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(71) Applicant (for all designated States except US): **LG**

ELECTRONICS INC. [KR/KR]; 20, Yoido-Dong, Yongsungpo-gu, Seoul 150-010 (KR).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **KIM, Te-Hyun**

[KR/KR]; Dong-a Echoville Apt. 102-1002, 518, Poil-dong, Uiwang, Gyeonggi-do 437-771 (KR).

(74) Agent: **PARK, Jang-Won**; Jewoo Bldg. 5th Floor, 200,

Nonhyun-Dong, Gangnam-Gu, Seoul 135-010 (KR).

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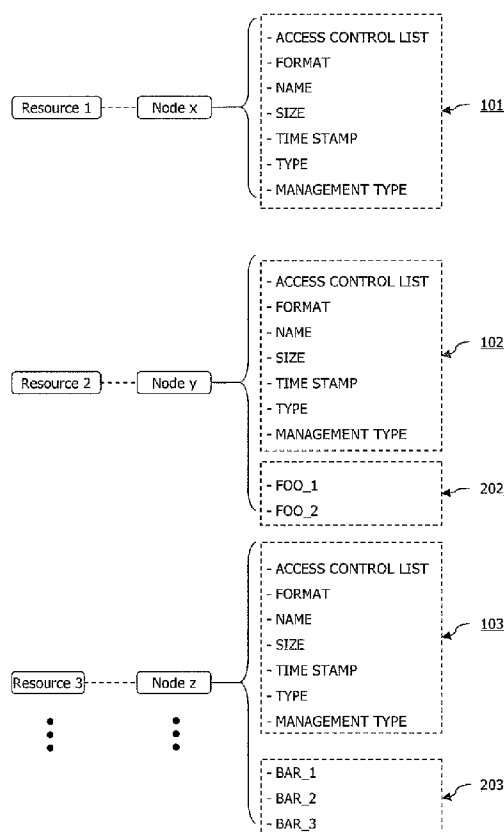
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(54) Title: DEVICE MANAGEMENT METHOD USING NODES HAVING ADDITIONAL ATTRIBUTE AND DEVICE MANAGEMENT CLIENT THEREOF



(57) Abstract: A device management (DM) method and a device management (DM) client use a node having an additional attribute. The DM client includes a node having a common attribute indicating attribute information that is common to every node and an additional attribute indicating attribute information of each node. The DM method includes: receiving a node generation command; and generating a node having a common attribute indicating attribute information that is common to every node and an additional attribute indicating attribute information of each node according to the node generation command.

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Description

DEVICE MANAGEMENT METHOD USING NODES HAVING ADDITIONAL ATTRIBUTE AND DEVICE MANAGEMENT CLIENT THEREOF

Technical Field

- [1] The present invention relates to a device management (DM) method and a DM client using an additional attribute and, more particularly, to a DM method and DM client that use additional attributes specified to a corresponding node in addition to attributes commonly required for every node.

Background Art

- [2] In general, a DM technique is a technique for changing setting of a device (a DM client) by remotely controlling a variable or an object stored in the device by a server (DM server). Commonly, when a particular command is received from the DM server, the DM client immediately performs the corresponding command.
- [3] The DM server performs DM such as reading, changing, deleting and generating a value of a particular management object through a process in which the DM client performs the command upon receiving it.
- [4] The DM technique is a standard for supporting various functions compared with any other management technique, including a DM protocol specification, a specification relating to a way how to express a DM document, a specification relating to a way how to bind between transmission protocols, a specification relating to a DM tree and a DM node, a specification relating to a DDF (Device Description Framework), and a specification regarding notification, etc.
- [5] The DM technique is implemented such that the DM server transmits the command relating to the particular management object existing within the device and then the DM client performs the corresponding command upon receiving it. In this case, the DM object mainly exists in a database of the device and is logically connected with a node of the DM tree existing within the device. Namely, the DM server can issue a management command by accessing a node logically connected with the management object through a URI (Uniform Resource Indicator).
- [6] Thus, in order for the DM server to access resources or the object present in the DM client, each resource or object has a node. The nodes are associated with resources or objects, the DM server can access a corresponding node and manage the corresponding resource or object. In this case, in order for the DM server to manage the resources or objects associated with each node, each node has attribute values indicating information regarding the resources or objects to which it belongs.

- [7] FIG. 1 illustrates the attributes of nodes of the DM client. The resources stored in the DM client can be divided into resource 1, resource 2, etc. according to characteristics of each resource, and each node is associated with a node. A node x has fields indicating information on the resource 1 and a node y has fields indicating information on the resource 2. All the nodes of the DM client including the node x and node y have the following fields:
- [8] - ACCESS CONTROL LIST: a list of external devices that can access corresponding resources
 - [9] - FORMAT: an encoding type of a corresponding resource
 - [10] - NAME: a name of a node
 - [11] - SIZE: a size of a corresponding resource
 - [12] - TIME STAMP: time point at which a value of a corresponding resource was finally changed
 - [13] - TYPE: a form or type of a corresponding resource
- [14] The fields are applied to all types of nodes in the same manner regardless of nodes. Namely, all the nodes have the set of same fields including ACCESS CONTROL LIST, FORMAT, NAME, SIZE, TIME STAMP and TYPE.

Disclosure of Invention

Technical Problem

- [15] Thus, because all the nodes have the same fields, a problem arises that an attribute suitable for the characteristics of each node cannot be expressed. For example, nodes of a message object in a mail server are preferred to have attributes that may show information such as whether a message has been read or deleted. In this respect, however, if the server provides a calendar service, there is no need to assign the attributes required for the message object. In this case, if only the attributes commonly required for the nodes of the message object and the calendar object are used likewise as in the related art, the resources logically connected with the nodes can not be effectively managed. In addition, application of the attributes required only for the message object and the attributes required only for the calendar for every node without discrimination would be a waste of a storage space.

Technical Solution

- [16] One exemplary feature of the present invention is to provide a device management (DM) method using nodes having an additional attribute which is defined according to characteristics of resources or a management object associated with the node.
- [17] Another exemplary feature of the present invention is to provide a DM method for synchronizing data between a DM server and a DM client by including an additional attribute indicating a state of a node of the DM client that communicates with the DM

server in the node through DataSync.

- [18] To implement at least the above feature in whole or in parts, the present invention provides a DM client that may include a node having a common attribute that is common to every node and an additional attribute that is specified to each node.
- [19] To implement at least the above feature in whole or in parts, the present invention also provides a DM method that may include: receiving a command for generating a node; and, generating a node including a common attribute and an additional attribute, according to the command; wherein the common node includes at least one field that is common to every node, and the additional attribute includes at least one field that is specified to each node.
- [20] To implement at least the above feature in whole or in parts, the present invention also provides a DM client that may include: a node including a common attribute and an additional attribute; wherein, the common attribute includes at least one field that is common to every node and the additional attribute includes at least one field that relates to log information.
- [21] To implement at least the above feature in whole or in parts, the present invention also provides a DM client including: a node including a common attribute and an additional attribute; wherein the common attribute includes at least one field that is common to every node of the DM client and the additional attribute includes at least one field indicating a state of a received message.
- [22] To implement at least the above feature in whole or in parts, the present invention also provides a DM method in a mail server that communicates with a plurality of mail clients, that may include: receiving a message from any mail client; generating a message object node including an additional attribute which includes at least one field indicating a state of the received message; and changing the field of the additional attribute according to a message processing request from the mail client and storing it.
- [23] To implement at least the above feature in whole or in parts, the present invention also provides a DM client having a DM tree, which may include a node having attributes with respect to log information of a management object.
- [24] To implement at least the above feature in whole or in parts, the present invention also provides a DM client including a node including at least one attribute to log data for a management object.
- [25] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realized and attained as particularly pointed out in the appended claims.

Brief Description of the Drawings

- [26] The invention will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:
- [27] FIG. 1 is a view showing attributes of device management (DM) client nodes according to the related art;
- [28] FIG. 2 is a view showing attributes of DM client nodes according to the present invention;
- [29] FIG. 3 is a view showing a DM tree including a logging node having common attributes and additional attributes according to the present invention;
- [30] FIG. 4 is a DM tree including a logging node having an integrated attribute according to the present invention;
- [31] FIG. 5 is a view showing message object nodes of a mail server having common attributes and additional attributes according to the present invention;
- [32] FIG. 6 is a view showing the message object nodes of the mail server having an integrated attribute according to the present invention; and
- [33] FIG. 7 illustrates a data synchronization process between a mail client and the mail server according to the present invention.

Mode for the Invention

- [34] The exemplary embodiment of the present invention will now be described with reference to the accompanying drawings.
- [35] FIG. 2 is a view showing attributes of DM client nodes according to the present invention. As shown, a node x has only a common attribute 101, node y has a common attribute 102 and an additional attribute 202, which includes at least one field, i.e. FOO_1 and FOO_2 fields, and a node z has a common attribute 103 and an additional attribute 203 which includes at least one field, i.e. BAR_1, BAR_2 and BAR_3.
- [36] Herein, the common attributes are common to every node, and the additional attributes refer to information required to be used for a node by node. In the related art, all the nodes have same fields, so the fields are not discriminated, but comparatively, in the present invention, because fields are differently assigned according to characteristics of a node, the fields are classified into the common attributes and the additional attributes.
- [37] As the common attribute, ACCESS CONTROL LIST, FORMAT, NAME, SIZE, TIME STAMP, TYPE and MANAGEMENT TYPE fields are used. The ACCESS CONTROL LIST field indicates a list of external devices that may access a corresponding resource, the FORMAT field indicates an encoding type of a corresponding resource, the NAME field indicates a name of a node, the SIZE field indicates a size of a corresponding resource, the TIME STAMP field indicates a time point at which a

value of a corresponding resource was finally changed, the TYPE field indicates a format or type of a corresponding resource, and the MANAGEMENT TYPE field indicates a type of a node.

- [38] Of the common attributes of the node y and node z, the MANAGEMENT TYPE field should indicate a type of the node y and the node z to allow an external device such as a server to know an additional attribute of the node y and the node z. And the MANAGEMENT TYPE field should have a specific value with respect to a type of each node.
- [39] The FOO_1 and FOO_2 fields of the additional attribute in the node y are required for explaining particular characteristics of resources belonging to the node y, and the BAR_1, BAR_2 and BAR_3 fields of the additional attribute in the node z are required for explaining particular characteristics of resources belonging to the node z.
- [40] The additional attribute can be generated by the external device. When the external device transfers a command for generating a node, the command includes an instruction to generate the additional attribute. Namely, the command has a value of MANAGEMENT TYPE field indicating a type of the node to be generated.
- [41] Herein, the concept of a node is described to be limited to the DM client, but the node can be applied for a server as well as the client as a unit that can be independently implemented.
- [42] FIG. 3 is a view showing a DM tree including a Log/Logging node having a common attribute and an additional attribute according to the present invention.
- [43] The DM client can record its state value in the DM tree while performing a particular operation, to log to a DM server when predetermined conditions are met. The DM server uses the DM tree in order to remotely manage information stored in a common database in various types of devices through the same DM session and protocol.
- [44] The DM tree assigns a name to information stored in the common database, provides a path to access each information, and has attributes such as logical/physical format of the information.
- [45] As shown in FIG. 3, the DM client can have the DM tree including Status, Rate, Gauge and Log nodes according to characteristics of resources. The Status node, Rate node and Gauge node include Object A, Object B and Object C, respectively. The Objects A, B and C store a state value that changes when the DM client performs a particular operation, a periodically measured value or a value measured when a particular event occurs, etc. For example, when a value of the objects reaches a pre-set threshold value, when a particular time arrives, or when a particular event occurs in the device, the Objects A, B and C stores the value.
- [46] In the DM tree, the Log node records and stores the state value or measured value

that changes in the DM client. The Log node is divided into a control part and a data part. The control part corresponds to the Log/Control node. The control part includes a Log/Control/Size node informing of a maximum number of log data that can be stored, a Log/Control/Current node informing of a location where the next log data is to be stored and a Log/Control/Recursive node informing of how to process new log data if there is no storage space. Namely, the Log node is used to control a way how to store and record the log data. Herein, the log data refers to a target stored as the state value or the measured value in the device and reported to the server when certain conditions are met.

- [47] It is noted that there is the data part of the Log node. The data part corresponds to the Log/Logging node and provides a space to allow the log data to be stored therein. The process of storing the log data below the Log/Logging node is as follows:
- [48] Step 1: The DM client receives a DM command for storing log data. The DM command includes a management object to be logged and URI of a location where to store log data of the management object. The URI of the location where the object to be logged is to be stored may be equal to Log/Logging.
- [49] Step 2: When there is a space for storing the log data, a new folder node Item1 is generated.
- [50] Step 3: Object A node, Object B node and Object C node are generated in the Item1 node.
- [51] Step 4 : The log data (Object A, Object B and Object C) are copied.
- [52] Step 5: The log data with respect to the Object A is stored in Log/Logging/Item1/ObjectA, the log data with respect to the Object B is stored in Log/Logging/Item1/ObjectB, and the log data with respect to the Object C is stored in Log/Logging/Item1/ObjectC.
- [53] Namely, the values of the Object A, B and C read at a particular time point or under a certain condition are stored by generating the new nodes (Item1, Item2, Item3, ...,) below the logging tree. In this case, the nodes (Log/Logging/Item1/ObjectA, Log/Logging/Item1/ObjectB, Log/Logging/Item1/ObjectC) generated below the logging tree have an additional attribute for explaining the characteristics of the nodes. The additional attribute includes a DATA SOURCE field which indicates the location of the original data to be logged, and a REASON field which indicates the reason why the log data has been generated.
- [54] The DATA SOURCE field indicates the location of the original data to be logged. Accordingly, an additional attribute of the Log/Logging/Item1/ObjectA node has a field such as "DATASOURCE=./Status/Amodule/ObjectA". An additional attribute of the Log/Logging/Item1/ObjectB node has a field such as "DATASOURCE=./Rate/ObjectB". An additional attribute of the Log/

Logging/Item1/ObjectC node has a field such as

"DATASOURCE=Gauge/Buffer/Receive/ObjectC". Namely, they have the URI (Uniform Resource Indicator) of the Objects A, B and C.

- [55] The REASON field provides information on the reason why the logging node has been generated, namely, why the node has logged. The Log/Logging node can be generated according to a logging request of the external device (DM server). In this case, the REASON field has an ID with respect to the logging request. In addition, the Log/Logging node can be also generated according to a scheduling stored in the DM client. According to the DM scheduling method, the server schedules the DM command for the client, and the client spontaneously reports a state of the device (e.g., a terminal) at a particular time point or state and executes a scheduled program (a diagnosis program, a state logging program and a virus search program). When the Log/Logging node has been generated according to this method, its REASON field has an ID of scheduling.
- [56] In order to use the additional attribute, the MANAGEMENT TYPE field is added to a common attribute of the Log/Logging/Item1/ObjectA node, the Log/Logging/Item1/ObjectA node and the Log/Logging/Item1/ObjectA node, and the MANAGEMENT TYPE field informs of the type of the node. Herein, by making MANAGEMENT TYPE = Logging, the external device can recognize that the node relates to log data.
- [57] FIG. 4 is the DM tree including a Log/Logging node having an integrated attribute according to the present invention. The Status node, Rate node and Gauge node of the DM tree include Object A, Object B and Object C, respectively. The Objects A, B and C store a state value that changes when the DM client performs a particular operation, a periodically measured value or a value measured when a particular event occurs.
- [58] The Objects A, B and C are copied and stored below the Log node when particular conditions are met. The Log node includes a control part, i.e. a Log/Control node and a data part, i.e. a Log/Logging node. Log data is stored in the Log/Logging node according to the steps 1 to 5 described above with reference to FIG. 3.
- [59] Accordingly, the Item1 node includes a Log/Logging/Item1/ObjectA in which the log data with respect to Object A is stored, a Log/Logging/Item1/ObjectB in which the log data with respect to Object B is stored, and a Log/Logging/Item1/ObjectC in which the log data with respect to Object C is stored.
- [60] Nodes (Log/Logging/Item1/ObjectA, Log/Logging/Item1/ObjectB and Log/Logging/Item1/ObjectC) generated below the logging tree have an integrated attribute 301 for indicating characteristics of their own together with the common attribute.
- [61] Namely, each of the Log/Logging/Item1/ObjectA, the Log/Logging/Item1/ObjectB and the Log/Logging/Item1/ObjectC has a DATA SOURCE field which indicates a

location of the original data to be logged, and a REASON field which indicates the reason why the log data has been generated, as well as the common attribute including ACCESS CONTROL LIST, FORMAT, NAME, SIZE, TIME STAMP, TYPE fields.

- [62] The DATA SOURCE field indicates the location of the original data to be logged. Accordingly, a DATA SOURCE field of an integrated attribute in the Log/Logging/Item1/ObjectA node has a value of "/Status/Module/ObjectA". A DATA SOURCE of an integrated attribute in the Log/Logging/Item1/ObjectB has the value of "/Rate/ObjectB". A DATA SOURCE of an integrated attribute in the Log/Logging/Item1/ObjectC node has the value of "Gauge/Buffer/Receive/ObjectC". Namely, they have the URI (Uniform Resource Indicator) of the Objects A, B and C.
- [63] The REASON field provides information on the reason why the logging node has been generated, namely, why the node has logged. The Log/Logging node can be generated according to a logging request of an external device or according to a scheduling stored in the DM client. When the Log/Logging node is generated according to the logging request of the external device, the REASON field has an ID with respect to the logging request. In case that the Log/Logging node is generated according to the scheduling, the REASON field has an ID of the scheduling.
- [64] In a different embodiment, a method for synchronizing an e-mail by using the additional attribute will now be described. When a mail server and a mail client communicate with each other by using a DataSync method, various message flags are used as additional attributes of a message object node to synchronize message objects stored in the mail server to the mail client.
- [65] FIG. 5 is a view showing the message object node of the mail server having the common attributes and additional attributes according to the present invention. As shown, the message object nodes (message object 1, message object 2 and message object 3) have the common attributes required for every node and the additional attributes required according to characteristics of each node.
- [66] For example, the common attributes may include ACCESS CONTROL LIST, FORMAT, NAME, SIZE, TIME STAMP, TYPE and MANAGEMENT TYPE fields. The ACCESS CONTROL LIST field indicates a list of mail clients that have authority of accessing a corresponding message object, the FORMAT field indicates an encoding type of a resource belonging to the message object node, the NAME field indicates the name of a node, and the SIZE field indicates a size of a stored message. The TIME STAMP field indicates a time point at which a message was finally changed, so in case of a new message, the TIME STAMP field indicates time at which the new message was received, in case of a message deleted after being read, the TIME STAMP field indicates time at which the message was deleted, and in case of a message for which a reply was sent in response to the message, the TIME STAMP

field indicates time at which the replay was sent. In order for the mail client to recognize a type of the corresponding node, it uses the MANAGEMENT TYPE filed.

[67] The ACCESS CONTROL LIST, FORMAT, NAME, SIZE, TIME STAMP, TYPE fields are examples of nodes required for every node of the mail server, and MANAGEMENT TYPE field allows the mail client to recognize a type of a corresponding node when managing nodes by using the additional attributes.

[68] An additional attribute of the message object node includes at least one or more fields such as SEEN, DELETED, RECENT, DRAFT, ANSWERED fields. The SEEN field indicates whether a message has been read, the DELETED field indicates whether the message has been deleted, the RECENT field indicates whether a new message has been received, the ANSWERED field indicates whether a response of a message has been sent, and the DRAFT field indicates that a message has been created but not sent.

[69] When a new message is received by the mail server, the mail server stores every received message as a message object and manages it. FIG. 5 shows a case, for example, that three messages are received by the mail server, and in a MailBox node, message objects 1, 2 and 3 are generated.

[70] The message objects 1, 2 and 3 have common attributes of "MANAGEMENT TYPE=message" to allow the mail client to recognize that the nodes relate to messages. Values of the fields of the additional attributes are different in each message object as described in the following:

[71] (1) Newly received message:

[72] - SEEN=False

[73] - DELETED=False

[74] - RECENT=True

[75] - DRAFT=False

[76] - ANSWERED=False

[77] Because the newly received message has not been read yet, SEEN=False, because it has not been deleted, DELETED=False, because it is not temporarily created one, DRAFT=False, because a reply to the message has not been sent, ANSWERED=False, and because it has been recently received, RECENT=True.

[78]

[79] (2) A message to which a reply has been sent

[80] - SEEN=True

[81] - DELETED=False

[82] - RECENT=False

[83] - DRAFT=False

[84] - ANSWERED=True

[85] Because the replay has been sent after the message was read, the attributes SEEN

and ANSWERED are True, while other attributes have the value of False.

[86]

[87] (3) The message is deleted after the replay was sent

[88] - SEEN=True

[89] - DELETED=True

[90] - RECENT=False

[91] - DRAFT=False

[92] - ANSWERED=True

[93] Because the reply was sent after the message was read, the values of SEEN and ANSWERED fields are True, and because the message was deleted, the values of the DELETED field is True. Values of other filed are False.

[94] FIG. 6 is a view showing the message object nodes of the mail server having an integrated attribute according to the present invention. In this case, the mail server communicates with the mail client according to the DataSync method, and the message object nodes include fields for indicating a state of each message object node.

[95] The message object nodes can basically include the integrated attribute including ACCESS CONTROL LIST, FORMAT, NAME, SIZE, TIME STAMP and TYPE fields. The ACCESS CONTROL LIST field indicates a list of mail clients that have authority of accessing a corresponding message object, the FORMAT field indicates an encoding type of a resource belonging to the message object node, the NAME field indicates the name of a node, and the SIZE field indicates a size of a stored message. The TIME STAMP field indicates a time point at which a message was finally changed, so in case of a new message, the TIME STAMP field indicates time at which the new message was received, in case of a message deleted after being read, the TIME STAMP field indicates time at which the message was deleted, and in case of a message for which a reply was sent in response to the message, the TIME STAMP field indicates time at which the replay was sent.

[96] The integrated attribute can further include SEEN, DELETED, RECENT, DRAFT and ANSWERED fields. Namely, various fields are used to synchronize the message object nodes stored in the mail server and the mail client. The SEEN field indicates whether a message has been read, the DELETED field indicates whether the message has been deleted, the RECENT field indicates whether a message is a newly received message, the ANSWERED field indicates whether a reply was sent in response to a message, and the DRAFT field indicates whether a message has been created but not sent yet.

[97] FIG. 7 illustrates a data synchronization process between the mail client and the mail server according to the present invention. As shown, a mail client A and a mail client B can access a message stored in the mail server through the DataSync. The mail

clients A and B can be a mobile terminal, a laptop computer, a desktop computer that can communicate with the mail server.

- [98] When the mail server receives a new mail (step S101), it generates a new message object for the received message. (step S102). In this case, an additional attribute of the message object has fields such as SEEN=False, DELETED=False, RECENT=True, DRAFT=False, ANSWERED=False. Because the message is a newly received message, value of RECENT field is True and values of the other remaining fields are False.
- [99] When the mail client A is connected with the mail server (step S103), an initial synchronization is performed between the mail client A and the mail server (step S104). In the initial synchronization process, the mail server checks that there is a new mail which has not been read yet. Then, the mail server transmits a notification message to inform the mail client that there is the new mail has been received (step S105). Thereafter, the mail server changes a value of the RECENT from True to False.
- [100] Upon receiving the notification message, the mail client A transmits a text Sync request to the mail server in order to check the received mail (step S106). Upon receiving the text Sync, the mail server provides the text content to the mail client A (step S107) and changes the fields of the additional attribute. Because the message is read upon the request of the text Sync of the mail client A, the value of the SEEN field is changed from False to True. Thus, the fields of the additional attribute have the following values: SEEN=True, DELETED=False, RECENT=False, DRAFT=False and ANSWERED=False.
- [101] Thereafter, the mail client A and the mail server are disconnected (step S108), and when the mail client B requests connection to the mail server (step S109), initial synchronization is made between the mail server and the mail client B (step S110). In this case, the fields of the additional attribute have the following values: SEEN=True, DELETED=False, RECENT=False, DRAFT=False and ANSWERED=False.
- [102] Subsequently, when the mail client B requests deletion of the message from the mail server (step S111), the fields of the additional attribute are changed. Because the request is made to delete the already read mail, the value of the SEEN field which has been True is not changed and the value of the DELETED field is changed from False to True. Accordingly, the additional attribute of the message object in the mail server has fields such as SEEN=True, DELETED=True, DRAFT=False and ANSWERED=False.
- [103] Accordingly, the user can read or delete the message of the mail server, or send a reply to the message, by using the plurality of mail clients such as the mobile phone, the PDA or the notebook computer. Such content is recorded in the mail server through synchronization with the mail server. Thereafter, when the user is connected with the

mail server again by using a different mail client, the previously operated content appears as it is.

[104] As so far described, the DM method and the DM client using additional attributes according to the present invention have the following advantages.

[105] That is, for example, first the attributes specific to a corresponding node, as well as the attributes common to every node, can be included in the node attributes and the management method can be differentiated according to a type of each node.

[106] Namely, recognizing the problem that every node cannot be effectively managed with the same attributes because characteristics of resources belonging to each node are different, the inventor of the present invention solves the problem as described above.

[107] In addition, because an additional attribute are assigned only to a particular node, various values can be stored by using a smaller space of a memory.

[108] The foregoing embodiments and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art. In the claims, means-plus-function clauses are intended to cover the structure described herein as performing the recited function and not only structural equivalents but also equivalent structures.

Claims

- [1] A device management (DM) client, comprising:
a node including a common attribute and an additional attribute;
wherein the common attribute includes at least one field that is common to every node, and the additional attribute includes at least one field that is specified to each node.
- [2] The client of claim 1, wherein the field of the common attribute includes information on a type or a state of the additional attribute.
- [3] The client of claim 1, wherein if the node relates to log data, the field of the additional attribute includes information on the location of original data to be logged.
- [4] The client of claim 3, wherein the information is a URI (Uniform Resource Indicator) where the original data to be logged was located.
- [5] The client of claim 1, wherein if the node relates to log data, the field of the additional attribute includes information on a reason why the log data has been generated.
- [6] The client of claim 5, wherein if the log data has been generated according to a scheduling command, the field of the additional attribute includes a scheduling ID.
- [7] The client of claim 5, wherein if the log data has been generated according to a logging request of an external device, the field of the additional attribute includes an ID of the logging request.
- [8] The client of claim 1, wherein if the node relates to an e-mail message, the field of the additional attribute includes information on whether a message object of the node has been read.
- [9] The client of claim 1, wherein if the node relates to the e-mail message, the field of the additional attribute includes information on whether the message has been deleted.
- [10] The client of claim 1, wherein if the node relates to the e-mail message, the field of the additional attribute includes information on whether the message is a newly received message.
- [11] The client of claim 1, wherein if the node relates to the e-mail message, the field of the additional attribute includes information indicating that the message has been created but not sent yet.
- [12] The client of claim 1, wherein if the node relates to the e-mail message, the field of the additional attribute includes information on whether a reply to the message has been sent.

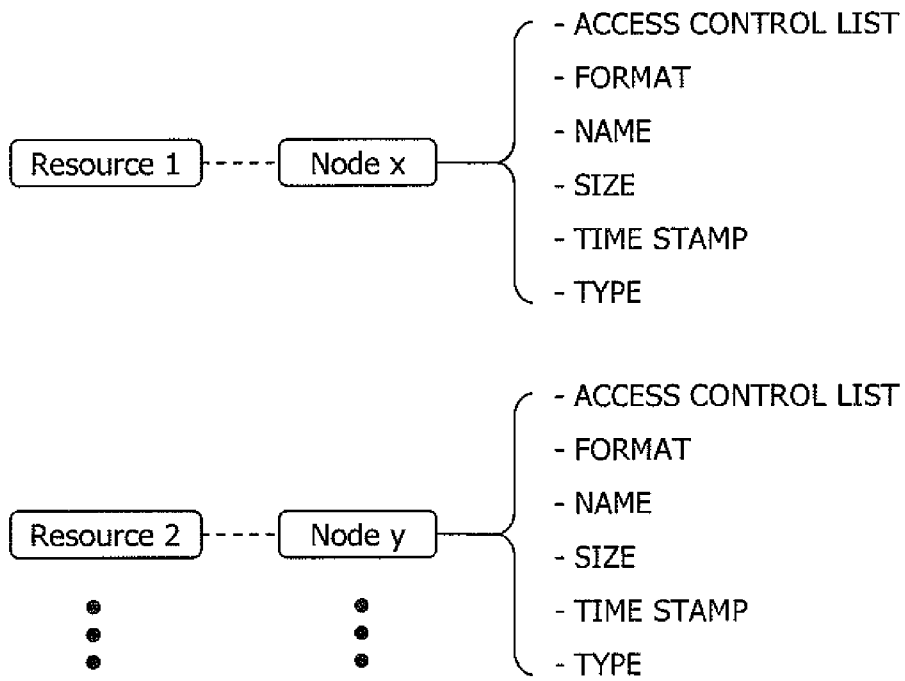
- [13] A device management method comprising:
receiving a command for generating a node; and
generating a node including a common attribute and an additional attribute,
according to the command;
wherein the common node includes at least one filed that is common to every
node, and the additional attribute includes at least one filed that is specified to
each node.
- [14] The method of claim 13, wherein the command comprises instructions to
generate the common attribute having the filed, and the additional attribute
having the filed.
- [15] The method of claim 13, wherein the filed of the common attribute includes in-
formation indicating a type and a state of the additional attribute.
- [16] The method of claim 13, wherein if the generated node relates to log data, the
filed of the additional attribute includes information indicating the location of the
original data to be logged.
- [17] The method of claim 13, wherein if the generated node relates to log data, the
filed of the additional attribute includes information indicating a reason of the
generation of the log data.
- [18] The method of claim 13, wherein if the generated node relates to an e-mail m
essage, the filed of the additional attribute includes information indicating
whether a message has been read.
- [19] The method of claim 13, wherein if the generated node relates to an e-mail
message, the filed of the additional attribute includes information indicating
whether the message has been deleted.
- [20] The method of claim 13, wherein if the generated node relates to an e-mail
message, the filed of the additional attribute includes information indicating that
the message is a newly received message.
- [21] The method of claim 13, wherein if the generated node relates to an e-mail
message, the filed of the additional attribute includes information indicating that
the message has been created but not sent yet.
- [22] The method of claim 13, wherein if the generated node relates to an e-mail
message, the field of the additional attribute includes information indicating that
a reply to the message has been sent in the additional attribute.
- [23] A device management(DM) client comprising:
a node including a common attribute and an additional attribute;
wherein, the common attribute includes at least one filed that is common to every
node and the additional attribute includes at least one filed that relates to log in-
formation.

- [24] The client of claim 23, wherein the field of the common attribute includes information indicating that the node relates to the log information.
- [25] The client of claim 23, wherein a first field of the additional attribute may be a 'DATASOURCE' field indicating the location of original data to be logged and a second field of the additional attribute may be a 'REASON' field indicating a reason of generation of the log data.
- [26] The client of claim 25, wherein when the node has been generated according to a logging request from outside, the 'REASON' field includes an ID of the logging request.
- [27] The client of claim 25, wherein when the node has been generated according to a scheduling command, the 'REASON' field includes a scheduling ID.
- [28] The client of claim 25, wherein the 'DATASOURCE' field includes a URI where the original data to be logged was located.
- [29] A device management (DM) client comprising:
a node including a common attribute and an additional attribute;
wherein the common attribute includes at least one field that is common to every node in the DM client and the additional attribute includes at least one field indicating a state of a received message.
- [30] The client of claim 29, wherein the field of the common attribute includes information indicating that the node relates to an e-mail message.
- [31] The client of claim 29, wherein the field of the additional attribute indicates whether the message has been read.
- [32] The client of claim 29, wherein the field of the additional attribute indicates whether the message has been deleted.
- [33] The client of claim 29, wherein the field of the additional attribute indicates whether the message has been newly received.
- [34] The client of claim 29, wherein the field of the additional attribute indicates that the message has been created but not sent yet.
- [35] The client of claim 29, wherein the field of the additional attribute indicates whether a reply to the message has been sent.
- [36] A device management method in a mail server that communicates with a plurality of mail clients, comprising:
receiving a message from any mail client;
generating a message object node including an additional attribute which includes at least one field indicating a state of the received message; and
changing the field of the additional attribute according to a message processing request from the mail client and storing it.
- [37] The method of claim 36, further comprising:

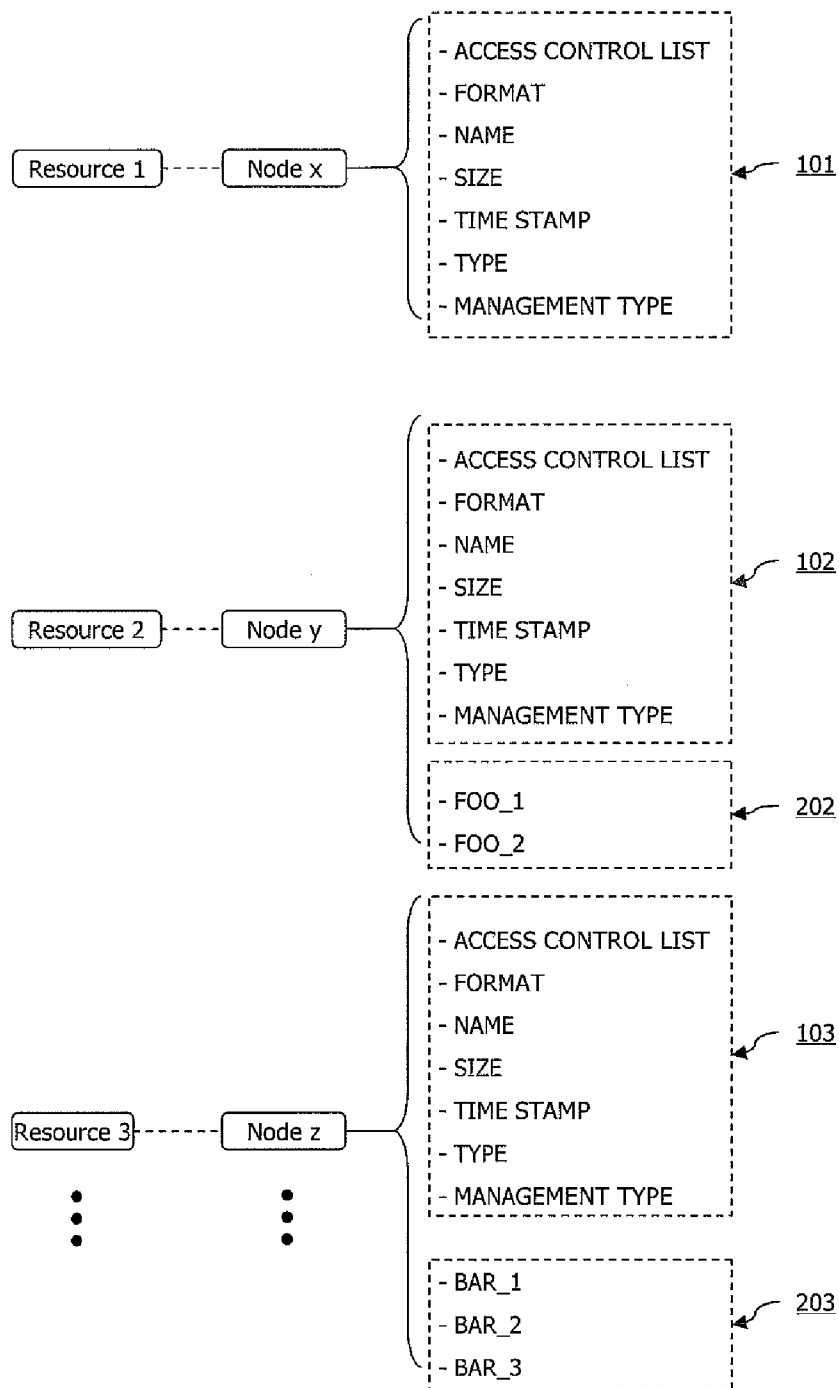
- performing initial synchronization when the mail client is connected with the mail server; and
- providing information in the field of the additional attribute to the mail client.
- [38] The method of claim 36, wherein the field of the additional attribute indicates whether the message has been read.
- [39] The method of claim 38, wherein the field of the additional attribute is changed when the mail server receives a request for synchronizing the message from the mail client.
- [40] The method of claim 36, wherein the field of the additional attribute indicates whether the message has been deleted.
- [41] The method of claim 40, wherein the field of the attribute value is changed when the mail server receives a request for deleting the message from the mail client.
- [42] The method of claim 36, wherein the field of the additional attribute indicates whether the message is a newly received message.
- [43] The method of claim 42, wherein the field of the additional attribute is changed after the mail server informs the mail client about the reception of the message.
- [44] The method of claim 36, wherein the field of the additional attribute indicates that the message has been not sent to a recipient mail client.
- [45] The method of claim 44, wherein the field of the additional attribute is changed when the mail server receives a request for storing the newly created message from the mail client.
- [46] The method of claim 36, wherein the field of the additional attribute indicates that a reply to the message has been sent.
- [47] The method of claim 46, wherein the field of the attribute value is changed when the mail server receives a request for sending the reply.
- [48] A device management client, comprising:
a node including at least one attribute with respect to log data for a management object.
- [49] The client of claim 48, wherein a value of the attribute is determined according to the log information, respectively.
- [50] The client of claim 48, wherein a first attribute with respect to the log data corresponds to 'DATASOURCE' indicating a location of the original data to be logged and a second attribute with respect to the log data corresponds to 'REASON' indicating a reason of the generation of the log data.
- [51] The client of claim 50, wherein when the node has been generated according to a logging request from outside, the 'REASON' includes an ID of the logging request.
- [52] The client of claim 50, wherein when the node has been generated according to a

- scheduling command, the 'REASON' includes a scheduling ID.
- [53] The client of claim 50, wherein the 'DATASOURCE' includes a URI where the original data to be logged was located.
- [54] A device management client comprising:
a message object including at least one attribute with respect to a received message .
- [55] The client of claim 54, wherein the attribute indicates a state of a message object to which they belong, respectively.
- [56] The client of claim 54, wherein the attribute indicates whether a message has been read.
- [57] The client of claim 54, wherein the attribute indicates whether the message has been deleted.
- [58] The client of claim 54, wherein the attribute indicates whether the message has been newly received.
- [59] The client of claim 54, wherein the attribute indicates that the message has been created but not sent yet.
- [60] The client of claim 54, wherein the attribute indicates whether a reply to the message has been sent.

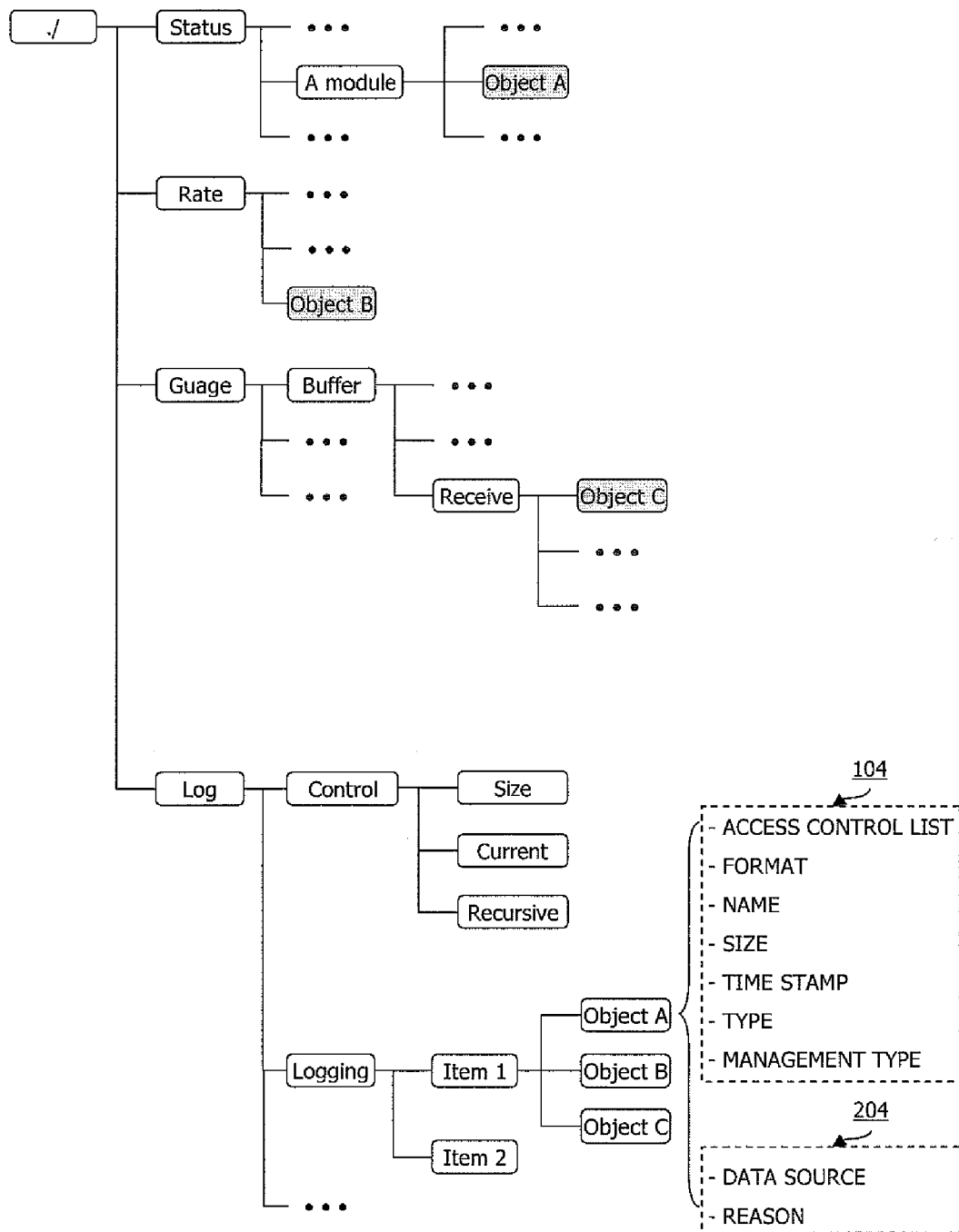
[Fig. 1]



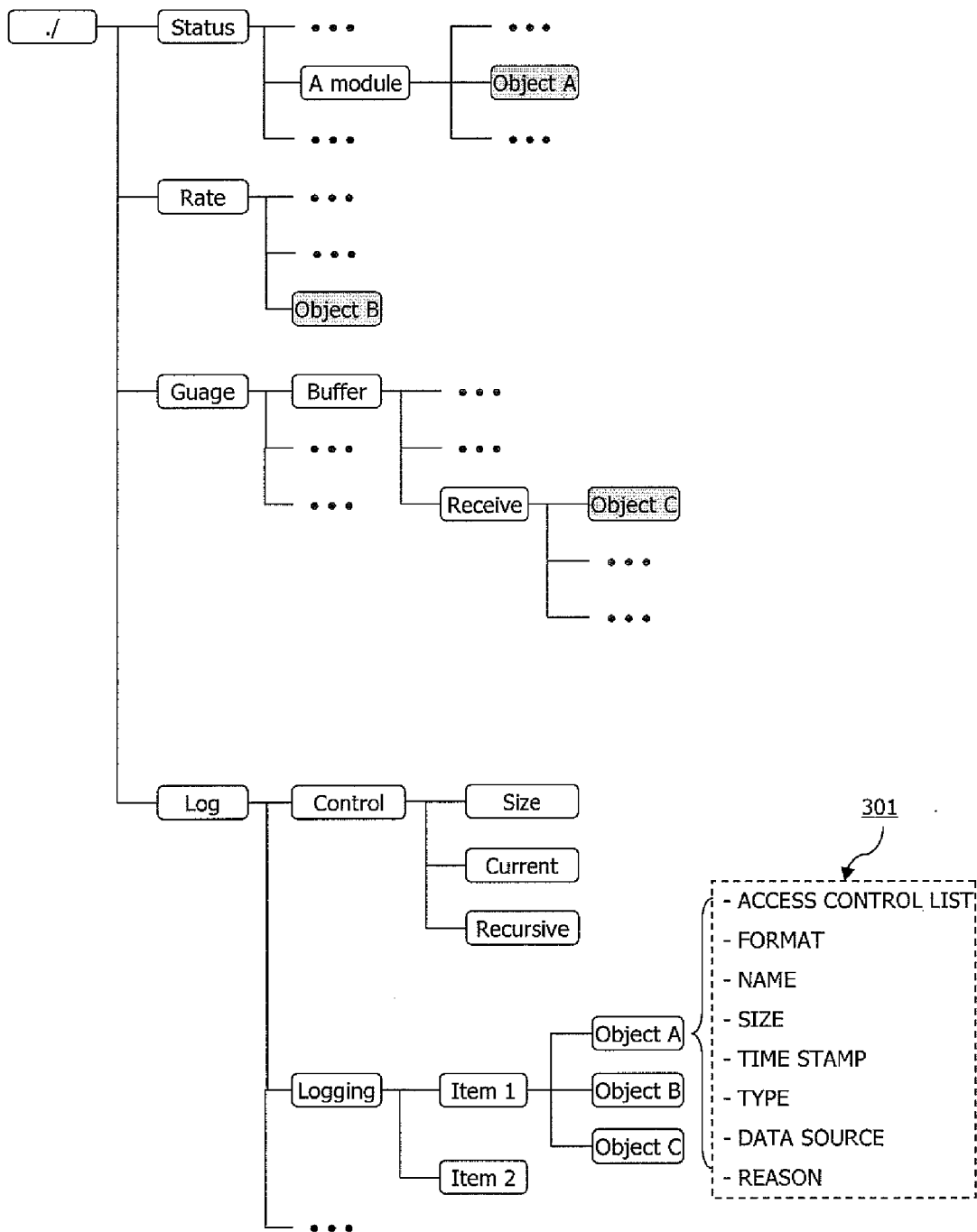
[Fig. 2]



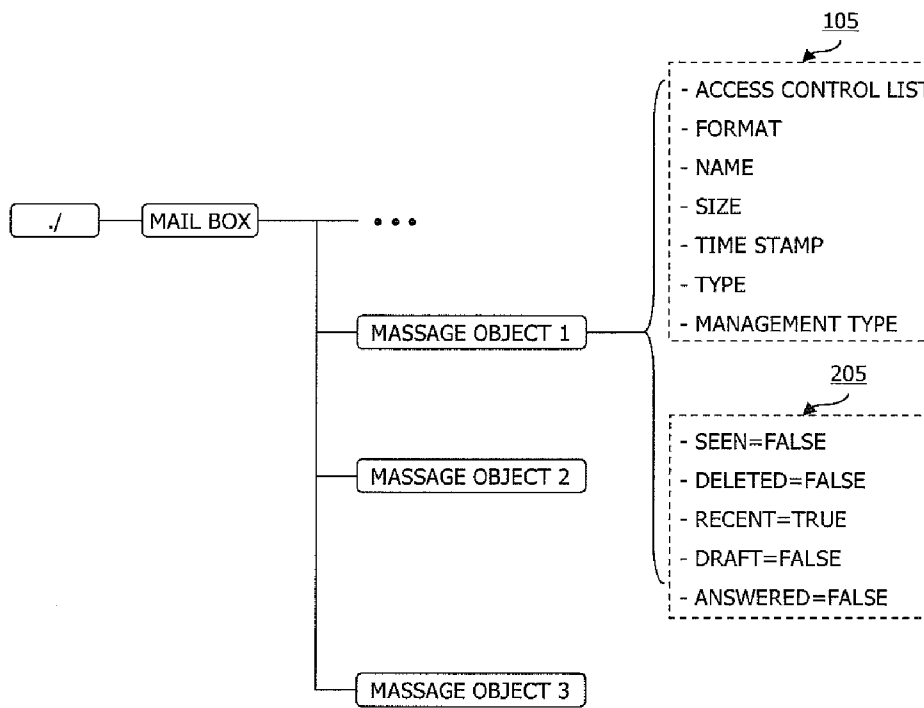
[Fig. 3]



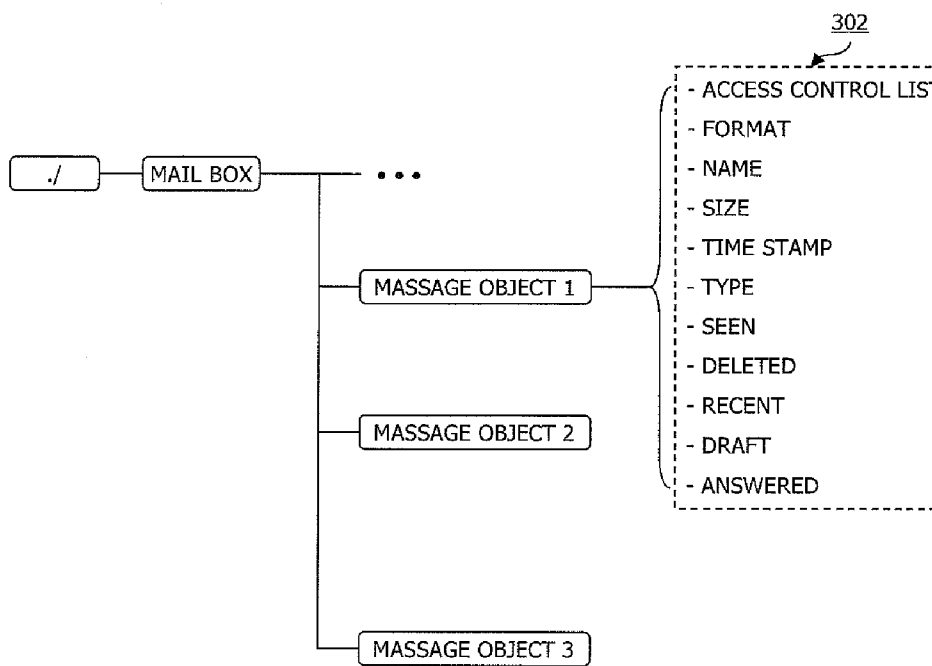
[Fig. 4]



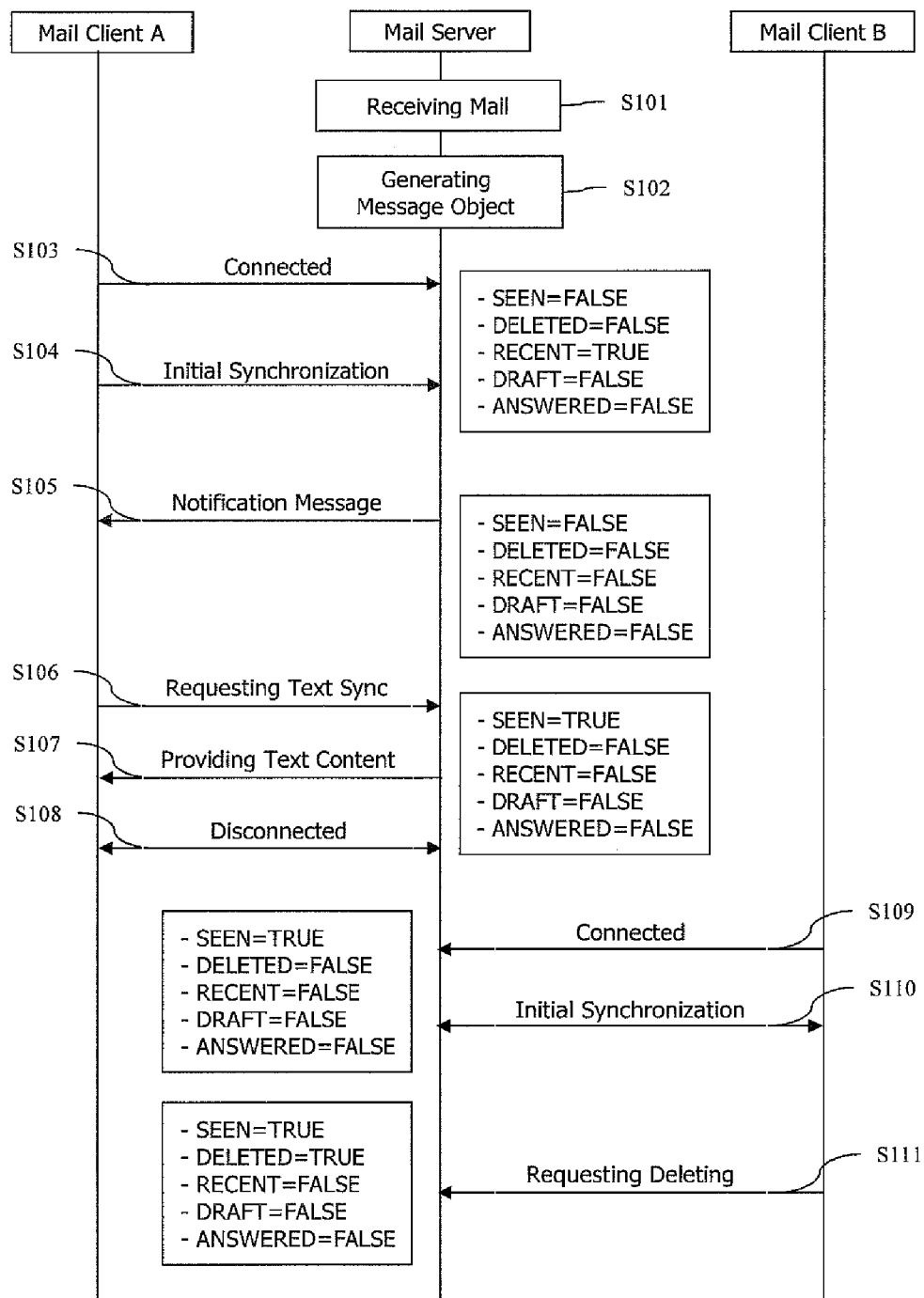
[Fig. 5]



[Fig. 6]



[Fig. 7]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2006/003945**A. CLASSIFICATION OF SUBJECT MATTER****H04L 12/24(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC8: GO6F 15/173, H04L 12/24, G05B 19/042

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and applications for inventions since 1975Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPI, eKIPASS(KIPO internal) "Keyword: device management, attribute"**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 6,574,662 B2 (AKIRA SUGIYAMA. et al) 3 June 2003 See abstract; figs. 1, 4, 10, 11; claims 1-4, 6, 7.	1, 13, 23, 29, 36 2, 14, 30, 31, 34, 37, 49, 55, 56, 59
X A	US 2003-0204640 A1 (SAHINOJA MIKKO. et al) 30 October 2003 See abstract; claims 1-4, 9, 24.	1, 13, 23, 29, 36 2, 14, 15, 16, 24, 37, 49, 55
X A	US 6,874,021 B1 (CHUNGUANG. et al) 29 March. 2005 See abstract; fig. 1; claims 1, 3, 5.	1, 13, 23, 29, 36 2, 14, 49, 50, 55, 56
A	US 5,960,214 A (RICHARD R. SHARPE, JR. et al) 28 September. 1999 See abstract; claims 1-3, 7, 9, 13.	1, 2, 13, 14, 15, 23, 24, 29, 30, 31, 37, 49, 55

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

12 JANUARY 2007 (12.01.2007)

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Name and mailing address of the ISA/KR

Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

YANG, CHAN HO

Telephone No. 82-42-481-5689



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2006/003945

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