an OMA DS device is to support Put, Get, and Result when exchanging device information.

6.5.1 Add

Restrictions: The Add command is generally used to convey to the recipient any additions made to the originator’s database. For example, a mobile device will indicate to the network server any additions made to the local calendar database. This command MUST only be specified within a Sync command.

The originator of the command SHOULD only send features/properties of the data item that are supported by the recipient. The device information document of the recipient can contain this information.

The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL NoResp element type indicates that a response status code MUST NOT be returned for the command.

The OPTIONAL Cred element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the parent Sync element type. If not specified there, the default authentication credential is taken from the SyncHdr element type. If a Cred element type is not present in any of these other element types, then the command is specified without an authentication credential.

The OPTIONAL Meta element type specifies meta-information to be used for the command. For example, the common media type or format for all the items can be specified. The scope of the meta-information is limited to the command.

One or more Item element types MUST be specified. The Item element type specifies the data item added to the database. The Target and Source specified within the Item element type SHOULD be a relative URI, as relative to the corresponding Target and Source specified in the parent Atomic, Sequence or Sync command.

When synchronizing hierarchical objects, Add command Item element MUST include parent information. For this purpose SourceParent or TargetParent MUST be used by the sending device referring to an existing parent. Refer to each of the respective sections in this specification to learn more about when to use SourceParent and TargetParent.

Example: The client requests the server to add a new item to the root.

```
<Add>
  <CmdID>12345</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Source><LocURI>1002345/</LocURI></Source>
    <SourceParent><LocURI>/</LocURI></SourceParent>
    <Data>
      ...
    <Data>
  </Item>
</Add>
```

The recipient MAY assign new local identifiers for the data items specified in this command. However, in such cases the recipient MUST also notify the originator of the item identifier correlation by returning a `Map` command.

If the command completed successfully, then the (`201`) `Item added` exception condition is created by the command.

If the recipient determines that the data item already exists on the recipient's database, then the (`418`) `Already exists` exception condition is created by the command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (`401`) `Unauthorized` exception condition is created by the command. If no authentication credentials were specified, then (`407`) `Authentication required` exception condition is created by the command. A suitable challenge can also be returned.

Non-specific errors created by the recipient while attempting to complete the command create the (`500`) `Command failed` exception condition.

If there is insufficient space on the recipient database for the data item, then the (`420) Device full` exception condition is created by the command.

If the media type or format for the data item is not supported by the recipient, then the (`415`) `Unsupported media type or format` exception condition is created by the command.

Example:

```
<Add>
  <CmdID>12345</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Meta>
    <Format xmlns='syncml:metinf'>chr</Format>
    <Type xmlns='syncml:metinf'>text/x-vcard</Type>
  </Meta>
  <Item>
    <Source><LocURI>./2</LocURI></Source>
    <Data>BEGIN:VCARD
VERSION:2.1
FN:Bruce Smith
N:Smith;Bruce
TEL;WORK;VOICE:+1-919-555-1234
TEL;WORK;FAX:+1-919-676-9876
```

```
EMAIL;INTERNET:bruce1@host.com
END:VCARD
    </Data>
  </Item>
</Add>
```

6.5.2 Alert

Restrictions: The Alert command is specifically used to convey notifications, such as data synchronization requests, to the recipient. For example, a mobile device will use this command to initiate a "client-initiated, two-way synchronization" with a network server.

The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL NoResp element type indicates that a response status code MUST NOT be returned for the command.

The OPTIONAL Cred element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the SyncHdr element type. If a Cred element type is not present in any of these other element types, then the command is specified without an authentication credential.

The OPTIONAL Data element type specifies the type of alert.

Optionally, one or more Item element types MUST be specified. The Item element type specifies parameters for the Alert command. The Target and Source specified within the Item element type MUST be an absolute URI.

If the command and the associated Alert action are completed successfully, then the (200) OK exception condition is created by the command.

If the command was accepted successfully, but the Alert action has not yet been executed successfully, then the (202) Accepted for processing exception condition is created by the command. A subsequent exception condition can be created to relate the eventual completion status of the associated Alert action.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (401) Unauthorized exception condition is created by the command. If no authentication credentials were specified, then (407) Authentication required exception condition is created by the command. A suitable challenge can also be returned.

If the data synchronization protocol does not allow the Alert command to be specified within the current SyncML package (i.e., the Alert was issued in an incorrect protocol sequence), then the command creates the (405) Command not allowed exception condition.

If the specified Alert command is not supported by the recipient, the (406) Optional feature not supported exception condition is created by the command.

Non-specific errors created by the recipient while attempting to complete the command create the (500) Command failed exception condition.

If the Alert command didn't include all the correct parameters in the Item element type, then the (412) Incomplete command exception condition is created by the command.

If the media type or format for the data item is not supported by the recipient, then the (415) Unsupported media type or format exception condition is created by the command.

Example: The following example is an Alert type 100 that displays a message on the recipient's console or display.

```
<Alert>
  <CmdID>3456</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Data>100</Data>
  <Item>
    <Data>You have new mail!</Data>
  </Item>
</Alert>
```

The following example is for a hypothetical Alert type 299 that notifies the recipient of new mail items.

```
<Alert>
  <CmdID>5678</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Data>299</Data>
  <Item>
    <Data><Source><LocURI>mid:msg1@host.com</LocURI></Source></Data>
  </Item>
  <Item>
    <Data><Source><LocURI>mid:msg2@host.com</LocURI></Source></Data>
  </Item>
  <Item>
    <Data><Source><LocURI>mid:msg3@host.com</LocURI></Source></Data>
  </Item>
</Alert>
```

6.5.3 Atomic

Restrictions: The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL NoResp element type indicates that a response status code MUST NOT be returned for the command.

The OPTIONAL Meta element type specifies meta-information to be used for the command. For example, the common media type or format for all the items can be specified. The scope of the meta-information is limited to the command.

The remainder of the command consists of one or more Add, Delete, Copy, Atomic, Map, Replace, Sequence or Sync SyncML commands that are the scope of the Atomic functionality.

If the command and the associated individual commands are completed successfully, then the (200) OK exception condition is created by the command.

If an error occurs while performing an individual command specified in an Atomic element type, then the (507) Atomic failed exception condition is created by the command. The error status code indicates the failure of the complete Atomic command. Separate, individual error status code can also be created that identify specific errors that created the failure.

Nested Atomic commands are not legal. A nested Atomic command will generate an error (500) - command failed.

If a client can execute all the atomic commands together (and thus guarantee the result) then a client MAY split the responses up over multiple messages. If a client cannot execute all the atomic commands together (and thus cannot guarantee the results of commands not executed) and status responses would go into multiple messages, then the Atomic command MUST fail with status code (517)Atomic response too large to fit in message. Previously executed commands in Atomic command MUST be rolled back.

Example:

```
<Atomic>
  <CmdID>1234</CmdID>
  <Add>
    <CmdID>1235</CmdID
    <Cred>
      <Meta>
        <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
        <Format xmlns='syncml:metinf'>b64</Format>
      </Meta>
      <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
    </Cred>
    <Item>
      <Target><LocURI>./devinf10/pen</LocURI></Target>
      <Data>Yes</Data>
    </Item>
  </Add>
  <Replace>
    <CmdID>12346</CmdID>
    <Cred>
      <Meta>
        <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
        <Format xmlns='syncml:metinf'>b64</Format>
      </Meta>
      <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
    </Cred>
    <Item>
      <Target><LocURI>./devinf10/version</LocURI></Target>
      <Data>20000401T133000Z</Data>
    </Item>
  </Replace>
</Atomic>
```

6.5.4 Copy

Restrictions: It is implementation dependent whether a physical copy of the item is made in the recipient, or whether a shortcut or pointer is created to the source item in the target location.

The Copy command in this version of the specification is NOT intended to be used to attempt to change the media type of a data item, compress the data item or otherwise transform a target data item.

The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL `NoResp` element type indicates that a response status code MUST NOT be returned for the command.

The OPTIONAL `Cred` element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the parent `Sync` element type. If not specified there, the default authentication credential is taken from the `SyncHdr` element type. If a `Cred` element type is not present in any of these other element types, then the command is specified without an authentication credential.

The OPTIONAL `Meta` element type specifies meta-information to be used for the command. For example, the common media type or format for all the items can be specified. The scope of the meta-information is limited to the command.

One or more `Item` element types MUST be specified. The `Item` element type specifies the data item to be copied on the recipient's database. If specified within a `Sync` element type, the `Target` and `Source` specified within the `Item` element type in the `Copy` command SHOULD be a relative URI, as relative to the corresponding `Target` and `Source` specified in the parent `Sync` command. If specified within a `Sequence` or `SyncBody` element type, the `Target` and `Source` specified within the `Item` element type in the `Copy` command SHOULD be an absolute URI.

The recipient MAY assign new local identifiers for the data items specified in this command. However, in such cases the recipient MUST also notify the originator of the item identifier correlation by returning a `Map` command.

If the command completed successfully, then the (`201`) `Item added` exception condition is created by the command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (`401`) `Unauthorized` exception condition is created by the command. If no authentication credentials were specified, then (`407`) `Authentication required` exception condition is created by the command. A suitable challenge can also be returned.

If the target data item already exists in the recipient database, then the (`418`) `Already exists` exception condition is created by the command.

If there is insufficient space in the recipient database for the data item, then the (`420) Device full` exception condition is created by the command.

Non-specific errors created by the recipient while attempting to complete the command create the (`500`) `Command failed` exception condition.

If an error occurs while the recipient copying the data item within the recipient's data base, then the (`510`) `Data store failure` exception condition is created by the command.

Example:

```
<Copy>
  <CmdID>12345</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Target><LocURI>mid:msg1@host.com</LocURI></Target>
    <Source><LocURI>./mail/bruce1/folders/Project%20XYZ</LocURI></Source>
  </Item>
  <Item>
```

```
    <Target><LocURI>mid:msg2@host.com</LocURI></Target>
    <Source><LocURI>./mail/bruce1/folders/Admin</LocURI></Source>
  </Item>
</Copy>
```

6.5.5 Delete

Restrictions: The Delete command is generally used to permanently erase data items from the recipient's database. However, the command can also be used to temporarily remove data items from the recipient's database in order to create room for a subsequent Add command. This is termed a "soft delete".

Implementations that support both a preliminary, "Mark for Deletion" and a physical "Delete" capabilities, MUST use this command for the latter, "Delete" capability. The preliminary "Mark for Deletion" MUST be specified using the Mark meta-information in a Replace command.

The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL NoResp element type indicates that a response status code MUST NOT be returned for the command.

If specified and supported, the OPTIONAL Archive element type indicates that the recipient MUST preserve a copy of the data prior to deleting it from the database.

If the recipient implementation doesn't support archiving of data (i.e., doesn't support the Archive feature), then the command will create the (210) Delete without archive exception condition. However, under this condition, the data has been successfully deleted from the recipient database.

The OPTIONAL Cred element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the parent Sync element type. If not specified there, the default authentication credential is taken from the SyncHdr element type. If a Cred element type is not present in any of these other element types, then the command is specified without an authentication credential.

The OPTIONAL Meta element type specifies meta-information to be used for the command. For example, the common media type or format for all the items can be specified. The scope of the meta-information is limited to the command.

One or more Item element types MUST be specified. The Item element type specifies the data item deleted from the database. The Target and Source specified within the Item element type SHOULD be a relative URI, as relative to the corresponding Target and Source specified in the parent Atomic, Sequence or Sync command.

In applications (e.g., email) where the "delete" concept involves "moving" a data item from one folder to a special "Deleted" folder, this is achieved in OMA DS by the sequence of two SyncML functions; one, the Add of the specified data item to the "Deleted" folder and two, the subsequent Delete of the corresponding item from the original folder.

The recipient of a Delete command can delete any subset of the specified data elements. However, if all of the requested data was not deleted, then the (206) Partial content exception condition is created by the command. If a Status command is returned for this exception condition, then the identifiers of the data items not deleted SHOULD be returned also.

If the recipient determines that the data item doesn't exists on the recipient's database, then the (211) Item not deleted exception condition is created by the command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (401) Unauthorized exception condition is created by the command. If no authentication credentials were specified, then

(407) Authentication required exception condition is created by the command. A suitable challenge can also be returned.

In synchronization protocol cases where the client sends a Map command to the server, the server MUST always specify the client identifier for any data items to be deleted. Otherwise, the (412) Incomplete command exception condition is created and no data items will be deleted by the client.

When synchronizing hierarchical objects, Move or Delete command MUST be issued for all children before issuing a Delete for the parent. In case a Delete is received for the parent containing child items, an exception status code 427 “Item not empty”, MAY be returned.

Example:

```
<Delete>
  <CmdID>12345</CmdID>
  <Cred>
    <Meta>
      <Type xmlns=’syncml:metinf’>syncml:auth-md5</Type>
      <Format xmlns=’syncml:metinf’>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Source><LocURI>1002345/</LocURI></Source>
  </Item>
</Delete>
```

Non-specific errors created by the recipient while attempting to complete the command create the (500) Command failed exception condition.

Example:

The following is an example to delete a data item but archive it first.

```
<Delete>
  <CmdID>12345</CmdID>
  <Archive/>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Source><LocURI>./4</LocURI></Source>
  </Item>
</Delete>
```

The following is an example to "soft delete" a number of data items to allow room on the device for a subsequent Add or Copy command, not specified in this example.

```
<Delete>
  <CmdID>12345</CmdID>
  <SftDel/>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Target><LocURI>./5</LocURI></Target>
  </Item>
  <Item>
    <Target><LocURI>./10</LocURI></Target>
  </Item>
  <Item>
    <Target><LocURI>./8</LocURI></Target>
  </Item>
</Delete>
```

6.5.6 Exec

Restrictions: The Exec command is used to perform remote procedure calls on a remote network device. This command permits a mobile device to invoke network applications that can create updates to databases that the mobile device wishes to synchronization with. Likewise, the command can be used by network servers to invoke local mobile device applications.

Both implementers and users SHOULD take appropriate steps to avoid security threats introduced by a remote procedure call mechanism, such as the Exec command, in data synchronization products.

The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL NoResp element type indicates that a response status code MUST NOT be returned for the command.

The OPTIONAL Cred element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the SyncHdr element type. If a Cred element type is not present in this other element type, then the command is specified without an authentication credential.

One Item element type MUST be specified. The Item element type specifies the target address and parameters for the remote procedure call. The Target specified within the Item element type MUST be an absolute URI.

If the command completed successfully, then the (200) OK exception condition is created by the command.

If the recipient successfully accepts the command and has invoked the remote procedure call but the remote procedure has not yet successfully completed, then the (202) Accepted for processing exception condition is created by the command.

If an entity other than the remote procedure returns request status codes to the originator, then the (203) Non-authoritative response exception condition is created by the command. For example, an ERP or workflow procedure call can result in a subsystem daemon or process returning responses to the originator.

If the targeted remote procedure has been permanently relocated, then the (301) Moved permanently exception condition is created by the command.

If the targeted remote procedure has been temporarily moved, then the (302) Found exception condition is created by the command.

If the syntax of the Exec command was not specified correctly, then the (400) Bad request exception condition is created by the command.

If the originator doesn't have sufficient rights to issue an Exec command on the recipient, then the (403) Forbidden exception condition is created by the command. For this exception condition, there does not exist any authentication credential for the originator with sufficient rights. The exception condition (404) Not found can alternately be specified when the recipient doesn't want to make public why the request was denied.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (401) Unauthorized exception condition is created by the command. If no authentication credentials were specified, then (407) Authentication required exception condition is created by the command. A suitable challenge can also be returned.

If the Exec command is not allowed to be invoked on the recipient, then the (403) Forbidden exception condition is created by the command.

If the specified Exec command cannot be found on the recipient, then the (404) Not found exception condition is created by the command.

If the specified remote procedure call no longer exists on the recipient, then the (410) Gone exception condition is created by the command.

If the media type or format for the remote procedure call specified in the Item is not supported by the recipient, then the (415) Unsupported media type or format exception condition is created by the command.

If the specified remote procedure is currently busy and a retry later is possible, then the (417) Retry later exception condition is created by the command. The date/time after which the originator could retry the command SHOULD also be returned.

Non-specific errors created by the recipient while attempting to complete the command create the (500) Command failed exception condition.

If there is any error in the remote execution of the command, then the (506) Processing error exception condition is created by the command.

Example: The following is an example of a hypothetical employee-change-request process being invoked by the Exec command.

```
<Exec>
  <CmdID>1234</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Target>
      <LocURI>http://www.datasync.org/cgi?proc=ecrproc.exe</LocURI>
    </Target>
    <Data><ec:ecr xmlns:ec='abccorp:ecapp'>
<ec:ecrcmd>PROMOTION</ec:ecrcmd>
<ec:oldbnd>10</ec:oldbnd><ec:newbnd>D</ec:newbnd>
<ec:name>Bruce Smith</ec:name>
<ec:enum>L01234</ec:enum><ec:dop>20000523</ec:dop></ec:ecr></Data>
```

```
  </Item>
</Exec>
```

6.5.7 Get

Restrictions: There is no synchronization state information for data retrieved using the `Get` command and data items retrieved using `Get` commands are not considered part of the set of synchronized items for the purpose of future synchronizations. This command MUST NOT be specified within a `Sync` command.

Data returned from a `Get` command is returned in a `Results` element type in a subsequent SyncML message.

The mandatory `CmdID` element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL `NoResp` element type indicates that a response status code MUST NOT be returned for the command.

If specified, the OPTIONAL `Lang` element type specifies the language desired for any returned results.

The OPTIONAL `Cred` element type specifies the authentication credential to be used for the command. If no present, the default authentication credential is taken from the `SyncHdr` element type. If a `Cred` element type is not present in this other element type, then the command is specified without an authentication credential.

The OPTIONAL `Meta` element type specifies meta-information to be used for the command. For example, the common media type or format for all the items can be specified. The scope of the meta-information is limited to the command.

One or more `Item` element types MUST be specified. The `Item` element type specifies the data items to be returned from the recipient. The `Target` and `Source` specified within the `Item` element type SHOULD be an absolute URI.

If the command completed successfully, then the (`200`) `OK` exception condition is created by the command.

If the command completed successfully but there is no content to return, then the (`204`) `No content` exception condition is created by the command.

If the command completed successfully but only a portion of the content is being returned, with the remainder being returned in subsequent `Results` commands, then the (`206`) `Partial content` exception condition is created by the command.

If the command specifies an ambiguous target with multiple matches, then the (`300`) `Multiple choices` exception condition is created by the command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (`401`) `Unauthorized` exception condition is created by the command. If no authentication credentials were specified, then (`407`) `Authentication required` exception condition is created by the command. A suitable challenge can also be returned.

If the specified data item doesn't exist on the recipient, then the (`404`) `Not` found exception condition is created by the command.

If the requested data item is too large to be transferred at this time, then the (`413`) `Request entity too` large exception condition is created by the command.

Non-specific errors created by the recipient while attempting to complete the command create the (`500`) `Command failed` exception condition.

If the media type or format for the data item is not supported by the recipient, then the (415) Unsupported media type or format exception condition is created by the command.

Example1 illustrates how multiple items can be retrieved using the Get command. The data retrieved in response to this command is illustrated in Example 1 of the Results command.

Example1:

```
<Get>
  <CmdID>12345</CmdID>
   <Lang>en-US</Lang>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Target><LocURI>./telecom/pb</LocURI></Target>
    <Source><LocURI>http://www.datasync.com/servlet/</LocURI></Source>
    <Meta>
      <Type xmlns='syncml:metinf'>text/x-vCard</Type>
    </Meta>
  </Item>
</Get>
```

Example 2 illustrates how multiple email data items which have already been synchronized, and have been assigned LUIDs, can be retrieved using the Get command. This example is specific to the email datatype. This case is useful for retrieving an entire data item when only a portion of it has been received due to synchronization filters (eg. only email headers were synced, and the entire email will be retrieved with the Get command). The syntax used for this case is illustrated in the first <item> where only the LUID is specified.

The second <item> illustrates how a specific attachment can be retrieved with the Get command by appending the Content-ID to the LUID. The Content-ID represents the attachment on the partial document which was previously synced. Examples of the use of the Content-ID to synchronize an email object are described in OMA-TS-DS_DataObjEmail-V1_2-20060710-A. The Content-ID itself is defined in RFC2046. The Results of both of these commands are shown in the Results command examples.

Implementors Note: Note that there are currently in the 1.2 specifications no restrictions on valid characters within datastore names or LUIDs. Implementations that choose to support retrieval of individual items or portions of items need to be able to uniquely identify what to retrieve.

Example 2:

```
<Get>
  <CmdId>7</CmdId>
  <Meta>
      <Type xmlns='syncml:metinf'>message/rfc822</Type>
  </Meta>
  <Item>
    <Target><LocURI>mailstore.cdb/2345</LocURI></Target>
  </Item>
  <Item>
    <Target><LocURI>mailstore.cdb/6723/00054736@idtserver.rtp.ibm.com
</LocURI></Target>
  </Item>
</Get>
```

6.5.8 Map

Restrictions: The Map command specifies additions and deletions to the recipient's item identifier map table. Map tables are used to correlate small resolution item identifiers with larger resolution item identifiers. For example, if a mobile device has 2-byte item identifiers and a network server has 16-byte item identifiers, a map table is necessary to correlate an equivalent 2-byte and 16-byte identifier. Generally, map tables are maintained by the data synchronization engine on the network server. Item identifier map tables are not necessary when the originator and the recipient databases are exact replicas of each other (i.e., the databases have the same physical schema).

If an item identifier map table is needed, it is the responsibility of the recipient maintaining the map table to perform item identifier translations when communicating synchronization commands with the mobile device necessitating the map table.

The Map command MUST be atomic, in nature. This means that the recipient MUST process either the entire list of mappings supplied, or none of them. If the operation fails, the recipient MUST specify an error status code in the requested response.

The Map command is idempotent, which means that if the recipient applies the same Map command more than once, the result MUST be the same as applying the Map command only once.

The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

The Target and Source element types MUST be specified. The Target element type specifies the target address for the map table on the recipient. The Source element type specifies the source address for the map table on the originator.

The OPTIONAL Cred element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the SyncHdr element type. If a Cred element type is not present in any of these other element types, then the command is specified without an authentication credential.

The OPTIONAL Meta element type specifies meta-information defining the type of Map command.

One or more MapItem element types MUST be specified. The MapItem element type specifies an individual item identifier mapping.

There MUST only be a single exception condition associated with each Map command.

If the command completed successfully, then the (200) OK exception condition is created by the command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (401) Unauthorized exception condition is created by the command. If no authentication credentials were specified, then (407) Authentication required exception condition is created by the command. A suitable challenge can also be returned.

If there is insufficient space on the recipient for the map table items, then the (420) Device full exception condition is created by the command.

If the recipient encounters a data store failure while processing the command, then the (510) Data store failure exception condition is created by the command.

Non-specific errors created by the recipient while attempting to complete the command create the (500) Command failed exception condition.

Example: The following is an example of a Map command for creating three item identifier mappings.

```
<Map>
  <CmdID>1234</CmdID>
  <Target><LocURI>http://www.datasync.org/servlet/syncit</LocURI></Target>
  <Source><LocURI>IMEI:001004FF1234567</LocURI></Source>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <MapItem>
    <Target><LocURI>./0123456789ABCDEF</LocURI></Target>
    <Source><LocURI>./01</LocURI></Source>
  </MapItem>
  <MapItem>
    <Target><LocURI>./0123456789ABCDF0</LocURI></Target>
    <Source><LocURI>./02</LocURI></Source>
  </MapItem>
  <MapItem>
    <Target><LocURI>./0123456789ABCDF1</LocURI></Target>
    <Source><LocURI>./03</LocURI></Source>
  </MapItem>
</Map>
```

6.5.9 MapItem

Restrictions: The Source element type specifies the relative URI for the source item identifier.

The Target element type specifies the relative URI for the target item identifier.

Example:

```
<MapItem>
  <Target><LocURI>./0123456789ABCDEF</LocURI></Target>
  <Source><LocURI>./01</LocURI></Source>
</MapItem>
```

6.5.10 Move

Move command allows moving items (ex: files, folder, emails, vcards) from current location to a new location. This command MUST only be specified within a Sync command.

The mandatory CmdID element type specifies the SyncML message-unique identifier for the command

If specified, the OPTIONAL `NoResp` element type indicates that a response status code MUST NOT be returned for the command.

The OPTIONAL `Cred` element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the parent `Sync` element type. If not specified there, the default authentication credential is taken from the `SyncHdr` element type. If a `Cred` element type is not present in any of these other element types, then the command is specified without an authentication credential.

The OPTIONAL Meta element type specifies meta-information to be used for the command. For example, the common media type or format for all the items can be specified. The scope of the meta-information is limited to the command.

`Move` command MUST include parent information, either `SourceParent` or `TargetParent` element within `Item`. The usage of `SourceParent` and `TargetParent` within `Move` command depends on who is requesting the `Move` operation, client or server. Refer to each of the respective sections in this specification to learn more about when to use SourceParent and TargetParent.

One or more `Item` element types MUST be specified. Even if `Data` is specified in `Item` , it will be ignored by the recipient. Thus, `Move` is strictly used for moving items and thus in situations where items could get modified and moved, `Move` MUST NOT be used. The `Target` and `Source` specified within the `Item` element type SHOULD be a relative URI, as relative to the corresponding `Target` and `Source` specified in the parent `Atomic`, `Sequence` or `Sync` command.

If the command completed successfully, then the (`200`) `Item` moved exception condition is created by the command.

If the recipient determines that the data item couldn't be moved on recipient's database, then the (428) `Move Failed` exception condition is created by the command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (`401`) `Unauthorized` exception condition is created by the command. If no authentication credentials were specified, then (`407`) `Authentication required` exception condition is created by the command. A suitable challenge can also be returned.

Non-specific errors created by the recipient while attempting to complete the command create the (`500`) `Command failed` exception condition.

Example: The following is an example of a `Move` command sent by the server. The server requests the client to move the item which has the LUID '110'.

```
<Move>
  <CmdID>1234</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Meta><Type xmlns='syncml:metinf'>text/plain</Type></Meta>
  <Item>
    <Target><LocURI>110</LocURI></Target>
    <TargetParent><LocURI>1234</LocURI></TargetParent>
  </Item>
</Move>
```

Example: The item '111' has been moved from the folder '1212' to the folder '1313' in the client's datastore and both parents (i.e. folders) have earlier been synchronized with the server. The client creates the following Move command:

```
<Move>
  <CmdID>2</CmdID>
  <Meta><Type xmlns='syncml:metinf'>application/vnd.omads-
file</Type></Meta>
  <Item>
    <Source><LocURI>111</LocURI></Source>
    <SourceParent><LocURI>1313</LocURI></SourceParent>
  </Item>
</Move>
```

6.5.11 Put

Restrictions: There is no synchronization state information for data transferred using the `Put` command. This command MUST NOT be specified within a `Sync` command.

The mandatory `CmdID` element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL `NoResp` element type indicates that a response status code MUST NOT be returned for the command.

If specified, the OPTIONAL `Lang` element type specifies the language desired for any returned results.

The OPTIONAL `Cred` element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the `SyncHdr` element type. If a `Cred` element type is not present in this other element type, then the command is specified without an authentication credential.

The OPTIONAL `Meta` element type specifies meta-information to be used for the command. For example, the common media type or format for all the items can be specified. The scope of the meta-information is limited to the command.

One or more `Item` element types MUST be specified. The `Item` element type specifies the data items to be transferred to the recipient. The `Target` and `Source` specified within the `Item` element type SHOULD be an absolute URI.

If the command completed successfully, then the (`200`) `OK` exception condition is created by the command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (`401`) `Unauthorized` exception condition is created by the command. If no authentication credentials were specified, then (`407`) `Authentication required` exception condition is created by the command. A suitable challenge can also be returned.

If the Put command did not include the size of the data item to be transferred (i.e., in the Meta element type), then the (411) Size required exception condition is created by the command.

If the data item to be transferred is too large (e.g., there are restrictions on the size of data items transferred to the recipient), then the (413) Request entity too large exception condition is created by the command.

If the Size specified in the Meta element type was too large for the recipient (e.g., the recipient does not have sufficient input buffer for the data), then the (416) Requested size too big exception condition is created by the command.

If the media type or format for the data item is not supported by the recipient, then the (415) Unsupported media type or format exception condition is created by the command.

If the recipient device storage is full, then the (420) Device full exception condition is created by the command.

Non-specific errors created by the recipient while attempting to complete the command create the (500) Command failed exception condition.

Example: The following is an example of a Put command used to exchange device information.

```
<Put>
  <CmdID>12345</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>

  <Meta><Type xmlns='syncml:metinf'>application/vnd.syncml-

devinf+xml</Type></Meta>
  <Item>
        <Source><LocURI>./devinf12 </LocURI></Source>
        <Data>
      <DevInf xmlns='syncml:devinf'>
        <Man>UltraLite Mobile, Ltd.</Man>
        <FwV>3.0</FwV>
        <FwD>19981015</FwD>

        <DevID>001004FF1234567</DevID>
        <Mem>
          <TotalMaxMem>1046529</TotalMaxMem>
          <TotalMaxID>1024</TotalMaxID>
        </Mem>
      </DevInf>
    </Data>
  </Item>

</Put>
```

6.5.12 Replace

Restrictions: The Replace command is used to replace data on the recipient. This command MUST only be specified within a Sync command. The Replace may be partial (field-level Replace) or full. If the specified data item does not exist, then the command MUST be interpreted as an Add command.

The originator of the command SHOULD only send features/properties of the data item that are supported by the recipient. The device information document of the recipient can contain this information.

The mandatory `CmdID` element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL `NoResp` element type indicates that a response status code MUST NOT be returned for the command.

The OPTIONAL `Cred` element type specifies the authentication credential to be used for the command. If no present, the default authentication credential is taken from the parent `Sync` element type. If not specified there, the default authentication credential is taken from the `SyncHdr` element type. If a `Cred` element type is not present in any of these other element types, then the command is specified without an authentication credential.

The OPTIONAL `Meta` element type specifies meta-information to be used for the command. For example, the common media type or format for all the items can be specified. If the Replace is partial, then the FieldLevel `Meta`tag MUST be used. The sender MAY include unchanged fields of the item inside <Data> element if the <FieldLevel> element is included in the<Meta> element. The receiver MUST NOT remove any fields of the item in the database that are not present in <Data> element content if the <FieldLevel> element is included in <Meta> element. If the <FieldLevel> is included in <Meta>, the partial item inside the <Data> MUST still satisfy the validity rules defined for the content type specified in <Type> element The scope of the meta-information is limited to the command.

Example:

```
<Replace>
   <CmdID>3</CmdID>
   <Meta>
      <FieldLevel xmlns="syncml:metinf"/>
      <Type xmlns="syncml:metinf">x-type/x-subtype</Type>
   </Meta>
   <Item>
      <Target>
         <LocURI>244</LocURI>
      </Target>
      <Data>
...
      </Data>
   </Item>
</Replace>
```

One or more `Item` element types MUST be specified. The `Item` element type specifies the data item replaced in the database. The `Target` and `Source` specified within the `Item` element type SHOULD be a relative URI, as relative to the corresponding `Target` and `Source` specified in the parent `Atomic`, `Sequence` or `Sync` command.

When synchronizing hierarchical objects, the Replace command MUST include parent information. For this purpose SourceParent or TargetParent MUST be used by sending device referring to an existing parent.. Refer to each of the respective sections in this specification to learn more about when to use SourceParent and TargetParent.

In the case where an item has been modified and moved, Replace MUST be used instead of Move.

If Replace command is used by client for add operation, then client MUST add parent first before adding all children of that parent. For example, if an item B has a parent A, then before adding item B, parent A MUST be added by the client.

Example:

```
<Replace>
  <CmdID>12345</CmdID>
  <Cred>
    <Meta>
      <Type xmlns=’syncml:metinf’>syncml:auth-md5</Type>
      <Format xmlns=’syncml:metinf’>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Item>
    <Source><LocURI>1002345/</LocURI></Source>
    <SourceParent><LocURI>/</LocURI></SourceParent>
    <Data>
     ...
    <Data>
  </Item>
</Replace>
```

The recipient MAY assign new local identifiers for the data items specified in this command. However, in such cases the recipient MUST also notify the originator of the item identifier correlation by returning a `Map` command.

If the command completed successfully, then the (`200`) `OK` exception condition is created by the command. However, if the command was interpreted as an `Add` command and the command completed successfully, then the (`201`) `Item` added exception condition is created by this command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (`401`) `Unauthorized` exception condition is created by the command. If no authentication credentials were specified, then (`407`) `Authentication required` exception condition is created by the command. A suitable challenge can also be returned.

Non-specific errors created by the recipient while attempting to complete the command create the (`500`) `Command failed` exception condition.

If there is insufficient space on the recipient database for updating the data item, then the (`420) Device full` exception condition is created by the command.

If the media type or format for the data item is not supported by the recipient, then the (`415`) `Unsupported media type or format` exception condition is created by the command.

In case the receiver is unable to process a partial item update (e.g. when the item does not exist on receiver), it MUST return status code 426 (Partial item not accepted).

Example: The following example specifies a source item that was replaced in the source database. The `Source` contains the relative URI of the item that was replaced. The absolute URI of the Source is specified in the parent `Sync` element type (not shown in the example).

```
<Replace>
  <CmdID>1234</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Meta><Type xmlns='syncml:metinf'>text/calendar</Type></Meta>
  <Item>
    <Source><LocURI>./20</LocURI></Source>
    <Data>BEGIN:VCALENDAR
VERSION:2.0
METHOD:REQUEST
BEGIN:VEVENT
UID:12345-19991015T133000Z
SEQUENCE:1
DTSTART:19991026T110000Z
DTEND:19991026T190000Z
SUMMARY:Technical Committee Meeting
CATEGORIES:Appointment
ORGANIZER:henry@host.com
ATTENDEES:techcomm@host.com
END:VEVENT
END:VCALENDAR
    </Data>
  </Item>
</Replace>
```

6.5.13 Results

Restrictions: No additional restrictions beyond those defined in [REPPRO].

Example 1: The following illustrates the type of data which can be returned in response to the Example 1 of the `Get` command.

```
<RESULTS>
  <CMDID>4321</CMDID>
  <MSGREF>1</MSGREF>
  <CMDREF>12345</CMDREF>
  <META>
    <TYPE XMLNS='SYNCML:METINF'>TEXT/X-VCARD</TYPE>
  </META>
  <TARGETREF>./TELECOM/PB</TARGETREF>
  <SOURCEREF>HTTP://WWW.DATASYNC.COM/SERVLET/</SOURCEREF>
  <ITEM>
    <SOURCE><LOCURI>./1</LOCURI></SOURCE>
    <DATA>BEGIN:VCARD
VERSION:2.1
FN:BRUCE SMITH
N:SMITH, BRUCE
TEL;WORK;VOICE:+1-919-555-1234
END:VCARD
    </DATA>
  </ITEM>
  <ITEM>
    <SOURCE><LOCURI>./2</LOCURI></SOURCE>
    <DATA>BEGIN:VCARD
VERSION:2.1
FN:IDA BLUE
N:BLUE, IDA
TEL;WORK;VOICE:+1-919-555-2345
END:VCARD
```

```
    </DATA>
  </ITEM>
  <ITEM>
    <SOURCE><LOCURI>./3</LOCURI></SOURCE>
    <DATA>BEGIN:VCARD
VERSION:2.1
FNKE MCGRATH
N:MCGRATH, MIKE
TEL;WORK;VOICE:+1-919-555-3456
END:VCARD
    </DATA>
  </ITEM>
</RESULTS>
```

Example 2: This example is specific to the email datatype. It illustrates how multiple email data items can be returned in response to the Example 2 of the `Get` command. This `Get` command specified two different Items by LUID. The first item specified in the `Get` was a LUID for an email so the item retrieved in the Results is a full email of type multipart/mixed, including a text/html portion and an attachment of type pdf. The second item specified in the `Get` was an attachment specified by the Content-ID appended to the LUID.

Implementors Note: Note that there are currently in the 1.2 specifications no restrictions on valid characters within datastore names or LUIDs. Implementations that choose to support retrieval of individual items or portions of items need to be able to uniquely identify what to retrieve.

Example 2:

```
<Results>
  <CmdID>4323</CmdID>
  <MsgRef>2</MsgRef>
  <CmdRef>7</CmdRef>
  <Meta>
      <Type xmlns='syncml:metinf'>message/rfc822</Type>
  </Meta>
    <Item>
        <Target><LocURI>mailstore.cdb/2345</LocURI></Target>
         <Data>Message-Id: <200703200136.l2K1XdS8007894@dns1.epnet.com>
mime-version: 1.0
from: ephost@epnet.com
To: momenee@us.ibm.com
date: 19 Mar 2007 21:36:26 -0400
subject: Medical Report from the Stone Age
content-type: multipart/mixed;

boundary=--boundary_51518_0f940d79-df5a-4b99-a847-f0cb165029ca
----boundary_51518_0f940d79-df5a-4b99-a847-f0cb165029ca
content-transfer-encoding: base64
content-type: text/html; charset=utf-8
PGg0PlJlY29yZDogMTwvaDQ+PHRhYmxlPjx0cj48dGQgdmFsaWduPSJ0b3AiIG5vd3JhcD0i
…

----boundary_51518_0f940d79-df5a-4b99-a847-f0cb165029ca
content-type: application/octet-stream; name=2285033.pdf
Content-Transfer-Encoding: base64

jz9MNCjM1IDAgb2JqIDw8L0xpbmVhcml6ZWQgMS9MIDE0NDQxMy9PIDM3L0Ug
….
    </Data>
  </Item>
  <Item>
    <Target>
      <LocURI>mailstore.cdb/6723/00054736@idtserver.rtp.ibm.com</LocURI>
    </Target>
    <Data>
mime-version:  1.0
Content-Type: application/x-zip-compressed;
        name="SCTS_3.1.2_TestCaseDoc.ZIP"
Content-Disposition: attachment;
        filename="SCTS_3.1.2_TestCaseDoc.ZIP"
Content-Transfer-Encoding: base64

UEsDBBQAAAAIABZthTCvvZyByD4BAACiCAAaAAAAU0NUU18zXzFfMl9UZXN0Q2FzZURvYy5kb2
Ps
XE2MI8d17h0LGggrJrKkFRIhh8oowO4kHC6bP8OZtSOIy+HuNDRDjknOrheSYDTJ4rC1zW66uz
mj
SYAgB+fnqkWyOTgwkEMMONDBRgIEycVIDAWBE9g+5hLAMXzMJT4FQWDlvVdVza6enp1eaeU4yD
Yw
22R3vVev3vveT/1wf/D9z/7wz7716r8Zqet14zPGTz96zng28ew5+PvNZ+SXFwzjc/D5Enz86U
cf
fYSPyvDdhL8K/FXhrwZ/dfjbhL8G/L0Ofx89vX6urn//878zDt94Dizzny9+O7YsXGD4b925ZP
yC
MXx3+O4HX/3gq8aZ67lnXjG2fvQZ43v/YdDfd9+8RM//dUVvh19XDbT9L8bPzvusrj+kf3/0y0
Z8
T37G6+uvnr2/nODwt/L5yn9dOnPfgvsNuL8Noj3870vGP68u23/zwxXje/Dce2bF+ErBMH7y2

..............
    </Data>
  </Item>
</Results>
```

6.5.14 Search

Restrictions: The results from the search are returned in the Results command, unless NoResults are specified in the command.

The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL NoResp element type indicates that a response status code MUST NOT be returned for the command.

If specified, the OPTIONAL NoResults element type indicates that the results MUST NOT be returned for the command. Instead, the results MUST be stored in the temporary storage location specified in the Target element type. The temporary results are intended to be specified as the source for a subsequent Sync command.

The OPTIONAL Cred element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the SyncHdr element type. If a Cred element type is not present in any of these other element types, then the command is specified without an authentication credential.

If present, the OPTIONAL Target element type specifies the temporary location on the recipient for the search results. If present, the NoResults element MUST also be specified.

One or more Source element types MUST be specified. The Source element type specifies the databases to be searched.

If present, the OPTIONAL Lang element type specifies the language requested for any search results.

The Meta element type MUST be specified. The element type specifies meta-information about the type of search grammar used in the command.

The Data element type MUST be specified. The element type specifies the search grammar for the command. The search grammar is generally object-specific and is based on prior agreement or provisioning between the originator and recipient.

If the command completed successfully, then the (200) OK exception condition is created by the command.

If the command completed successfully, but there was not any search results, then the (204) No content exception condition is created by the command.

If the command completed successfully, and the results are being returned in the response and also in subsequent messages, then the (206) Partial content exception condition is created by the command.

If the command failed because the search grammar was malformed, then the (400) Bad request exception condition is created by the command.

If the search grammar is not known then (421) Unknown search grammar MUST be returned.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (401) Unauthorized exception condition is created by the command. If no authentication credentials were specified, then (407) Authentication required exception condition is created by the command. A suitable challenge can also be returned.

If the originator's authentication credentials specify a principal that has had its rights to issue Search commands denied, then the (403) Forbidden exception condition is created by this command. However, if the recipient does not want to make this fact public, then the (404) Not found exception condition can be used.

If the recipient does not allow Search commands either on the specified database or on the network device, then the (405) Command not allowed exception condition is created by this command.

If the specified database cannot be found on the recipient network device, then the (404) Not found exception condition is created by this command.

If the Search command results are too large for processing on the recipient, then the (413) Request entity too large exception condition is created by this command.

Non-specific errors created by the recipient while attempting to complete the command create the (500) Command failed exception condition.

If there is insufficient space on the recipient database for the temporary results, then the (420) Device full exception condition is created by the command.

If the media type or format requested for the search results in the Meta element type is not supported by the recipient, then the (415) Unsupported media type or format exception condition is created by the command.

An alternative to the Search command is the use of CGI scripting (Section 5.13.2.2) on LocURI within the Source and Target element types in SyncML commands. See Section 5.12.

Example:

```
<Search>
```

```
  <CmdID>1234</CmdID>
  <Cred>
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Source>
    <LocURI>http://www.datasync.org/servlet/syncit/bruce1</LocURI>
  </Source>
  <Meta><Type xmlns='syncml:metinf'>application/sql</Type></Meta>
  <Data>SELECT EQ * WHERE "FN" EQ "Bruce Smith"</Data>
</Search>
```

6.5.15 Sequence

Restrictions: The mandatory CmdID element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL NoResp element type indicates that a response status code MUST NOT be returned for the command.

The OPTIONAL Meta element type specifies meta-information to be used for the command. For example, the common media type or format for all of the command can be specified. The scope of the meta-information is limited to the command.

One or more Add, Replace, Delete, Copy, Atomic, Map or Sync element types MUST be specified. These element types MUST be processed in the specified sequence.

If the command completed successfully, then the (200) OK exception condition is created by the command.

If the recipient does not support the command, then the (406) Optional feature not supported exception condition is created by the command.

Non-specific errors created by the recipient while attempting to complete the command create the (500) Command failed exception condition.

Nested Sequence commands are not legal. A nested Sequence command will generate an error (500)Command failed.

Example: The following is an incomplete (i.e., Add and Delete commands only include skeleton content) example for a Sequence command containing two Add commands, followed by a Delete command.

```
<Sequence>
  <CmdID>1234</CmdID>
  <Add>
    <CmdID>1235</CmdID>
    ...blah, blah...
  </Add>
  <Add>
    <CmdID>1236</CmdID>
    ...blah, blah...
  </Add>
  <Delete>
    <CmdID>1237</CmdID>
    ...blah, blah...
  </Delete>
```

```
</Sequence>
```

6.5.16 Sync

Restrictions: The mandatory `CmdID` element type specifies the SyncML message-unique identifier for the command.

If specified, the OPTIONAL `NoResp` element type indicates that a response status code MUST NOT be returned for the command.

The `Cred` element type specifies the authentication credential to be used for the command. If not present, the default authentication credential is taken from the `SyncHdr` element type. If a `Cred` element type is not present in any of these other element types, then the command is specified without an authentication credential.

The `Target` element type MUST be used to specify the recipient database to be synchronized.

The `Source` element type MUST be used to specify the originator database to be synchronized.

The OPTIONAL `Meta` element type specifies meta-information to be used for the command. In this command, the meta-information contains the search grammar. The search grammar is generally object-specific and is based on prior agreement or provisioning between the originator and recipient.

Zero or more `Add`, `Replace`, `Delete`, `Copy`, `Atomic`, or `Sequence` element types MUST be specified. There is no implied order to the processing of these commands unless they are placed in the `Sequence` command.

If the command completed successfully, then the (`200`) `OK` exception condition is created by the command.

If the originator's authentication credentials specify a principal with insufficient rights to complete the command, then the (`401`) `Unauthorized` exception condition is created by the command. If no authentication credentials were specified, then (`407`) `Authentication required` exception condition is created by the command. A suitable challenge can also be returned.

If the originator's authentication credentials specify a principal that has had its rights to issue `Sync` commands denied, then the (`403`) `Forbidden` exception condition is created by this command. However, if the recipient does not want to make this fact public, then the (`404`) `Not found` exception condition can be used.

If the recipient does not allow `Sync` commands either on the specified database or on the network device, then the (`405`) `Command not allowed` exception condition is created by this command.

If the specified database cannot be found on the recipient network device, then the (`404`) `Not found` exception condition is created by this command.

If the recipient determines that there is a high probability that the client device data is out of sync, then the (`508`) `Refresh required` exception condition is created by this command. When this exception condition occurs, the originator of the Sync command SHOULD initiate a slow synchronization with the recipient.

Non-specific errors created by the recipient while attempting to complete the command create the (`500`) `Command failed` exception condition.

Example: The following is an example of a `Sync` command with authentication credentials and a single `Add` of a calendar entry.

```
<Sync>
  <CmdID>1234</CmdID>
  <Cred>
```

```
    <Meta>
      <Type xmlns='syncml:metinf'>syncml:auth-md5</Type>
      <Format xmlns='syncml:metinf'>b64</Format>
    </Meta>
    <Data>Zz6EivR3yeaaENcRN6lpAQ==</Data>
  </Cred>
  <Target><LocURI>./mail/bruce1</LocURI></Target>
  <Source><LocURI>./calendar</LocURI></Source>
  <Add>
    <CmdID>1246</CmdID>
    <Item>
      <Source><LocURI>./12</LocURI></Source>
      <Meta>
        <Type xmlns='syncml:metinf'>text/x-vCalendar</Type>
      </Meta>
      <Data>BEGIN:VCALENDAR
VERSION:1.0
BEGIN:VEVENT
DTSTART:20000531T160000Z
DTEND:20000531T160100Z
SUMMARY:Release v0.9 of specs
END:VEVENT
END:VCALENDAR
      </Data>

    </Item>
  </Add>
</Sync>
```

7. Alert Types

The alert types in SyncML are a numeric text value. The types are divided into two classes, User Alert, that are intended to be conveyed to the recipient's user agent, and Application Alert, that are intended to be conveyed to a target application on the recipient. The only valid values are the standard values defined in this specification.

Implementations that desire to add to these values SHOULD submit a change request to mailto:technical-comments@openmobilealliance.org

Alert Code Value	Name	Description
Alert Codes used for user alerts		
100	DISPLAY	Show. The Data element type contains content information that SHOULD be processed and displayed through the user agent.
101-150	-	Reserved for future SyncML usage.
Alert Codes used at the synchronization initialization		
200	TWO-WAY	Specifies a client-initiated, two-way synchronization.
201	SLOW SYNC	Specifies a client-initiated, two-way slow-synchronization.
202	ONE-WAY FROM CLIENT	Specifies the client-initiated, one-way only synchronization from the client to the server.
203	REFRESH FROM CLIENT	Specifies the client-initiated, refresh operation for the one-way only synchronization from the client to the server.
204	ONE-WAY FROM SERVER	Specifies the client-initiated, one-way only synchronization from the server to the client.
205	REFRESH FROM SERVER	Specifies the client-initiated, refresh operation of the one-way only synchronization from the server to the client.
Alert Codes used by the server when alerting the synchronization		
206	TWO-WAY BY SERVER	Specifies a server-initiated, two-way synchronization.
207	ONE-WAY FROM CLIENT BY SERVER	Specifies the server-initiated, one-way only synchronization from the client to the server.
208	REFRESH FROM CLIENT BY SERVER	Specifies the server-initiated, refresh operation for the one-way only synchronization from the client to the server.
209	ONE-WAY FROM SERVER BY SERVER	Specifies the server-initiated, one-way only synchronization from the server to the client.
210	REFRESH FROM SERVER BY SERVER	Specifies the server-initiated, refresh operation of the one-way only synchronization from the server to the client.
Special Alert Codes		
221	RESULT ALERT	Specifies a request for synchronization results.

222	NEXT MESSAGE	Specifies a request for the next message in the package.
223	NO END OF DATA	End of Data for chunked object not received
224	SUSPEND	Suspend synchronization session
225	RESUME	Resume synchronization session
226-250	-	Reserved for future SyncML usage.

8. Base Media and Content formats

Data Type	Media Type	URI	Content Format
Contact	text/x-vcard	http://imc.org/pdi/vcard-21.doc	vCard 2.1
	text/vcard	http://www.ietf.org/rfc/rfc2426.txt	vCard 3.0
Calendar	text/x-vcalendar	http://www.imc.org/pdi/vcal-10.doc	vCalendar 1.0
	text/calendar	http://www.ietf.org/rfc/rfc2445.txt	iCalendar 2.0
Memos	text/plain	http://www.ietf.org/rfc/rfc2046.txt	
Tasks	text/x-vcalendar	http://www.imc.org/pdi/vcal-10.doc,	vCalendar 1.0
	text/calendar	http://www.ietf.org/rfc/rfc2445.txt	iCalendar 2.0
Email	message/rfc822	http://www.ietf.org/rfc.html	RFC822
			RFC2822
			RFC2045
	application/vnd.omads-email	http://www.openmobilealliance.org/	XML object
File	application/vnd.omads-file	http://www.openmobilealliance.org/	XML object
Folder	application/vnd.omads-folder	http://www.openmobilealliance.org/	XML object

9. MIME Media Type Registration

The following section is the MIME media type registrations for OMA Data Synchronization specific MIME media types.

9.1 application/vnd.syncml+xml

To: ietf-types@iana.org

Subject: Registration of MIME media type application/vnd.syncml+xml

MIME media type name: application

MIME subtype name: vnd.syncml+xml

REQUIED parameters: None

OPTIONAL parameters: charset, synctype, verproto, verdtd. May be specified in any order in the Content-Type MIME header field.

Content-Type MIME header.

charset Parameter

Purpose: Specifies the character set used to represent the SyncML document. The default character set for SyncML representation protocol is UTF-8, as defined in [RFC2279].

Formal Specification: The following ABNF defines the syntax for the parameter.

chrset-param = ";" "charset" "=" <any IANA registered charset identifier>

synctype Parameter

Purpose: Specifies the data synchronization protocol used by the SyncML document. If present, the value MUST be the same value as that specified by the "SyncType" element type in the SyncML MIME content information. There is no default value.

Formal Specification: The following ABNF defines the syntax for the parameter.

stype-param = ";" "synctype" "=" text

verproto Parameter

Purpose: Specifies the major/minor revision identifiers for the SyncML synchronization protocol specification for the workflow of messages with SyncML MIME content. If present, MUST be the same value as that specified by the "VerProto" element type in the SyncML MIME content information. If not present, the default value "1.2" is to be assumed.

Formal Specification: The following ABNF defines the syntax for the parameter.

verprot-param = ";" "verproto" "=" 1*numeric "." 1*numeric

text = 1*ALPHA

numeric = "0" / "1" / "2" / "3" / "4" / "5" / "6" / "7" / "8"/ "9"

verdtd Parameter

Purpose: Specifies the major/minor revision identifiers for the SyncML representation protocol specification that defines the SyncML MIME media type. If present, MUST be the same value as that specified by the "VerDTD" element type in the SyncML MIME content information. If not present, the default value "1.2" is to be assumed.

Formal Specification: The following ABNF defines the syntax for the parameter.

verdtd-param = ";" "verdtd" "=" 1*numeric "." 1*numeric

text = 1*ALPHA

numeric = "0" / "1" / "2" / "3" / "4" / "5" / "6" / "7" / "8"/ "9"

Encoding considerations: The default character set for the SyncML MIME content type is UTF-8. Transfer of this character set through some MIME systems could require that the content is first character encoded into a 7bit character set with an IETF character encoding mechanism such as Base64, as defined in [RFC2045]

Security considerations:

Authentication: The SyncML MIME content type definition provides for the inclusion of authentication information for the purpose of authenticating the originator and recipient of messages containing the data synchronization content type. The content type definition supports Basic, Base64 userid/password mark-up, MD5 digest challenge and response strings and any other registered authentication credential scheme.

Threats: The SyncML MIME content type definition provides for the inclusion of remote execution commands. Administrators for MIME implementations that support this content type SHOULD take every standard precaution to assure the activation of the originator of SyncML content, as well as take every standard precaution to confirm the validity of the included remote execution command prior to allowing the command to be executed on the targeted recipient's system.

Interoperability considerations: Implementations that have support for the mandatory features of this content type will greatly increase the chances of interoperating with other implementations supporting this content type. Conformance to this content type requires an implementation to support every mandatory feature.

Published specification: URL:http://www.openmobilealliance.org/tech/docs

Applications, which use this media type: This MIME content type is intended for common use by networked data synchronization applications.

Additional information:

Magic number(s): None

File extension(s): XSM

Macintosh File Type Code(s): XSML

Person & email address to contact for further information: admins@syncml.org

Intended usage: COMMON

Author/Change controller: mailto:technical-comments@openmobilealliance.org

9.2 application/vnd.syncml+wbxml

To: ietf-types@iana.org

Subject: Registration of MIME media type application/vnd.syncml+wbxml

MIME media type name: application

MIME subtype name: vnd.syncml+wbxml

REQUIRED parameters: None

OPTIONAL parameters: charset, synctype, verproto, verdtd. May be specified in any order in the Content-Type MIME header field.

Content-Type MIME header.

charset Parameter

Purpose: Specifies the character set used to represent the SyncML document. The default character set for SyncML representation protocol is UTF-8, as defined [RFC2279].

Formal Specification: The following ABNF defines the syntax for the parameter.

chrset-param = ";" "charset" "=" <any IANA registered charset identifier>

synctype Parameter

Purpose: Specifies the data synchronization protocol used by the SyncML document. If present, the value MUST be the same value as that specified by the "SyncType" element type in the SyncML MIME content information. There is no default value.

Formal Specification: The following ABNF defines the syntax for the parameter.

stype-param = ";" "synctype" "=" text

verproto Parameter

Purpose: Specifies the major/minor revision identifiers for the SyncML synchronization protocol specification for the workflow of messages with SyncML MIME content. If present, MUST be the same value as that specified by the "VerProto" element type in the SyncML MIME content information. If not present, the default value "1.2" is to be assumed.

Formal Specification: The following ABNF defines the syntax for the parameter.

```
verprot-param = ";" "verproto" "=" 1*numeric "." 1*numeric

text = 1*ALPHA

numeric = "0" / "1" / "2" / "3" / "4" / "5" / "6" / "7" / "8"/ "9"
```

verdtd Parameter

Purpose: Specifies the major/minor revision identifiers for the SyncML representation protocol specification that defines the SyncML MIME media type. If present, MUST be the same value as that specified by the "VerDTD" element type in the SyncML MIME content information. If not present, the default value "1.2" is to be assumed.

Formal Specification: The following ABNF defines the syntax for the parameter.

```
verdtd-param = ";" "verdtd" "=" 1*numeric "." 1*numeric

text = 1*ALPHA

numeric = "0" / "1" / "2" / "3" / "4" / "5" / "6" / "7" / "8"/ "9"
```

Encoding considerations: The default character set for the SyncML MIME content type is UTF-8. Transfer of this character set through some MIME systems could require that the content is first character encoded into a 7bit character set with an IETF character encoding mechanism such as Base64, as defined in [RFC2045].

Security considerations:

Authentication: The SyncML MIME content type definition provides for the inclusion of authentication information for the purpose of authenticating the originator and recipient of messages containing the data synchronization content type. The content type definition supports Basic, Base64 userid/password mark-up, MD5 digest challenge and response strings and any other registered authentication credential scheme.

Threats: The SyncML MIME content type definition provides for the inclusion of remote execution commands. Administrators for MIME implementations that support this content type SHOULD take every standard precaution to assure the authentication of the originator of SyncML content, as well as take every standard precaution to confirm the validity of the included remote execution command prior to allowing the command to be executed on the targeted recipient's system.

Interoperability considerations: Implementations that have support for the mandatory features of this content type will greatly increase the chances of interoperating with other implementations supporting this content type. Conformance to this content type requires an implementation to support every mandatory feature.

Published specification:
http://www.syncml.org/docs/syncml_sync_represent_v111_20021002.pdf

Applications, which use this media type: This MIME content type is intended for common use by networked data synchronization applications.

```
Additional information:

Magic number(s): None

File extension(s): BSM

Macintosh File Type Code(s): BSML

Person & email address to contact for further information: admins@syncml.org

Intended usage: COMMON

Author/Change controller:  mailto:technical-comments@openmobilealliance.org
```

Appendix A. Static Conformance Requirements (Normative)

Static conformance requirements (SCR) specify the features that are OPTIONAL and MANDATORY within implementations conforming to this specification.

The notation used in this appendix is specified in [DMREPU].

A.1 Client Data Sync Usage of SyncML Representation

Table 1 – Client Common Use Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-CUE-C-001	Support for Archive element	6.1.1	O	
SCR-DS-CUE-C-002	Support for Chal element	6.1.2	M	SCR-DS-DDE-C-003
SCR-DS-CUE-C-003	Support for Cmd element	6.1.3	M	
SCR-DS-CUE-C-004	Support for CmdId element	6.1.4	M	
SCR-DS-CUE-C-005	Support for CmdRef element	6.1.5	M	
SCR-DS-CUE-C-006	Support for Cred element	6.1.6	M	SCR-DS-DDE-C-001
SCR-DS-CUE-C-007	Support for Field element	6.1.7	O	
SCR-DS-CUE-C-008	Support for Filter element	6.1.8	O	SCR-DS-CUE-C-09 AND (SCR-DS-CUE-C-007 OR SCR-DS-CUE-C-020)
SCR-DS-CUE-C-009	Support for FilterType element	6.1.9	O	
SCR-DS-CUE-C-010	Support for Final element	6.1.10	M	
SCR-DS-CUE-C-011	Support for Lang element	6.1.11	O	
SCR-DS-CUE-C-012	Support for LocName element	6.1.12	O	
SCR-DS-CUE-C-013	Support for LocURI element	6.1.13	M	
SCR-DS-CUE-C-014	Support for MoreData element	6.1.14	O	
SCR-DS-CUE-C-015	Support for MsgID element	6.1.15	M	
SCR-DS-CUE-C-016	Support for MsgRef element	6.1.16	M	
SCR-DS-CUE-C-017	Support for NoResp element	6.1.17	M	
SCR-DS-CUE-C-018	Support for NoResults element	6.1.18	O	
SCR-DS-CUE-C-019	Support for NumberOfChanges element	6.1.19	O	
SCR-DS-CUE-C-020	Support for Record element	6.1.20	O	

SCR-DS-CUE-C-021	Support for RespURI element	6.1.21	M	
SCR-DS-CUE-C-022	Support for SessionID element	6.1.22	M	
SCR-DS-CUE-C-023	Support for SftDel element	6.1.23	O	
SCR-DS-CUE-C-024	Support for Source element	6.1.24	M	SCR-DS-CUE-C-013
SCR-DS-CUE-C-025	Support for SourceParent	6.1.25	O	SCR-DS-CLIENT-012
SCR-DS-CUE-C-026	Support for SourceRef element	6.1.26	M	
SCR-DS-CUE-C-027	Support for Target element	6.1.27	M	SCR-DS-CUE-C-013
SCR-DS-CUE-C-028	Support for TargetParent	6.1.28	O	SCR-DS-CLIENT-012
SCR-DS-CUE-C-029	Support for TargetRef element	6.1.29	M	
SCR-DS-CUE-C-030	Support for VerDTD element	6.1.30	M	
SCR-DS-CUE-C-031	Support for VerProto element	6.1.31	M	

Table 2 – Client Message Container Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-MCE-C-001	Support for SyncML element	6.2.1	M	SCR-DS-MCE-C-002 AND SCR-DS-MCE-C-003
SCR-DS-MCE-C-002	Support for SyncHdr element	6.2.2	M	SCR-DS-CUE -C-015 AND SCR-DS-CUE -C-022 AND SCR-DS-CUE-C-024 AND SCR-DS-CUE-C-027 AND SCR-DS-CUE-C-030 AND SCR-DS-CUE-C-031
SCR-DS-MCE-C-003	Support for SyncBody element	6.2.3	M	SCR-DS-PCE-C-001 AND SCR-DS-PCE-C-002 AND SCR-DS-PCE-C-005 AND SCR-DS-PCE-C-007 AND SCR-DS-PCE-C-011 AND SCR-DS-PCE-C-012 AND SCR-DS-PCE-C-015 AND SCR-DS-PCE-C-016

Table 3 – Client Data Description Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-DDE-C-001	Support for Data element	6.3.1	M	
SCR-DS-DDE-C-002	Support for Item element	6.3.2	M	
SCR-DS-DDE-C-003	Support for Meta element	6.3.3	M	SCR-DSDM-METINF-S-011

Table 4 – Client Protocol Management Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-PME-C-001	Support for Status element	6.4.1	M	SCR-DS-CUE-C-003 AND SCR-DS-CUE-C-004 AND SCR-DS-CUE-C-005 AND SCR-DS-CUE-C-015 AND SCR-DS-CUE-C-024 AND SCR-DS-CUE-C-026 AND SCR-DS-DDE-C-001 AND SCR-DS-DDE-C-002

Table 5 – Client Protocol Command Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-PCE-C-001	Support for Add element	6.5.1	M	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002
SCR-DS-PCE-C-002	Support for Alert element	6.5.2	M	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002
SCR-DS-PCE-C-003	Support for Atomic element	6.5.3	O	SCR-DS-CUE-C-004
SCR-DS-PCE-C-004	Support for Copy element	6.5.4	O	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002
SCR-DS-PCE-C-005	Support for Delete element	6.5.5	M	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002
SCR-DS-PCE-C-006	Support for Exec element	6.5.6	O	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002
SCR-DS-PCE-C-007	Support for Get element	6.5.7	M	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002
SCR-DS-PCE-C-008	Support for Map element	6.5.8	O	SCR-DS-CUE-C-004 AND SCR-DS-PCE-C-009
SCR-DS-PCE-C-009	Support for MapItem element	6.5.9	O	SCR-DS-CUE-C-024 AND SCR-DS-CUE-C-027
SCR-DS-PCE-C-010	Support for Move element	6.5.10	O	
SCR-DS-PCE-C-011	Support for Put element	6.5.11	M	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002
SCR-DS-PCE-C-012	Support for Replace element	6.5.12	M	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002

SCR-DS-PCE-C-013	Support for Result element	6.5.13	O	SCR-DS-CUE-C-004 AND SCR-DS-DDE-C-002
SCR-DS-PCE-C-014	Support for Search element	6.5.14	O	SCR-DS-CUE-C-004 AND SCR-DS-CUE-C-024 AND SCR-DS-DDE-C-002 AND SCR-DS-DDE-C-003
SCR-DS-PCE-C-015	Support for Sequence element	6.5.15	O	SCR-DS-CUE-C-004
SCR-DS-PCE-C-016	Support for Sync element	6.5.16	M	SCR-DS-CUE-C-004

Table 6 – Client Content Formats

Item	Functionality	Reference	Status	Requirement
SCR-DS-CONTENT-C-001	Support for Contact Synchronization		O	SCR-DS-CONTENT-C-008 OR SCR-DS-CONTENT-C-009
SCR-DS-CONTENT-C-002	Support for Calendar Synchronization		O	SCR-DS-CONTENT-C-010 OR SCR-DS-CONTENT-C-011
SCR-DS-CONTENT-C-003	Support for Memo Synchronization		O	SCR-DS-CONTENT-C-012
SCR-DS-CONTENT-C-004	Support for Task Synchronization		O	SCR-DS-CONTENT-C-013
SCR-DS-CONTENT-C-005	Support for Email Synchronization		O	SCR-DS-CONTENT-C-014 OR SCR-DS-CONTENT-C-015 OR SCR-DS-CONTENT-C-016 OR SCR-DS-CONTENT-C-017
SCR-DS-CONTENT-C-006	Support for File Synchronization		O	SCR-DS-CONTENT-C-018
SCR-DS-CONTENT-C-007	Support for Folder Synchronization		O	SCR-DS-CONTENT-C-019
SCR-DS-CONTENT-C-008	Support for vCard 2.1		O	
SCR-DS-CONTENT-C-009	Support for vCard 3.0		O	
SCR-DS-CONTENT-C-010	Support for vCalendar 1.0		O	
SCR-DS-CONTENT-C-011	Support for iCalendar 2.0		O	
SCR-DS-CONTENT-C-012	Support for text/plain		O	
SCR-DS-CONTENT-C-013	Support for vTodo 1.0		O	
SCR-DS-CONTENT-C-014	Support for message/rfc822		O	

SCR-DS-CONTENT-C-015	Support for message/rfc2822		O	
SCR-DS-CONTENT-C-016	Support for Message/rfc2045		O	
SCR-DS-CONTENT-C-017	Support for x-email		O	
SCR-DS-CONTENT-C-018	Support for x-file		O	
SCR-DS-CONTENT-C-019	Support for x-folder		O	

A.2 Server Data Sync Usage of SyncML Representation

Table 7 – Server Common Use Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-CUE-S-001	Support for Archive element	6.1.1	O	
SCR-DS-CUE-S-002	Support for Chal element	6.1.2	M	SCR-DS-DDE-S-003
SCR-DS-CUE-S-003	Support for Cmd element	6.1.3	M	
SCR-DS-CUE-S-004	Support for CmdId element	6.1.4	M	
SCR-DS-CUE-S-005	Support for CmdRef element	6.1.5	M	
SCR-DS-CUE-S-006	Support for Cred element	6.1.6	M	SCR-DS-DDE-S-001
SCR-DS-CUE-S-007	Support for Field element	6.1.7	O	
SCR-DS-CUE-S-008	Support for Filter element	6.1.8	O	SCR-DS-CUE-S-009 AND (SCR-DS-CUE-S-007 OR SCR-DS-CUE-S-020)
SCR-DS-CUE-S-009	Support for FilterType element	6.1.9	O	
SCR-DS-CUE-S-0010	Support for Final element	6.1.10	M	
SCR-DS-CUE-S-011	Support for Lang element	6.1.11	O	
SCR-DS-CUE-S-012	Support for LocName element	6.1.12	O	
SCR-DS-CUE-S-013	Support for LocURI element	6.1.13	M	
SCR-DS-CUE-S-014	Support for MoreData element	6.1.14	M	
SCR-DS-CUE-S-015	Support for MsgID element	6.1.15	M	
SCR-DS-CUE-S-016	Support for MsgRef element	6.1.16	M	
SCR-DS-CUE-S-017	Support for NoResp element	6.1.17	M	

SCR-DS-CUE-S-018	Support for NoResults element	6.1.18	O	
SCR-DS-CUE-S-019	Support for NumberOfChanges element	6.1.19	M	
SCR-DS-CUE-S-020	Support for Record element	6.1.20	O	
SCR-DS-CUE-S-021	Support for RespURI element	6.1.21	M	
SCR-DS-CUE-S-022	Support for SessionID element	6.1.22	M	
SCR-DS-CUE-S-023	Support for SftDel element	6.1.23	O	
SCR-DS-CUE-S-024	Support for Source element	6.1.24	M	SCR-DS-CUE-S-013
SCR-DS-CUE-S-025	Support for SourceParent	6.1.25	O	SCR-DS-SERVER-012
SCR-DS-CUE-S-026	Support for SourceRef element	6.1.26	M	
SCR-DS-CUE-S-027	Support for Target element	6.1.27	M	SCR-DS-CUE-S-013
SCR-DS-CUE-S-028	Support for TargetParent	6.1.28	O	SCR-DS-SERVER-012
SCR-DS-CUE-S-029	Support for TargetRef element	6.1.29	M	
SCR-DS-CUE-S-030	Support for VerDTD element	6.130	M	
SCR-DS-CUE-S-031	Support for VerProto element	6.1.31	M	

Table 8 – Server Message Container Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-MCE-S-001	Support for SyncML element	6.2.1	M	SCR-DS-MCE-S-002 AND SCR-DS-MCE-S-003
SCR-DS-MCE-S-002	Support for SyncHdr element	6.2.2	M	SCR-DS-CUE-S-015 AND SCR-DS-CUE-S-022 AND SCR-DS-CUE-S-024 AND SCR-DS-CUE-S-027 AND SCR-DS-CUE-S-030 AND SCR-DS-CUE-S-031
SCR-DS-MCE-S-003	Support for SyncBody element	6.2.3	M	SCR-DS-PCE-S-001 AND SCR-DS-PCE-S-002 AND SCR-DS-PCE-S-005 AND SCR-DS-PCE-S-007 AND SCR-DS-PCE-S-010 AND SCR-DS-PCE-S-011 AND SCR-DS-PCE-S-015 AND SCR-DS-PCE-S-016

Table 9 – Server Data Description Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-DDE-S-001	Support for Data element	6.3.1	M	
SCR-DS-DDE-S-002	Support for Item element	6.3.2	M	
SCR-DS-DDE-S-003	Support for Meta element	6.3.3	M	SCR-DSDM-METINF-S-011

Table 10 –Server Protocol Management Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-PME-S-001	Support for Status element	6.4.1	M	SCR-DS-CUE-S-003 AND SCR-DS-CUE-S-004 AND SCR-DS-CUE-S-005 AND SCR-DS-CUE-S-015 AND SCR-DS-CUE-S-024 AND SCR-DS-CUE-S-026 AND SCR-DS-DDE-S-001 AND SCR-DS-DDE-S-002

Table 11 – Server Protocol Elements

Item	Functionality	Reference	Status	Requirement
SCR-DS-PCE-S001	Support for Add element	6.5.1	M	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-002	Support for Alert element	6.5.2	M	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-003	Support for Atomic element	6.5.3	O	SCR-DS-CUE-S-004
SCR-DS-PCE-S-004	Support for Copy element	6.5.4	M	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-005	Support for Delete element	6.5.5	M	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-006	Support for Exec element	6.5.6	O	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-007	Support for Get element	6.5.7	M	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-008	Support for Map element	6.5.8	M	SCR-DS-CUE-S-004 AND SCR-DS-PCE-S-009
SCR-DS-PCE-S-009	Support for MapItem element	6.5.9	M	SCR-DS-CUE-S-024 AND SCR-DS-CUE-S-027

SCR-DS-PCE-S-010	Support for Move element	6.5.10	O	
SCR-DS-PCE-S-011	Support for Put element	6.5.11	M	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-012	Support for Replace element	6.5.12	M	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-013	Support for Result element	6.5.13	M	SCR-DS-CUE-S-004 AND SCR-DS-DDE-S-002
SCR-DS-PCE-S-014	Support for Search element	6.5.14	O	SCR-DS-CUE-S-004 AND SCR-DS-CUE-S-024 AND SCR-DS-DDE-S-002 AND SCR-DS-DDE-S-003
SCR-DS-PCE-S-015	Support for Sequence element	6.5.15	M	SCR-DS-CUE-S-004
SCR-DS-PCE-S-016	Support for Sync element	6.5.15	M	SCR-DS-CUE-S-004

Table 12 – Server Content Formats

Item	Functionality	Reference	Status	Requirement
SCR-DS-CONTENT-S-001	Support for Contact Synchronization	ALL*	O	SCR-DS-CONTENT-S-008 AND SCR-DS-CONTENT-S-009
SCR-DS-CONTENT-S-002	Support for Calendar Synchronization	ALL*	O	SCR-DS-CONTENT-S-010 AND SCR-DS-CONTENT-S-011
SCR-DS-CONTENT-S-003	Support for Memo Synchronization	ALL*	O	SCR-DS-CONTENT-S-012
SCR-DS-CONTENT-S-004	Support for Task Synchronization	ALL*	O	SCR-DS-CONTENT-S-013
SCR-DS-CONTENT-S-005	Support for Email Synchronization	ALL*	O	SCR-DS-CONTENT-S-014 OR SCR-DS-CONTENT-S-015 OR SCR-DS-CONTENT-S-016 OR SCR-DS-CONTENT-S-017
SCR-DS-CONTENT-S-006	Support for File Synchronization	ALL*	O	SCR-DS-CONTENT-S-018
SCR-DS-CONTENT-S-007	Support for Folder Synchronization	ALL*	O	SCR-DS-CONTENT-S019
SCR-DS-CONTENT-S-008	Support for vCard 2.1	ALL*	O	
SCR-DS-CONTENT-S-009	Support for vCard 3.0	ALL*	O	
SCR-DS-CONTENT-S-010	Support for vCalendar 1.0	ALL*	O	
SCR-DS-CONTENT-S-011	Support for iCalendar 2.0	ALL*	O	

SCR-DS-CONTENT-S-012	Support for text/plain	ALL*	O	
SCR-DS-CONTENT-S-013	Support for vTodo 1.0	ALL*	O	
SCR-DS-CONTENT-S-014	Support for message/rfc822	ALL*	O	
SCR-DS-CONTENT-S-015	Support for message/rfc2822	ALL*	O	
SCR-DS-CONTENT-S-016	Support for Message/rfc2045	ALL*	O	
SCR-DS-CONTENT-S-017	Support for x-email	ALL*	O	
SCR-DS-CONTENT-S-018	Support for x-file	ALL*	O	
SCR-DS-CONTENT-S-019	Support for x-folder	ALL*	O	

* There are examples which use the various content types throughout the specifications.

Appendix B. Change History (Informative)

B.1 Approved Version History

Reference	Date	Description
OMA-SyncML-DataSyncRep-V1_1_2-20030612-A	12 Jun 2003	Initial OMA release
OMA-TS-DS_DataSyncRep-V1_2-20060710-A	10 Jul 2006	Approved by TP ref#OMA-TP-2006-0239R03-INP_DS_V1_2_for_final_approval
OMA-TS-DS-DataSyncRep-V1_2_1-20070613-A	13 Jun 2007	Incorporated CRs: OMA-DS-DS_1_2-2007-0002R01 OMA-DS-DS_1_2-2007-0021R04 Editorial corrections
OMA-TS-DS-DataSyncRep-V1_2_1-20070810-A	10 Aug 2007	Prepared for TP Notification TP ref # OMA-TP-2007-0326-INP_DS_V1_2_1_ERP_for_Notification