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(54) **ACCESS CONTROL SYSTEM AND METHOD FOR USE BY AN ACCESS DEVICE**

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Related U.S. Application Data

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(60) Provisional application No. 61/309,813, filed on Mar. 2, 2010.

(51) **Int. Cl.**

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G07C 9/00	(2006.01)
G06Q 20/04	(2012.01)
G06Q 20/32	(2012.01)
G06Q 20/38	(2012.01)
G06Q 30/06	(2012.01)
G07F 5/26	(2006.01)
G07F 15/00	(2006.01)
H04L 29/06	(2006.01)
B60L 11/18	(2006.01)

(52) **U.S. Cl.**

CPC ***G07C 9/00007*** (2013.01); ***B60L 11/1846*** (2013.01); ***B60L 11/1848*** (2013.01); ***G06Q 20/045*** (2013.01); ***G06Q 20/32*** (2013.01); ***G06Q 20/3223*** (2013.01); ***G06Q 20/38215*** (2013.01); ***G06Q 30/06*** (2013.01); ***G07F 5/26*** (2013.01); ***G07F 15/005*** (2013.01); ***H04L 9/3247*** (2013.01); ***H04L 9/3263*** (2013.01); ***H04L 63/0428*** (2013.01); *B60L 2230/40* (2013.01); *H04L 2209/56* (2013.01); *H04L 2209/80* (2013.01); *H04L 2209/84* (2013.01); *Y02T 10/7005* (2013.01); *Y02T 10/7088* (2013.01); *Y02T 90/12* (2013.01); *Y02T 90/121* (2013.01); *Y02T 90/128* (2013.01); *Y02T 90/14* (2013.01); *Y02T 90/16* (2013.01); *Y02T 90/163* (2013.01); *Y02T 90/169* (2013.01); *Y04S 30/14* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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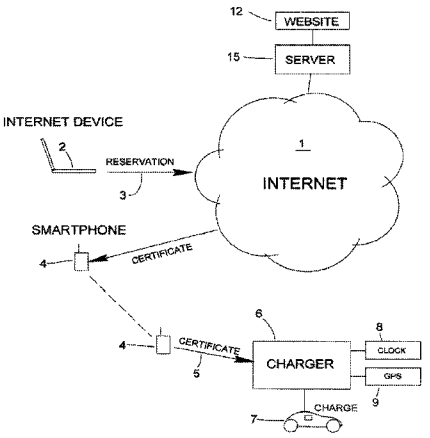
(57) **ABSTRACT**

Systems and methods are provided to allow a smart phone or any terminal to activate a door lock using a web site or server computer system. An access control system is provided that includes a server and an access device. The access device includes a processor and a communication module. The process has control of a door lock and is able to receive a reservation certificate presented by a portable terminal through the communication module. The processor activates the door lock when a current reservation certificate has been presented.

24 Claims, 7 Drawing Sheets



ASSA ABLOY-HID EXHIBIT 1001

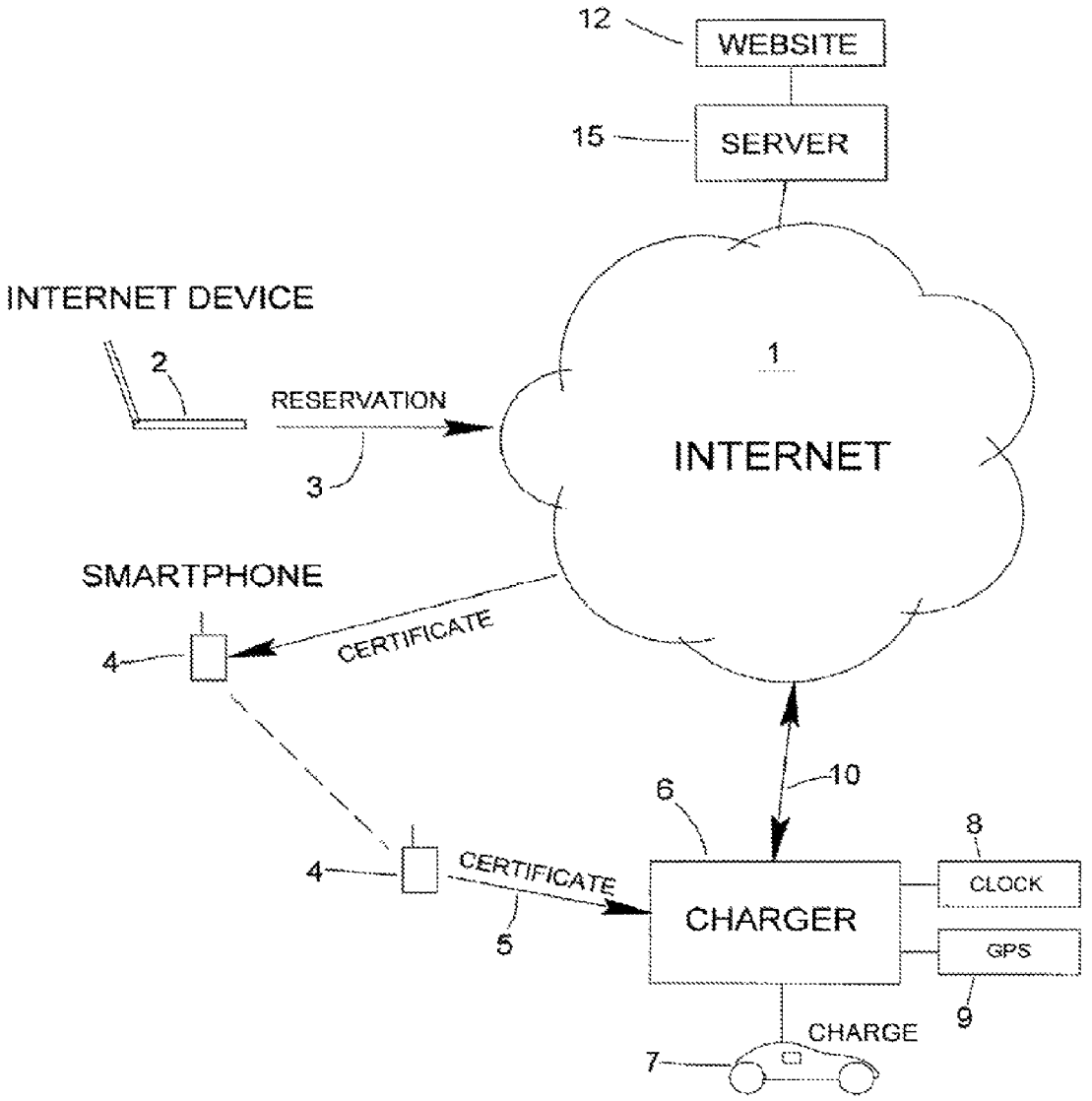

12
WEBSITE
15
SERVER
INTERNET DEVICE
2
RESERVATION
3
1
INTERNET
SMARTPHONE
4
CERTIFICATE
10
6
8
4
CERTIFICATE
5
CHARGER
CLOCK
GPS
9
CHARGE
7

FIG. 1

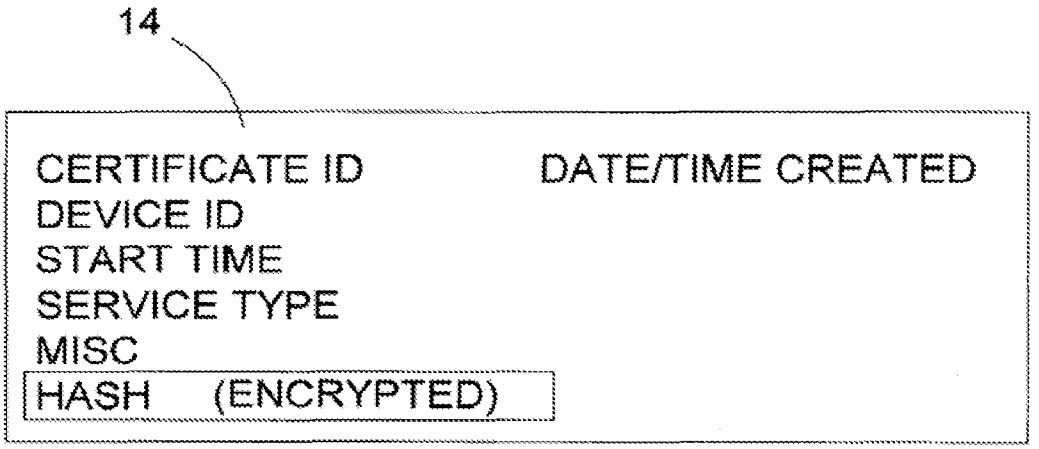

14
CERTIFICATE ID
DATE/TIME CREATED
DEVICE ID
START TIME
SERVICE TYPE
MISC
HASH (ENCRYPTED)

FIG. 2

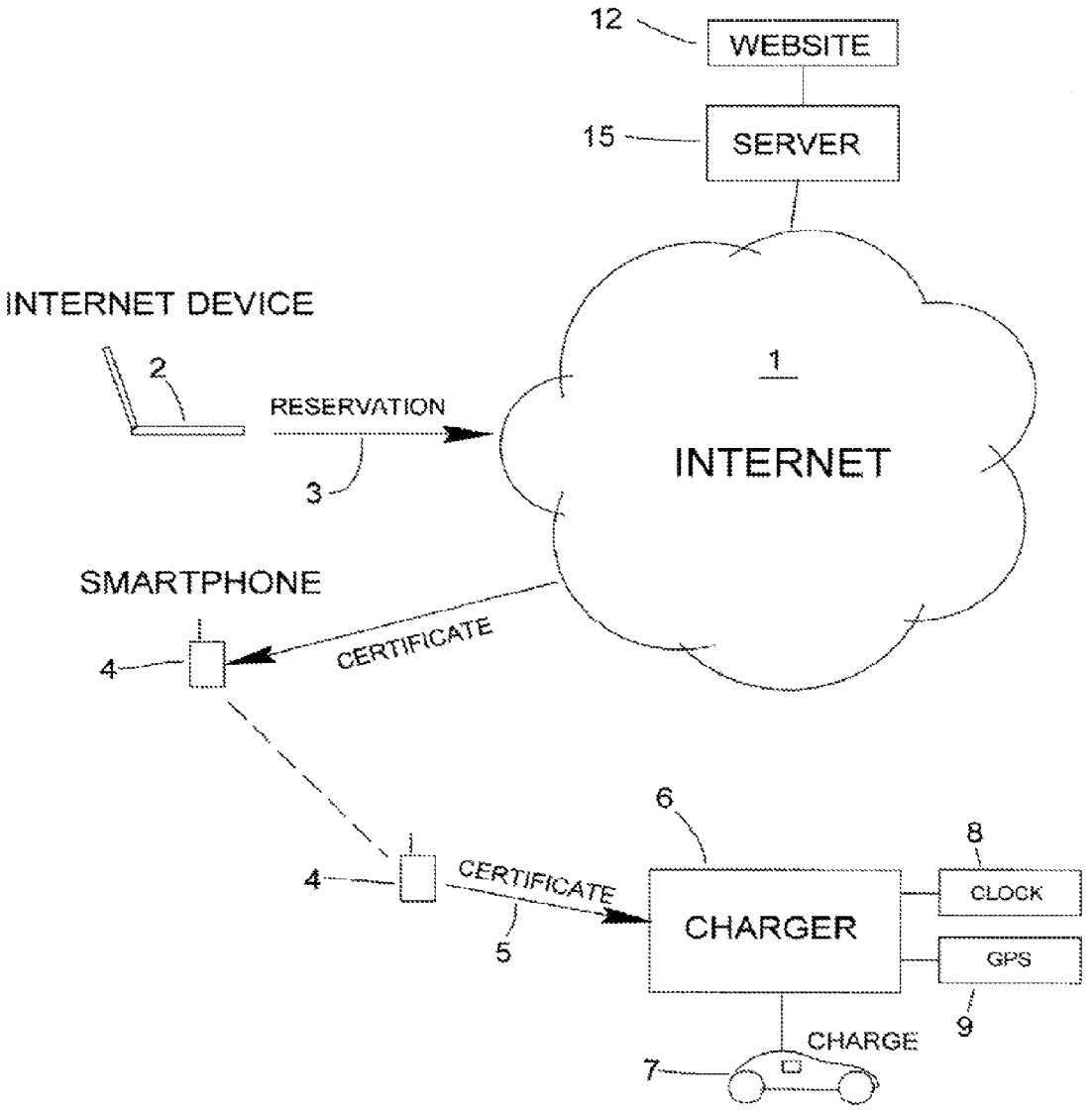

12
WEBSITE
15
SERVER
INTERNET DEVICE
2
RESERVATION
3
1
INTERNET
SMARTPHONE
4
CERTIFICATE
6
8
4
CERTIFICATE
CHARGER
CLOCK
5
GPS
9
CHARGE
7

FIG. 3

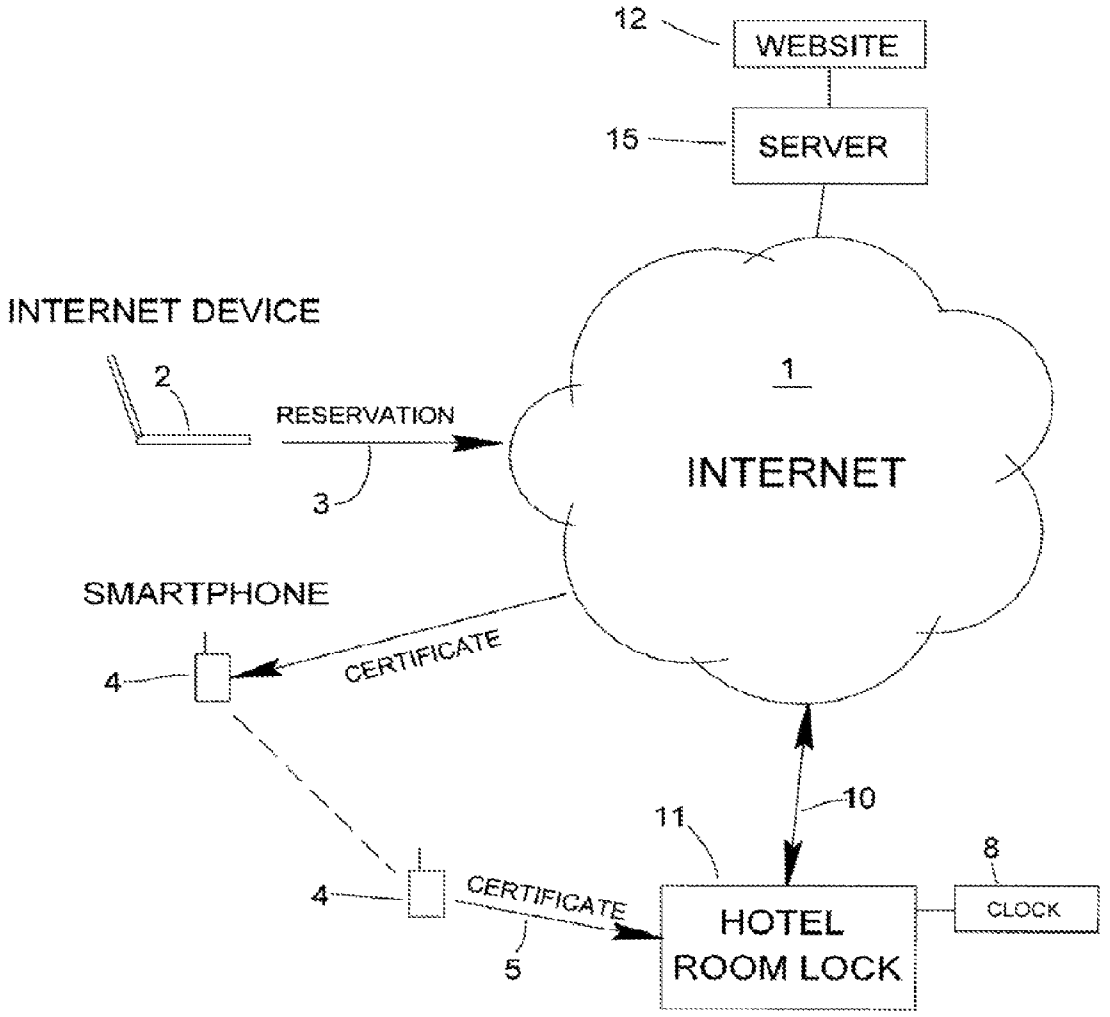

12
WEBSITE
15
SERVER
INTERNET DEVICE
2
RESERVATION
3
1
INTERNET
SMARTPHONE
4
CERTIFICATE
10
11
8
4
CERTIFICATE
5
HOTEL
ROOM LOCK
CLOCK

FIG. 4

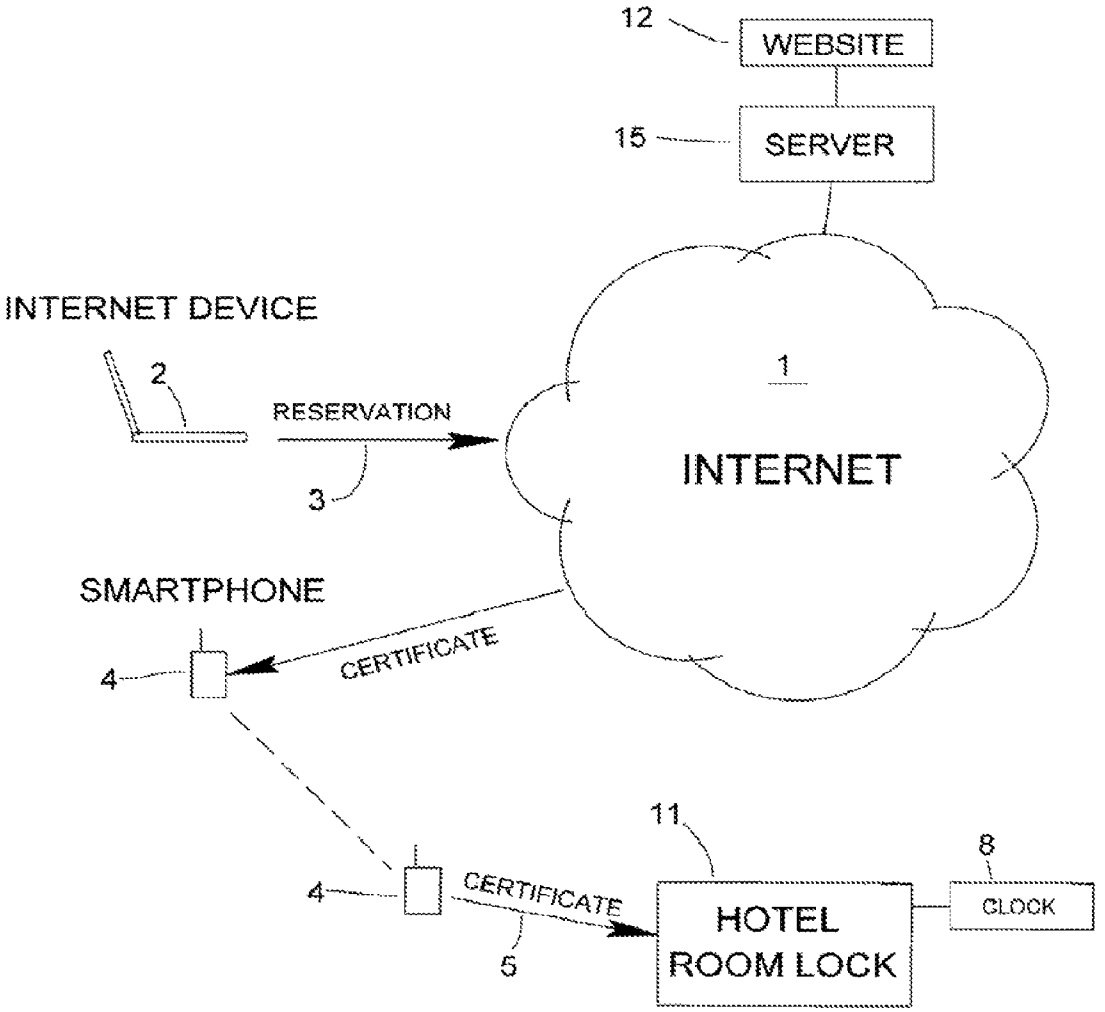

12
WEBSITE
15
SERVER
INTERNET DEVICE
2
RESERVATION
3
1
INTERNET
SMARTPHONE
4
CERTIFICATE
11
8
4
CERTIFICATE
5
HOTEL
ROOM LOCK
CLOCK

FIG. 5

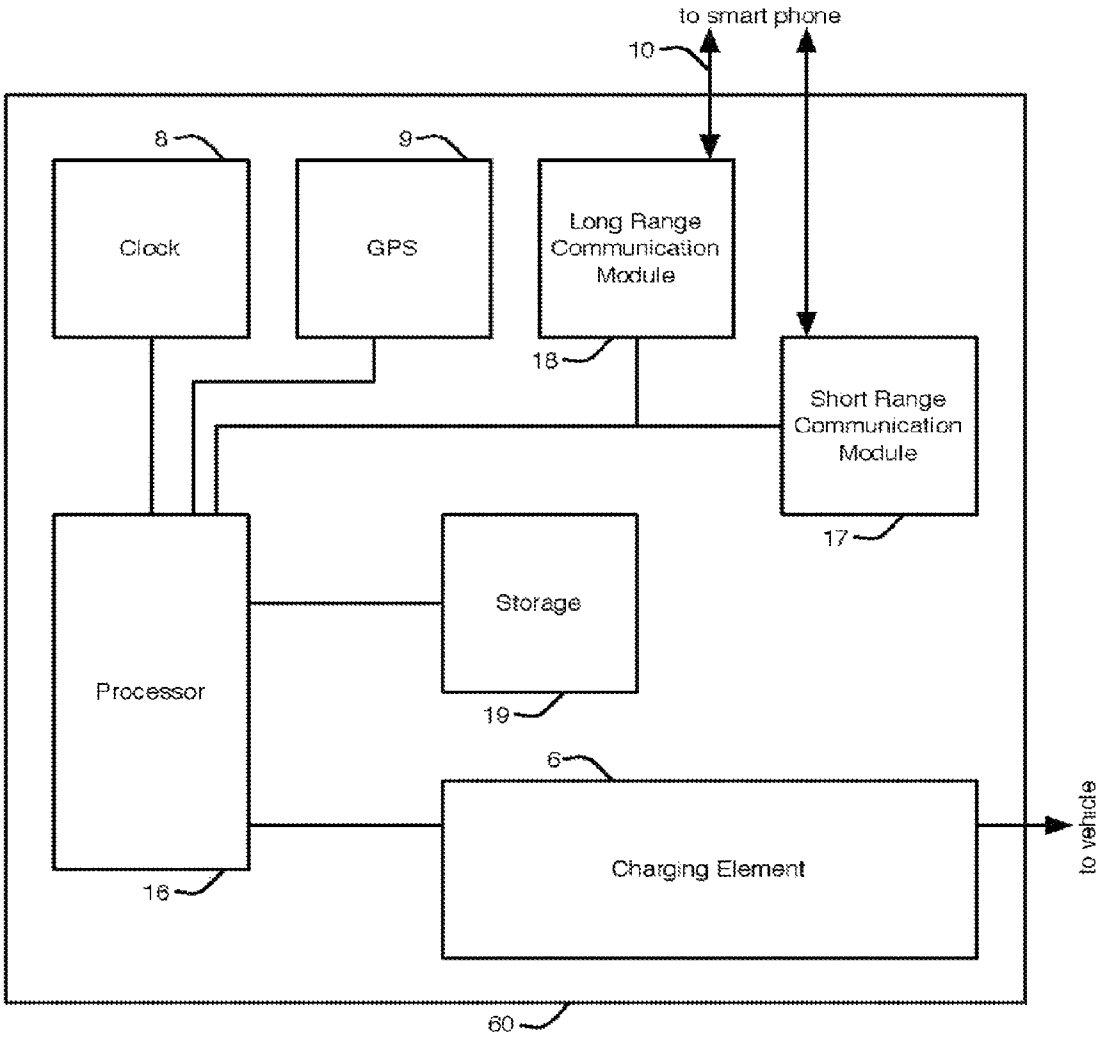

to smart phone
10
8
9
Clock
GPS
Long Range Communication Module
18
Short Range Communication Module
17
Processor
Storage
19
6
Charging Element
to vehicle
16
60

FIG. 6

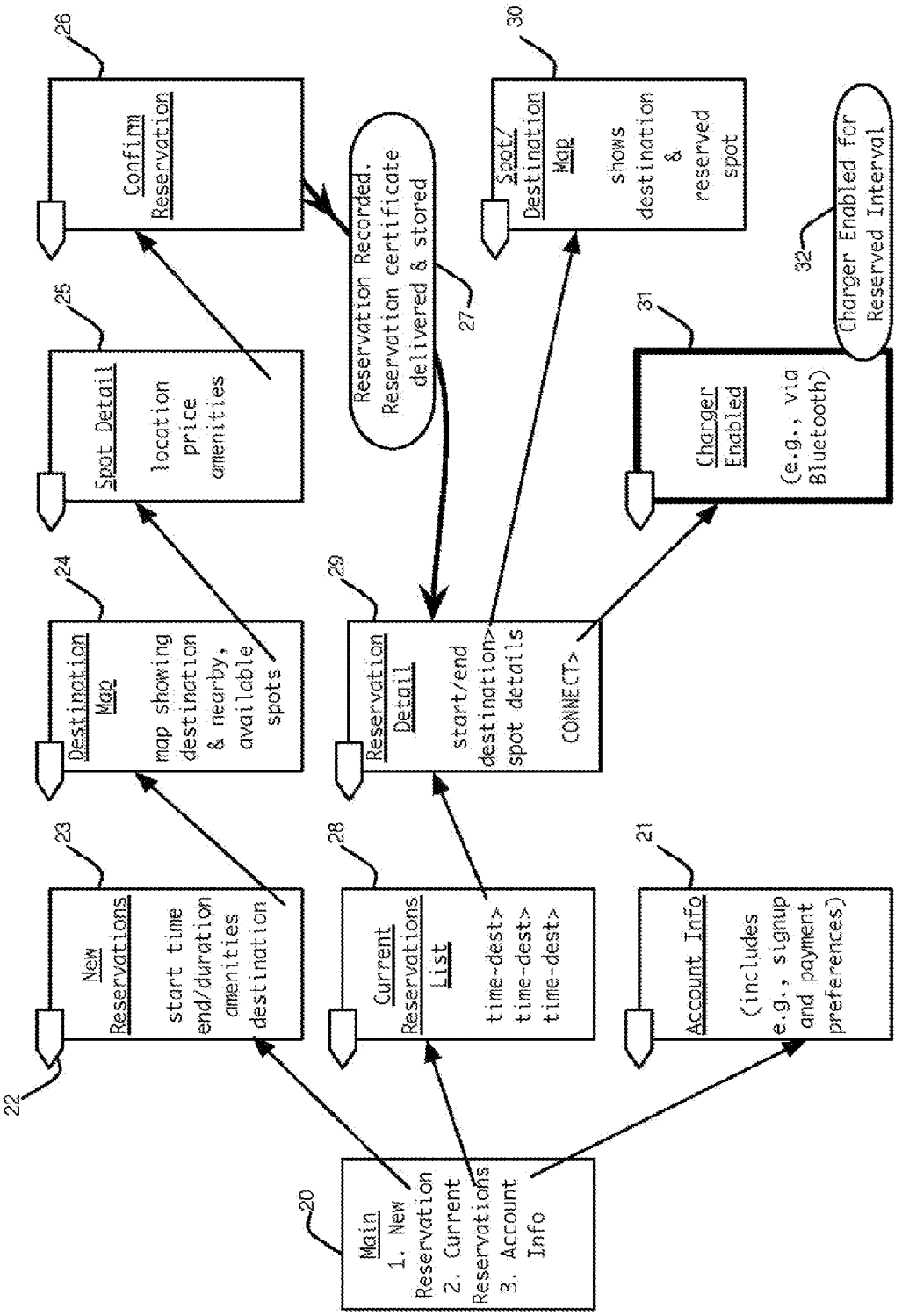

Main
1. New Reservation
2. Current Reservations
3. Account Info
20
New Reservations
start time
end/duration
amenities
destination
22
23
Current Reservations List
time-dest>
time-dest>
time-dest>
28
Account Info
(includes e.g., signup and payment preferences)
21
Destination Map
map showing destination & nearby, available spots
24
Reservation Detail
start/end
destination>
spot details
CONNECT>
29
Spot Detail
location
price
amenities
25
Confirm Reservation
26
Reservation Recorded. Reservation certificate delivered & stored
27
Spot/ Destination Map
shows destination & reserved spot
30
Charger Enabled
(e.g., via Bluetooth)
31
Charger Enabled for Reserved Interval
32

FIG. 7

ACCESS CONTROL SYSTEM AND METHOD FOR USE BY AN ACCESS DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation of U.S. patent application Ser. No. 13/582,467, filed Sep. 4, 2012, now U.S. Pat. No. 8,996,876, which is a national stage application of PCT Application No. PCT/US11/26781, filed Mar. 2, 2011, which claims the benefit of U.S. Provisional Patent Application No. 61/309,813, filed Mar. 2, 2010. All of the above mentioned applications are incorporated by reference herein in their entireties.

INTRODUCTION

Electric vehicles are rapidly gaining in popularity. With these electric vehicles, charge points, or chargers where the vehicle can charge its batteries, will also become ubiquitous. The simplest charger is simply a kiosk or charge station that a vehicle can plug into and charge. A fee or other access may be required to use this kiosk. In other situations, vehicles will be able to be charged at parking facilities, parking meters and even street lamps. Other electronic access devices such as hotel room locks and the like are also gaining in popularity.

A major problem with a random collection of charge stations is that a driver needing charge may have no idea exactly where to find a charging station that can charge his vehicle using the correct voltage and current, and may have no convenient way to reserve a place or make payments for this service. Of course, kiosks and the like can accept credit cards much like gas pumps; however, there still remains the problem of reservations and correct charging parameters.

Use of the Internet for almost everything has also become very common to many people today. A large percentage of fungible goods today are purchased directly from merchants over the Internet. It would be very desirable to have an easily accessed website that could provide reservation services for charges, including directions to the location of a specific charger and could provide correct charging parameters to that charger. This website could interact with a user's cellular telephone to provide an electronic token or certificate that could be temporarily stored in the phone that could be passed on to an access device such as a vehicle charger, hotel room lock or other access system to allow access and provide any necessary parameters.

Burger in U.S. Published Patent Application number 2010/0031043 teaches a portable electronic authorization method for enabling a user interface on a computer operated by a user to cause the memory content of an electronic device distinct from the computer to be modified. Burger teaches using RFID tags to replace each typical document found in a person's wallet or purse. Burger fails to teach enabling a charger for an electronic vehicle.

It would be advantageous to have a system and method of reserving an electrical vehicle charger on a web page and then transferring a token or certificate to a cellular telephone which could then further transfer this token to the charger to authorize charging.

SUMMARY OF THE INVENTION

The present invention relates to the use of a web site and a cellular telephone, preferably a smart phone, to reserve and activate an electric vehicle charger or to activate and allow access to any access device such as a hotel room lock or the

like. The web site can be general access or restricted access and can allow a user using a browser from a computer, laptop, web-capable cellular telephone, smart phone or any electronic processing device to place a reservation for a particular charger at a particular time window. A server or server computer not hosting a website can also interface directly with a telephone application. The server, or another server, can then transfer a digital token or certificate, which may be wholly or partially encrypted, to the cellular telephone. This certificate may comprise a unique ID and/or a date/time stamp.

The certificate generally has an ID referring to the final access device (for example, a charger), or is encoded in such a way that only the final access device can read and/or verify the message (e.g., the certificate may be encrypted with or signed with a public key for the final access device); whereby the final access device can recognize that the certificate is intended for it. The certificate generally has a start time and duration (or end time), describing the interval during which the final access device has been reserved. Additional options may also be included.

The certificate can also contain a digital authorization (for example, a digital signature) so that the final access device can verify that the certificate is genuine. Each charger or other access device in a particular system may have a unique ID, which can be changed for security.

The certificate can also contain this charger or device ID as well as other information such as approximate time when charging should begin (the reservation time), and the charging parameters.

If a wireless device, such as a laptop or smart phone, is used to carry the certificate, it can be running an application that turns on short-range wireless capability as the reservation time approaches. For simplicity in the following discussion, the term 'smart phone' is used, but will be understood to include any portable computer or PDA, having a wireless communication ability.

As the smart phone approaches the charger or access device, a wireless connection is made (e.g., via Bluetooth™, Zigbee™, or IRDA); notification may be provided to the user of the device's proximity; and the wireless device sends the digital token or certificate to the device. The device can be optionally Internet enabled; however, it does not have to necessarily be. In fact, the present invention is particularly useful for devices that may generally be Internet connected, but for which the connection is unreliable, for example, for chargers employing Wi-Fi connection in a garage or private residence. In such cases, an inopportunely placed truck may block communication, or a weakly secured or informally managed modem and/or router may not provide a sufficiently reliable communication. When the device sees its current unique ID on the received certificate or if the device's private key is usable to decrypt at least a portion of the received certificate, and if the reservation time from the certificate approximately agrees with its internal time-of-day/date clock, the device can allow charging. Communication with the smart phone may also include a message as to the smart phone's own clock-calendar, which may be taken into account for adjusting the clock of the device (as the smart phone may have had more recent connection to an authoritative time source.)

The incoming digital certificate can contain a new, updated unique ID for that charger or access device to assume. Upon assuming the new ID (after charging is complete or access is allowed), the old ID is no longer valid. This prevents hacking or spoofing the device by trying to use the same certificate twice (say by changing the date/time). The certificate can also contain a new encryption decoding key for the next use. This

prevents any decoding of an old or used token or certificate. In this case, since the transaction may not take place (for example, the customer could not find the charger), it is possible for the state of the charger to become ambiguous. It is possible to issue reservations with both the old certificate and the new certificate present simultaneously.

Funds transfer for the access service can be made by the website at the time of reservation from a user's account, from a money transfer service like PAYPAL™ or by receiving funds from a credit card similar to any other e-transaction. In addition, if the charger or access device is web-enabled, the device itself can report back that the charging took place or the access was allowed. Since the digital token or certificate has a reserved charging time, the certificate will die automatically a certain number of minutes or hours after that time in that the charger or access device will no longer allow access based on its time-of-day/date clock.

DESCRIPTION OF THE FIGURES

Attention is now directed to several illustrations that show some of the features of the present invention.

FIG. **1** shows a flow diagram of a reservation and charge from a web-enabled charger.

FIG. **2** shows an embodiment of a digital token or certificate.

FIG. **3** shows a similar flow diagram to that of FIG. **1**, except that the charger is not web-enabled.

FIG. **4** shows the flow with a web-enabled hotel room lock.

FIG. **5** shows the flow of FIG. **3** with a hotel room lock that is not web-enabled.

FIG. **6** shows a block diagram of a charger that might be used with the present invention.

FIG. **7** shows a block diagram of an embodiment of a smart phone application.

Several illustrations and drawings have been presented to aid in understanding the present invention. The scope of the present invention is not limited to what is shown in the figures.

DESCRIPTION OF THE INVENTION

The present invention allows reservation and activation of an electric vehicle charger or an access device like a hotel room lock from a website via a digital token or certificate sent to a cellular telephone or smart phone.

FIG. **1** shows a flow diagram of an embodiment of the present invention. A website **12** is hosted on a server **15** that communicates with the Internet **1**. An Internet terminal device **2** such as a laptop or smart phone has communication with the server **15**, browses the site **12** and initiates a reservation request **3** for charging or access. The website can be either open or secure. If secure, then generally a password is needed to access it. Communications security protocols such as https or IPSec may be used in any part of the system of the present invention.

The website **12** or server **15** can contain information about different services available including the location of possible vehicle chargers **6**. The website or server will generally have a database which lists all chargers/locations (including possible maintenance closures) and all current reservations along with their status. The user can select where he wants to be charged or can be directed to the nearest charger in the system. The reservation **3** can be let for a certain time when charging will begin on a certain date. The user can also supply any parameters concerning charging necessary such as voltage/current requirements, time needed and the like.

After all of the information is gathered, the website causes the server **15** to send a particular digital token or certificate (a "reservation certificate" **5**) to a particular portable terminal, e.g., a cellular telephone or smart phone **4** that the user specifies (which may the phone being used to make the reservation, but it does not need to be). All or part of the digital certificate may be encrypted with a public key for which the private key counterpart is known to only one charger or access device. Similarly, all or part of the digital certificate may be encrypted with a symmetrical key, known to both the server and the charger. All or part of the digital certificate may be encrypted with a private key known only to the server, but for which the public key is known to all compatible chargers, whereby the chargers can authenticate that the encryption was performed by the server. The certificate can contain a unique charger ID code for the target charger **6** or device, the date/time the certificate is issued, the date/time the charging is supposed to take place, the charging parameters, the charging time allocated, a new charger ID code that will replace the old ID, and optionally a new encryption key. Additionally, the certificate can contain communication information necessary to contact the device when in proximity to it, as discussed below. It is also possible that various portions of the message can be in plaintext. This makes it easier for a device to determine if any of many messages is for it without requiring decryption of every message. In this case, part of the certificate should include a hash of portions of the plaintext that would otherwise be exposed to tampering. The hash can then be encrypted by the server (e.g., with the server's private key) so that a charger or device is able to determine the authenticity of the certificate (by decrypting the hash with the server's public key and comparing that hash to one computed from the plaintext).

The charger **6** (or access device **11**, shown in FIG. **4**) may be Internet capable, having connection **10** to Internet **1**, or optionally it may be unconnected to the Internet **1** (as shown in FIG. **3** and FIG. **5** with no connection **10**). As the cellular telephone **4** approaches the charger **6** (or access device **11**, shown in FIGS. **4** & **5**), a wireless technology such as BLUETOOTH, Wi-Fi, Zigbee, infrared, or other wireless technique can be used to communicate with the charger or access device.

The charger may use these wireless techniques in a manner that does not advertise its presence, for instance, the BLUETOOTH service may not announce itself. In such cases as these, the application on the smart phone uses a predetermined communication setting, or obtains the appropriate communications settings (such as the network SSID, passcodes, IP addresses, Bluetooth ID, etc.) needed to contact the charger. In fact, with certain information (e.g., the Bluetooth ID) will allow the application to identify and communicate with a specific one of many chargers in proximity.

After a short communications handshake, the digital token or certificate **5** is sent to the charger or access device by short-range wireless. The charger **6** decrypts the certificate, if encrypted, reads the unique device ID, and decides if it is the correct device. If so, it reads the reservation time. If the reservation time approximately agrees with the time of day read from its internal time-of-day/date clock **8**, it then decodes the charge parameters or access parameters, if any, and allows charging or access to take place. FIG. **1** shows a vehicle **7** being charged, and it shows the charger **6** with a time-of-day/date clock **8** and an optional GPS receiver **9**. If the charger contains a GPS receiver, its identification can be by location, provided the charger has GPS access. This generally requires clear sky. The known coordinates or location of a charger can also be entered during installation, either

from a map or predetermined table or from a GPS carried by an installer. If the charger **6** or access device **11** is Internet enabled (i.e., having connection **10**), it can communicate with the website application via long-range wireless such as cellular or by wire access, or it can communicate with an Internet access point by Wi-Fi or the like.

FIG. **2** shows a sample certificate **14** (one embodiment of certificate **5**) containing several fields of data representative of the reservation:

In some embodiments, one field is provided that can associate the certificate with the charger, such as a device identification (Device ID) of the charger **6** (so that the charger will have some suggestion that this is a message for it;

Start Time: this can be in plaintext so that the smart phone application can read it also;

Duration/End Time: if the reservation is not just for a predetermined time like all day for example;

Service Type: for example level 1 charging vs. level 2, if the charger supports multiple services.

For security, in some embodiments, the first portion of the certificate can be hashed, and the hash encrypted using the public key of the charger. Upon receipt by the charger, the hash is decrypted using the private key of the charger, and the hash result compared with the charger's internal hash calculation. If the two match, then nobody has edited the reservation and the certificate may be trusted as authentic. This is safe unless someone cracks the key of the charger. In that case, only one charger **6** is affected. An alternative embodiment may use a signed hash or checksum. Here, the hash is computed as above, then encrypted with a private key held by a trusted authority such as the website.

Upon receipt, anyone, including the smart phone and the charger, can use the trusted authority's public key to decrypt the hash and compare that to the hash they run. This method is safe unless someone cracks the private key of the website. In still another embodiment, a Signed-then-Encrypted Hash/Checksum is used. Here the signed hash is encrypted so that only the charger can read it. This way, the private keys of both the charger **6** and the website server **15** need to be compromised, and then only that charger is threatened.

The certificate **14** can contain a certificate ID that is unique only to this certificate that can be used for tracking and debugging. The date/time the certificate was issued, again for tracking and debugging, a unique device ID of the target device, the reservation start time and duration, any charging parameters needed, an optional new device ID for the next session and an optional new decryption key for the next session.

When charging or access is complete, the charger **6** or access device can update its ID to the new ID supplied by the previous certificate and optionally update its decryption key (if encryption is used). If the charger is Internet capable **10**, it can notify the website **12** that the charging is complete or that the changeover has taken place.

FIG. **3** shows the flow of FIG. **1** with the charger **6** not having Internet access. FIG. **4** shows an Internet capable access device **11**, in this example a hotel room lock, having connection **10** to Internet **1**, while FIG. **5** shows an access device **11** (again a hotel room lock) that cannot communicate over the Internet. In the case of a hotel room, a room reservation can be made using an Internet-enabled cellular telephone **4**, laptop **2**, computer or other Internet device. The room can be paid for in the usually e-commerce way by credit card or by any other payment method. The digital token or certificate is sent to the smart phone **4**, and the user is told the external room number. As the guest approaches the hotel room door, the smart phone **4** sends the certificate **5** to the lock device by way of short-range wireless like BLUETOOTH. The user can then unlock the door at any time during the stay period by pressing a particular button on the phone or by other technique. The phone can re-send the unique (and secret) access device ID to the device so that the device knows it is the correct person each time access is requested.

FIG. **6** shows a block diagram of a charger system **60** that is an embodiment of the charger of the present invention. A processor **16** is tied to a communication module **17** that performs short-range communication with a cellular telephone or smart phone and allows certificate **5** to be transferred from the cellular/smart phone through processor **16** to a storage module **19**. The processor **16** or storage module **19** may comprise the private key for the charger **6** and/or may store a public key (e.g., of server **15**) to verify digital signatures (e.g., those made with the server's private key). The storage module **19** can be any type of disk, memory or mass storage device. A clock **8** and/or GPS receiver **9** are also connected to the processor **16** to provide the current time. The processor **16** directly controls access to a charging element **6**, i.e., enabling charging element **6** when a currently certificate **5** has been presented, and disabling charging element **6** otherwise. An optional long-range communication module **18** can communicate with the Internet either by placing a cellular telephone call or with Wi-Fi or the like.

Optionally, the application on a smart phone **4** can energize short-range communication when the local GPS in the phone indicates that the phone is near the target charger **6**. The smart phone can also optionally signal that the vehicle needs a charge, or that a particular charge reservation time is approaching. The system of the present invention can also optionally track motorists' visits and purchases at retail stores in a mall or shopping center, and have automatic credits that can be added to the smart phone good toward future vehicle charging paid for by merchants as an incentive to purchase from their stores.

In US Patent Application Publication 2007/0008181, Rollert et al. teach a "System and Method For Optimizing the Utilization Of Space," primarily parking spaces, by allowing a reservation to be made through the Internet. FIG. **7** shows how the present invention represents an improvement to the system and method of Rollert et al., enabled by a smart phone application that could, for example, run on an iPhone by Apple, Inc. of Cupertino, Calif. or other smart phone. Such an application would have a various screen views for performing such functions as making a new reservation, examining current reservations, and maintaining the patron's account. Some portions of the application require connectivity to the Internet to operate, but other portions may operate based on locally stored information. A few related operations, including examining current reservations, should be able to operate without Internet access, as the user may require immediate access to these operations, but be in a location such as in a parking garage where Internet access such as cell communication or Wi-Fi may not be provided.

In the diagram of FIG. **7**, a main application view **20** is shown to offer three options: New Reservation (for creating a new reservation), Current Reservations (for examining and using reservations already made), and Account Info (for creating and editing appropriate account information). FIG. **7** shows a smart phone application block diagram for an embodiment in which Internet device **2** and smart phone **4** are the same device: In another embodiment, the reservation-making portion of the application may run on Internet device **2** and the current reservation portion of the application may run on the smart phone **4**.

The patron would have selected the Account Info **21** at least once to create or otherwise associate an account with the

patron's smart phone **4**. An account may have associated payment preferences and perhaps acceptance of legal agreements. Payment preferences might include a credit card account, or a bank account. Another payment preference would provide permission to pre-charge a patron's credit card or bank account and subsequently allow the system to operate using micropayments made against that pre-charge amount. The parking reservation server **15** (or web site **12**) or another server with which it has communication (not shown) would maintain the micropayment accounts for each patron and apply their funds to charges for parking. The micropayment accounts would be settled daily or with a different period, or whenever the pre-charged amount has been consumed.

Once the patron's account has been enabled, the patron can access the views for creating a new reservation.

The New Reservations **23** screen accepts a start-time, an end-time (or duration), and a destination.

Required amenities can be selected, including for the present invention, available charging for an EV (which may further include a selection for Level 1 or Level 2 charging, for instance). The destination may be an actual parking location, but more commonly (and as illustrated herein) it is the patron's destination for which nearby parking is sought.

As with each screen in this diagram other than the Main view **20**, there is a 'back' arrow **22** atop the screen including the New Reservations screen **23**. The back arrow **22** is a user interface element that permits the patron to move back up the hierarchy to access screens and their interfaces higher up.

Once a destination has been entered into the New Reservation screen **23**, the user may be presented with the Destination Map screen **24** showing a map with the destination marked and parking spots nearby shown and selectable. The spots shown may be only ones having the stated amenities and that are available to be reserved for the interval entered such as beginning from the start-time and available for the duration or until the end-time. Current information regarding parking spot availability requires communication with the server responsible for maintaining reservations for that spot, which may be server **15**, web site **12**, or some other server.

Alternatively, the spots may be shown in a list, which may be sorted by their distance from the indicated destination, or by price, or a combination thereof.

The patron selects a parking spot, whether from a corresponding marking on the map, or from the spot list (not shown). Once selected, the Spot Detail screen **25** is shown, which includes information such as location, pricing, detailed amenities, and perhaps a picture of the specific parking location (or one representative of it).

If the patron does not like the parking spot presented, the back buttons allow returning to screens earlier in the interaction to make different selections, e.g., to choose a different spot or alter the start-time, etc.

If the patron does like the parking spot presented, he can confirm the reservation **26**, which initiates a reservation request to the server. Upon successfully obtaining a reservation for an EV charging enabled parking location, the server in response can provide or authenticate **27** a reservation certificate **5** to be stored in the smart phone **4**. For instance, in one embodiment, reservation certificate **5** comprises data representative of the reservation encrypted with the server's private key. In another embodiment, reservation certificate **5** comprises a digital signature by the server that authenticates data representative of the reservation. The completion of the reservation transitions the patron to a different region of the application screen hierarchy, and instead of being in the 'new reservation' branch (**23-26**), the interface jumps to a location in the 'current reservations' branch (**28-31**), such as the Reservation Detail page **29**, showing the reservation just made.

Another way of getting to the Reservation Detail screen **29** begins back on the Main application view **20** when the patron selects the current reservations option. Upon doing this, the Current Reservations List **28** is shown, which lists all pending parking reservations, for example in order of the date and time at which the reservation starts. Besides the start time, each entry in the list should show some additional information to remind the patron of each instance, for example the destination may be presented.

Upon selecting one of the reservations from the Current Reservations List **28**, the corresponding Reservation Detail screen **29** is shown, listing the same details that were selected and known when the reservation was made. Clicking on the destination entry on this screen can bring up a Spot/Destination Map screen **30**, showing the location of the parking spot with respect to the destination.

The Reservation Detail screen **29** also presents a connect option to direct the smart phone application to attempt communication with the EV charging system **4** (or other parking spot amenity system or access device **11**, e.g., a hotel room lock) and to provide the reservation certificate **5** to the charger **6** or device (**11**), thereby enabling it **32** for the interval of the reservation.

The Charger Enabled screen **31** can be used to monitor the connection attempt and confirm activation resulting from a successful connect action, and may also initiate a timer (not shown) on the smart phone to generate an alert as the parking interval is about to expire.

Several descriptions and illustrations have been presented to aid in understanding the features of the present invention. One skilled in the art will realize that numerous changes and variations are possible without departing from the spirit of the invention. Each of these changes and variations is within the scope of the present invention.

What is claimed is:

1. An access device for use in an access control system, the access device comprising:

a processor (**16**) having control of a door lock (**11**); and

a communication module (**17**) connected to the processor, the processor able to receive a reservation certificate (**5**) presented by a portable terminal (**4**) through the communication module;

wherein the processor activates the door lock when a current reservation certificate has been presented.

2. The access device of claim **1** wherein the processor activates the door lock for up to a predetermined duration.

3. The access device of claim **2** wherein the predetermined duration is all day.

4. The access device of claim **1** wherein the reservation certificate comprise data representative of a duration and the processor activates the door lock for up to the duration.

5. The access device of claim **1** wherein the processor has access to the current time, the reservation certificate comprises data representative of an interval of the reservation, and the processor activates the door lock during the interval.

6. The access device of claim **5** wherein the interval is specified by a start time and one of an end time and a duration.

7. The access device of claim **1** further comprising:

a memory to which the processor has access, the memory containing a public key for a server authorized to issue the reservation certificate;

wherein at least a portion of the reservation certificate is encrypted by the server using a private key and the processor verifies that the reservation certificate is genuine by decrypting the portion with the public key.

8. The access device of claim **1** further comprising:

a memory to which the processor has access, the memory containing a symmetric key;

wherein at least a portion of the reservation certificate is encrypted by a server using the symmetric key and the processor verifies that the reservation certificate is genuine by decrypting the portion with the symmetric key.

9. The access device of claim **1** wherein the processor verifies that the reservation certificate is genuine.

10. The access device of claim **1** further comprising:

an identification to which the processor has access, the identification corresponding to one of the access device and the door lock, wherein the processor determines that the reservation certificate comprises data representative of the identification.

11. The access device of claim **1** further comprising:

a memory to which the processor has access, the memory containing a private key of the access device;

wherein at least a portion of the reservation certificate is encrypted by a server using a corresponding public key for the access device and the processor decrypts the portion with the private key.

12. The access device of claim **1** wherein the processor has access to a server through the communication module and the processor reports to the server that door lock was activated on the basis of the reservation certificate.

13. A method for use by an access device in an access control system, the method comprising:

a) accepting, by a processor through a communication module, a reservation certificate presented with a portable terminal;

b) determining, by the processor, that the reservation certificate is current; and

c) activating, by the processor on the basis of the reservation certificate being current, a door lock.

14. The method of claim **13** wherein the certificate is current for up to a predetermined duration.

15. The method of claim **14** wherein the predetermined duration is all day.

16. The method of claim **13** wherein the reservation certificate comprises data representative of a duration and the certificate is current for up to the duration.

17. The method of claim **13** wherein the processor has access to the current time and the reservation certificate comprises data representative of an interval of the reservation, and the certificate is current for up to the interval.

18. The method of claim **17** wherein the interval is specified by a start time and one of an end time and a duration.

19. The method of claim **13** wherein at least a portion of the reservation certificate is encrypted by a server using a private key for which the corresponding public key is stored in a memory accessible to the processor, wherein the b) determining by the processor is further that the reservation certificate is genuine on the basis of decrypting the portion with the public key, and the c) activating is on the further basis of the reservation certificate being genuine.

20. The method of claim **13** wherein at least a portion of the reservation certificate is encrypted by a server using a symmetric key stored in a memory accessible to the processor, wherein the b) determining by the processor is further that the reservation certificate is genuine on the basis of decrypting the portion with the symmetric key, and the c) activating is on the further basis of the reservation certificate being genuine.

21. The method of claim **13** wherein the b) determining by the processor is further that the reservation certificate is genuine, and the c) activating is on the further basis of the reservation certificate being genuine.

22. The method of claim **13** wherein the processor has access to an identification, the identification corresponding to one of the access device and the door lock, wherein the b) determining by the processor is further that the reservation certificate comprises data representative of the identification, and the c) activating is on the further basis of the reservation certificate comprising data representative of the identification.

23. The method of claim **13** wherein at least a portion of the reservation certificate is encrypted by a server using a public key for which the corresponding private key is stored in a memory accessible to the processor, the method further comprising the step of:

d) decrypting the portion, by the processor, with the private key.

24. The method of claim **13** wherein the processor has access to a server through the communication module, the method further comprising the step of:

d) reporting to the server that the door lock was activated on the basis of the reservation certificate.

* * * * *

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(12) **EX PARTE REEXAMINATION CERTIFICATE** (207th)

Ex Parte Reexamination Ordered under 35 U.S.C. 257

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(45) **Certificate Issued: *Feb. 25, 2022**

(54) **ACCESS CONTROL SYSTEM AND METHOD FOR USE BY AN ACCESS DEVICE**

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(Continued)

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G07C 9/00 (2020.01)

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(52) **U.S. Cl.**

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(Continued)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

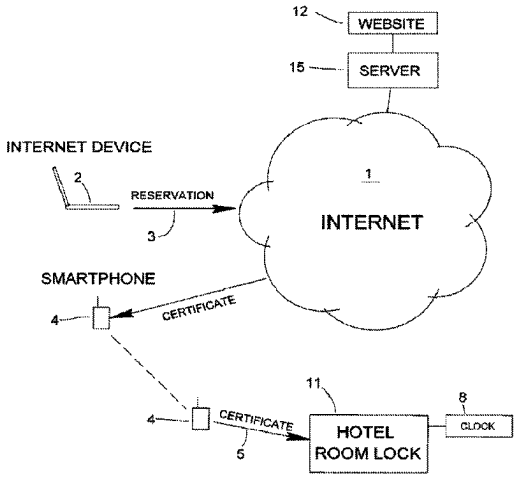
To view the complete listing of prior art documents cited during the supplemental examination proceeding and the resulting reexamination proceeding for Control Number 96/000,367, please refer to the USPTO's public Patent Application Information Retrieval (PAIR) system under the Display References tab.

Primary Examiner — Jeffrey D Carlson

(57) **ABSTRACT**

Systems and methods are provided to allow a smart phone or any terminal to activate a door lock using a web site or server computer system. An access control system is provided that includes a server and an access device. The access device includes a processor and a communication module. The process has control of a door lock and is able to receive

(Continued)



a reservation certificate presented by a portable terminal through the communication module. The processor activates the door lock when a current reservation certificate has been presented.

Related U.S. Application Data

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G07F 5/26	(2006.01)
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G06Q 20/38	(2012.01)
G06Q 20/32	(2012.01)
G07C 9/27	(2020.01)
B60L 53/57	(2019.01)
B60L 53/68	(2019.01)
B60L 53/14	(2019.01)
B60L 53/66	(2019.01)
B60L 53/16	(2019.01)
B60L 53/31	(2019.01)
B60L 53/18	(2019.01)
B60L 53/30	(2019.01)
B60L 53/65	(2019.01)
G07C 9/20	(2020.01)
G07C 9/29	(2020.01)
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H04W 12/069	(2021.01)
G06Q 10/02	(2012.01)
G06Q 50/06	(2012.01)
H04W 12/08	(2021.01)
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H04W 4/40	(2018.01)

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EX PARTE REEXAMINATION CERTIFICATE

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

Claims **1-14** and **16-18** are determined to be patentable as amended.

Claims **15** and **19-24**, dependent on an amended claim, are determined to be patentable.

1. An access device for use in an access control system, the access device comprising:

a processor (**16**) having control of a door lock (**11**); and a communication module (**17**) connected to the processor, the processor [able to] *is configured to* receive a reservation certificate (**5**) presented by a portable terminal (**4**) through the communication module;

wherein, *when a current reservation certificate that comprises an interval of a reservation is presented by the portable terminal,* the processor [activates] *is configured to compare the interval of the reservation of the current reservation certificate to a current time accessible to the processor, determine the current time is within the interval of the reservation, and activate* the door lock [when a current reservation certificate has been presented] *to allow the portable terminal to unlock the door lock during the interval of the reservation.*

2. The access device of claim **1** wherein the processor [activates] *is configured to determine the current time is within the interval of the reservation by determining if the current time is within a start time of the interval of the reservation of the current reservation certificate and a predetermined duration and is configured to activate* door lock [for] *to allow the portable terminal to unlock the door lock from the start time* up to [a] *the* predetermined duration.

3. The access device of claim **2** wherein *the processor is configured to activate the door lock to allow the portable terminal to unlock the door lock during the interval of the reservation from the start time up to* the predetermined duration *that* is all day.

4. The access device of claim **1** wherein the *interval of the reservation of the current* reservation certificate [comprise data representative of] *comprises a start time and* a duration and the processor [activates] *is configured to activate* the door lock [for] *to allow the portable terminal to unlock the door lock from the start time* up to the duration.

5. The access device of claim [**1**] *6* wherein the processor [has access to the current time, the reservation certificate comprises data representative of an interval of the reservation, and the processor activates the door lock during the interval] *is configured to activate the door lock to allow the portable terminal to unlock the door lock from the start time up to the end time.*

6. The access device of claim [**5**] *1* wherein the interval [is specified by a start time and one of] *of the reservation of the current reservation certificate comprises a start time and* an end time [and a duration].

7. The access device of claim **1** further comprising:

a memory to which the processor has access, the memory [containing] *is configured to comprise* a public key for a server [authorized] *of the access system configured* to issue the *current* reservation certificate;

wherein at least a portion of the *current* reservation certificate is encrypted by the server using a private key and the processor [verifies] *is configured to verify* that the *current* reservation certificate is genuine by decrypting the portion with the public key.

8. The access device of claim **1** further comprising:

a memory to which the processor has access, the memory [containing] *is configured to comprise* a symmetric key;

wherein at least a portion of the *current* reservation certificate is encrypted by a server [using] *of the access system configured to use* the symmetric key and the processor [verifies] *is configured to verify* that the *current* reservation certificate is genuine by decrypting the portion with the symmetric key.

9. The access device of claim **1** wherein the processor [verifies] *is configured to verify* that the *current* reservation certificate is genuine.

10. The access device of claim **1** further comprising:

an identification to which the processor has access, the identification corresponding to one of the access device and the door lock, wherein the processor [determines] *is configured to determine* that the *current* reservation certificate comprises data representative of the identification.

11. The access device of claim **1** further comprising:

a memory to which the processor has access, the memory [containing] *is configured to comprise* a private key of the access device;

wherein at least a portion of the *current* reservation certificate is encrypted by a server [using] *of the access system configured to use* a corresponding public key for the access device and the processor [decrypts] *is configured to decrypt* the portion with the private key.

12. The access device of claim **1** wherein the processor has access to a server *of the access system* through the communication module and the processor [reports] *is configured to report* to the server that *the* door lock was activated on the basis of the current reservation certificate.

13. A method for use by an access device in an access control system, the method comprising:

a) accepting, by a processor through a communication module, a reservation certificate *that comprises an interval of a reservation* presented with a portable terminal;

b) determining, by the processor, that the reservation certificate *presented by the portable terminal* is current *by comparing the interval of the reservation to a current time accessible to the processor and determining that the current time is within the interval of the reservation*; and

c) activating, by the processor on the basis of the reservation certificate being current, a door lock *to allow the portable terminal to unlock the door lock during the interval of the reservation.*

14. The method of claim **13** wherein *determining that the current time is within the interval of the reservation comprises determining that the current time is within a start time of the interval of the reservation and a predetermined duration and wherein* the certificate is current [for] *from the start time* up to [a] *the* predetermined duration.

16. The method of claim **13** wherein *the interval of the reservation of* the reservation certificate *further* comprises **[**data representative of**]** *a start time and* a duration and the *reservation* certificate is current **[**for**]** *from the start time* up to the duration.

17. The method of claim **[13]** *18* wherein **[**the processor has access to the current time and the reservation certificate comprises data representative of an interval of the reservation, and the certificate is current for up to the interval**]** *the reservation certificate is current from the start time up to the end time*.

18. The method of claim **[17]** *13* wherein the interval **[**is specified by a start time and one of**]** *of the reservation comprises a start time and* an end time **[**and a duration**]**.

* * * * *