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(54) **VENDING SYSTEM**

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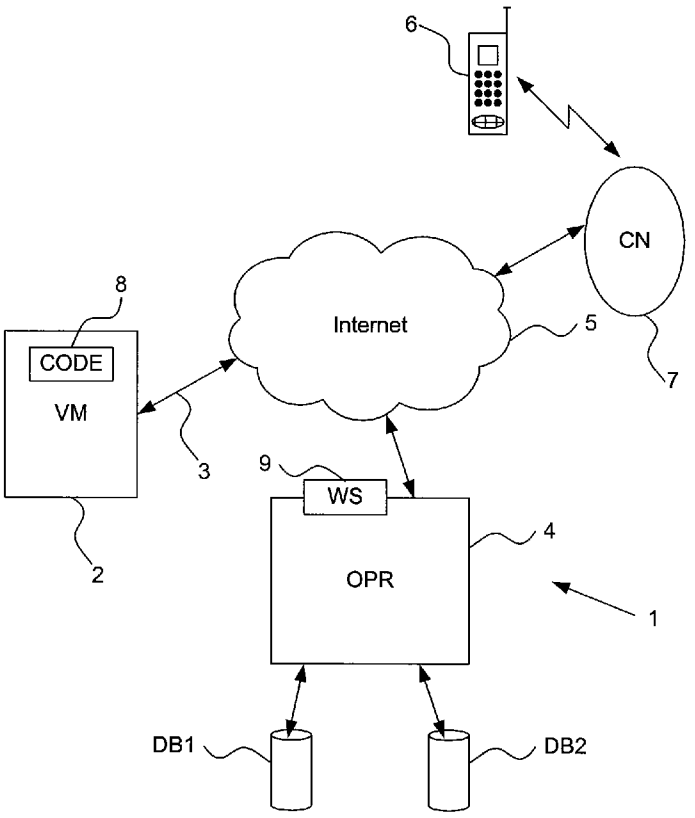
(57) **ABSTRACT**

A vending system server for a vending system for selling products or services, from at least one vending machine connected to a network, to purchasers having mobile communicators configured to communicate with the network by wireless data packet network connection, comprises an operator server, connected to the network by an operator network connection, wherein the operator server is configured to (1) receive via the operator network connection a communication from a mobile communicator of identifying data of a vending machine at which the mobile communicator is located, without receiving personal identification information from the mobile communicator, (2) transmit, via the operator network connection to the mobile communicator, vending machine identification information, (3) receive, via the operator network connection, authorization information from an external authorization center, and (4) authorize the vending machine to supply a good or service in response to the authorization information.



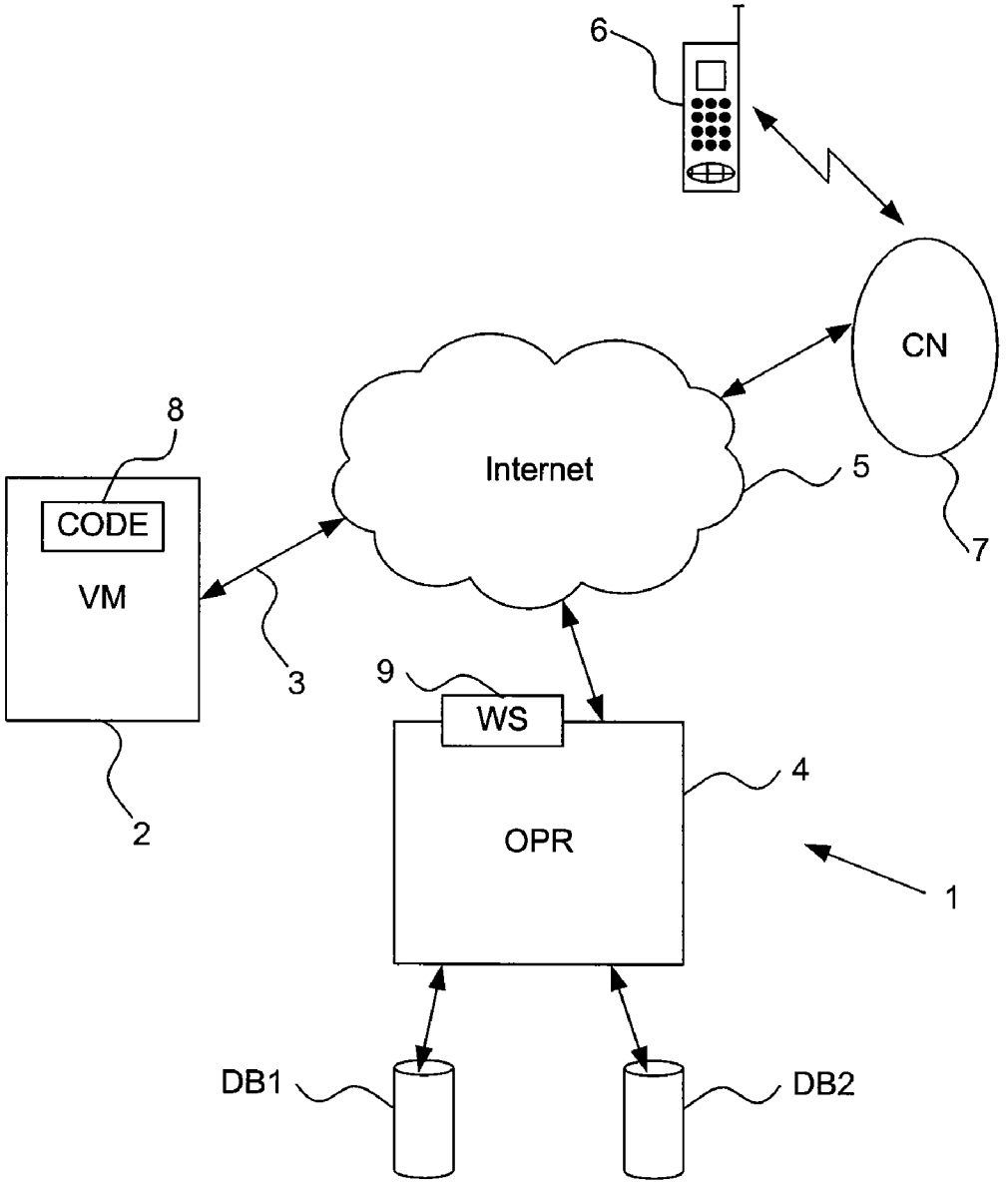


FIG. 1

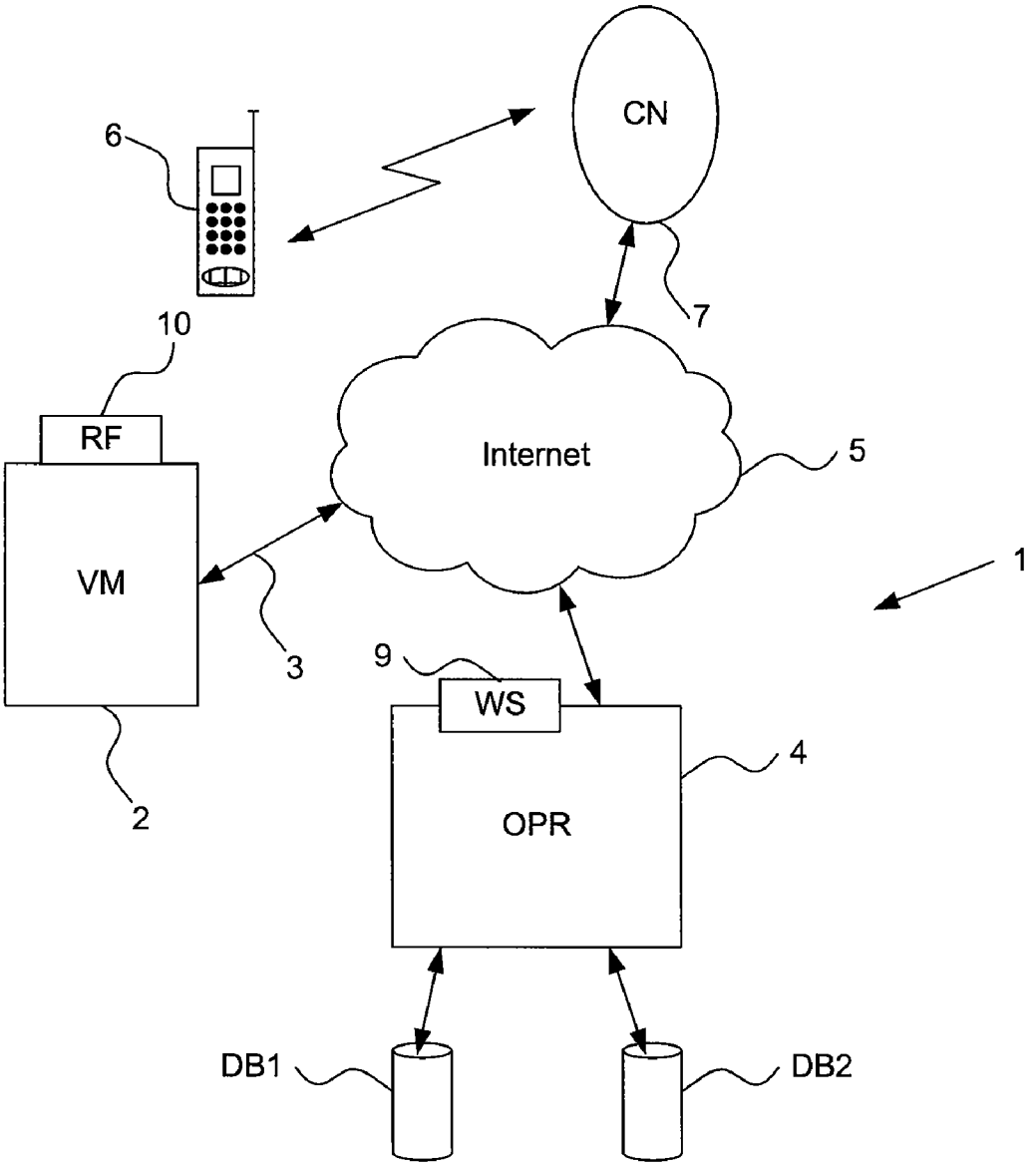


FIG. 2

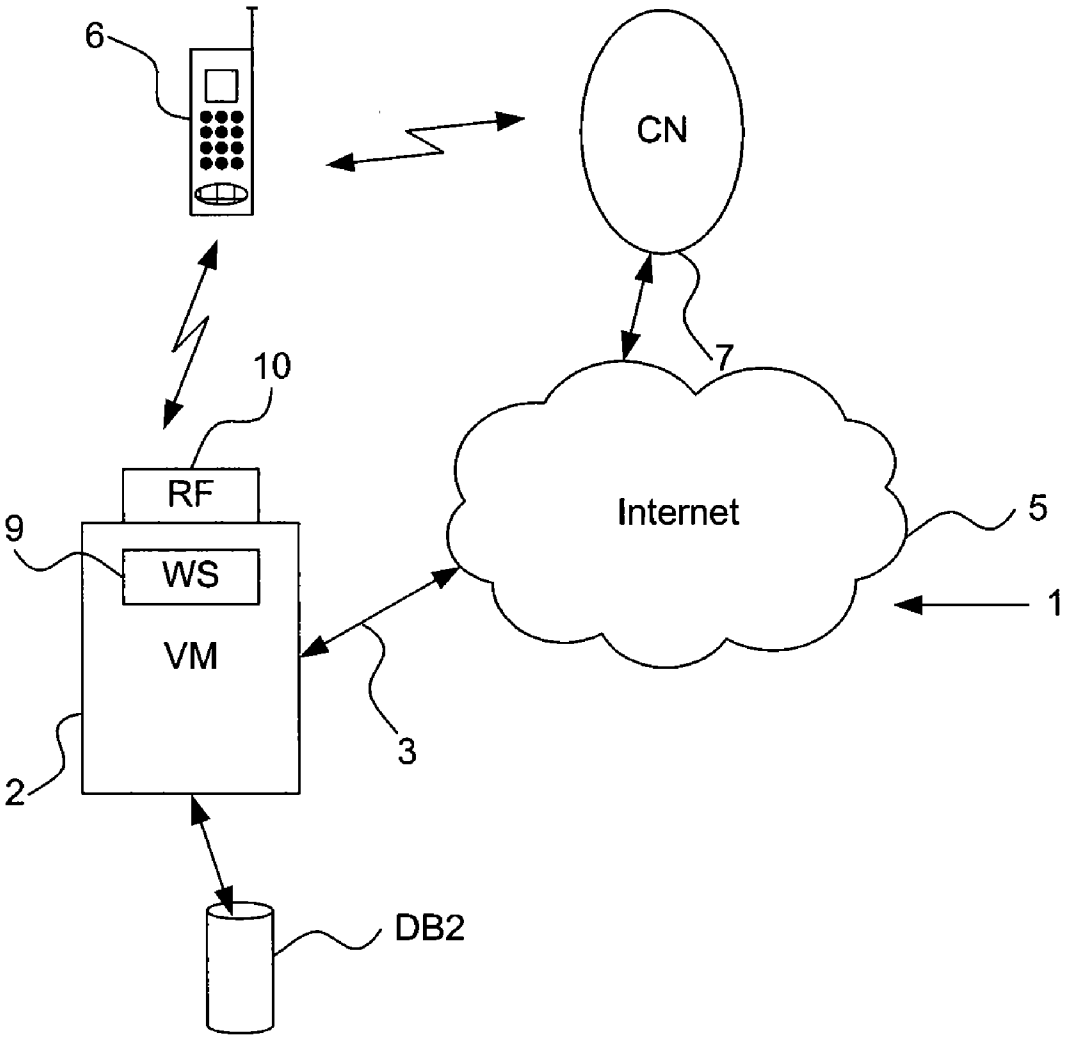


FIG. 3

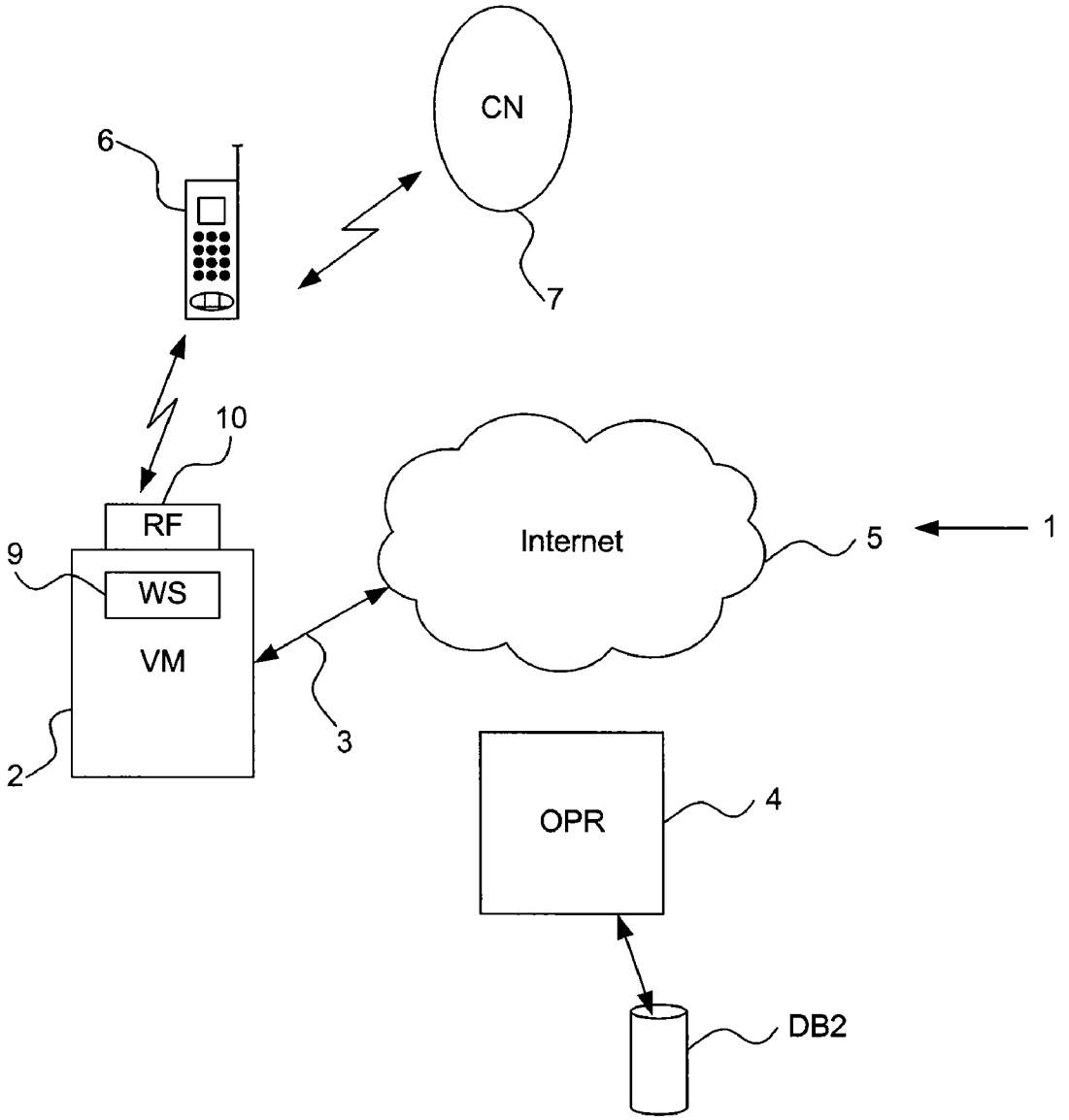


FIG. 4

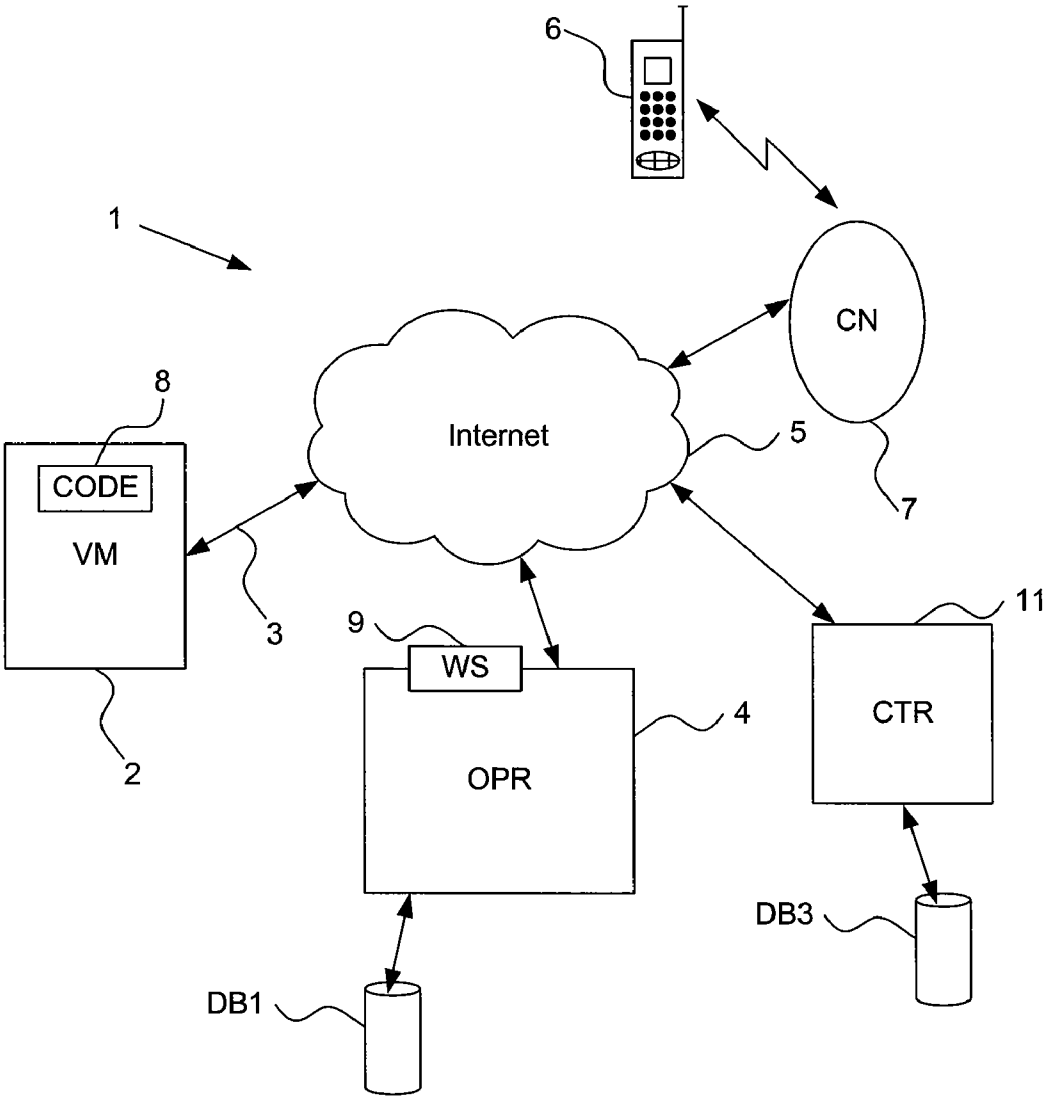


FIG. 5

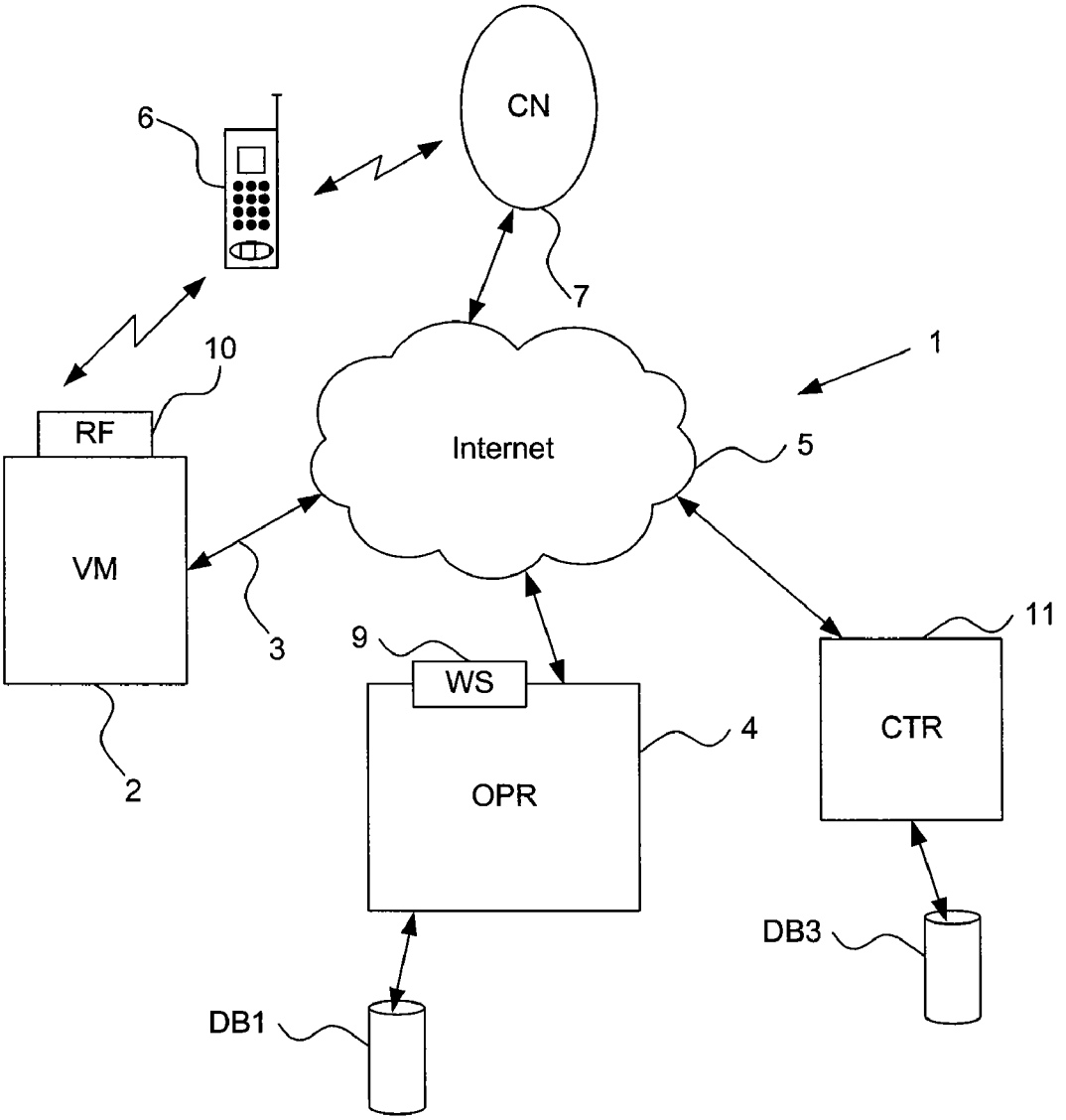


FIG. 6

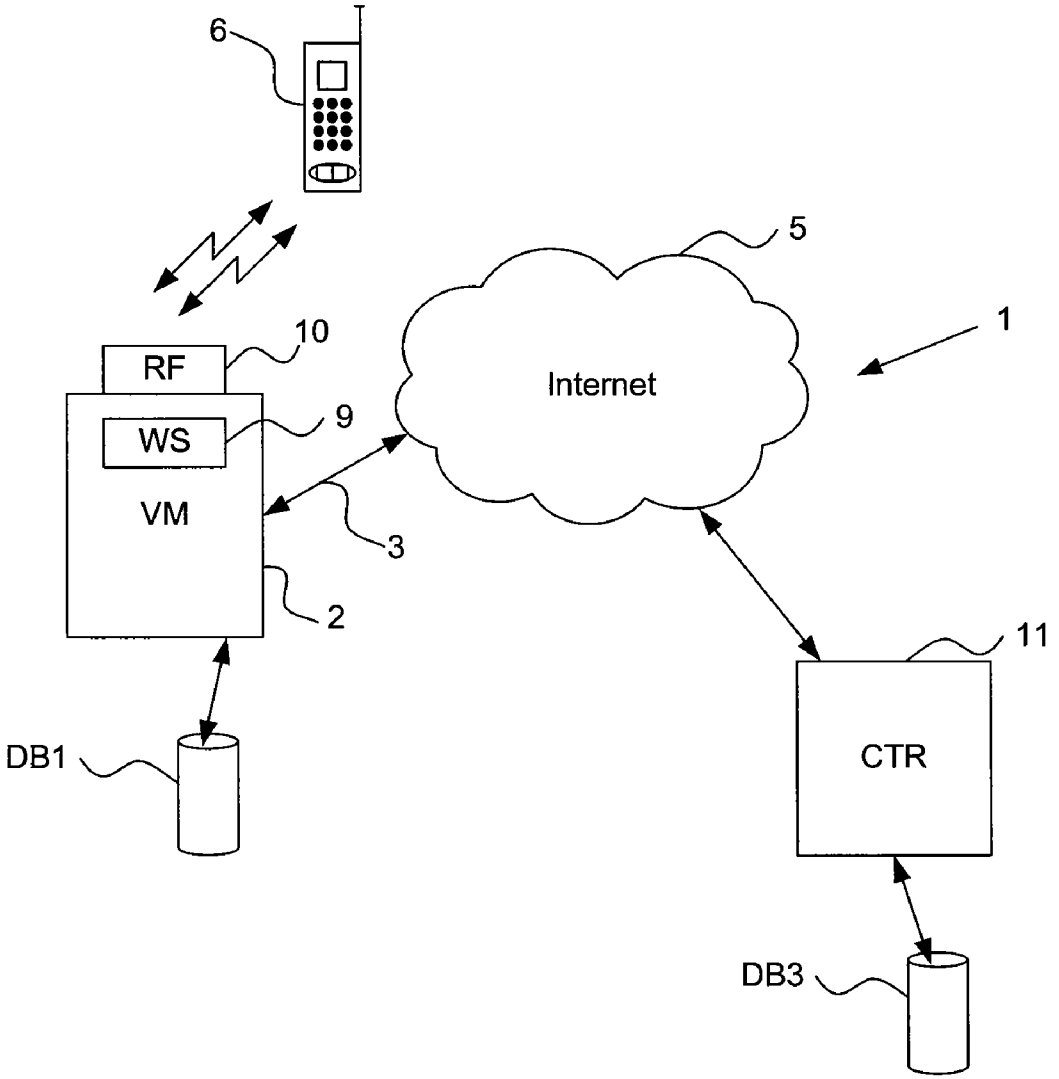


FIG. 7

VENDING SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application is a continuation application of U.S. application Ser. No. 10/363,060 (allowed), which is a national phase application of PCT/IB01/01841, filed Aug. 28, 2001, the content of each of which is incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

[0002] At present several vending systems are already known, in particular the so called "self service" systems by which a purchaser is able to buy a product or a service and to pay by his credit/debit card.

[0003] More recently, vending system based on the use of cellular phones have been proposed.

[0004] In respect of the previous vending systems, the "cellular" systems presents many advantages due to the fact that cellular phones are used world wide, so that such vending systems can potentially be of interest to a lot of customers.

[0005] Unfortunately, with the known systems a customer is not able to "communicate" with the system, in the sense that the cellular link can be utilised by the user only to give instruction without any feedback to the user.

[0006] A further disadvantage is that with these systems the customer has to transmit his private data (generally the credit card number) to the vending system. A still further disadvantage is that the capability of a user to access a cellular based vending system depends on the communication standard used by the cellular phone owned by the customer.

[0007] It is thus very difficult for a vending operator to reach all the potential customers (and vice versa) without a lot of difficulties (special agreements with the cellular network providers, specific smart cards) and similar problems.

[0008] Furthermore, in the known systems a considerable cost is associated with the user interface which is needed at the vending machines in order to permit the user to properly interact with the system.

[0009] An aim of the invention is to provide an improved vending system.

BRIEF SUMMARY OF THE INVENTION

[0010] According to the present invention there is provided a vending system for selling products or services to purchasers having mobile communicators enabled to a wireless Internet connection, the system comprising:

[0011] means to permit a customer to communicate to an operator, via an Internet connection, the identity of a vending machine at which he is located;

[0012] means by which the operator can authorise via the Internet connection an identified vending machine to make a sale to the purchaser; and

[0013] means to notify said purchaser via the Internet connection. Employing the present invention enables the client to conduct a transaction with the vending machine he is at, the operator authorising the vending machine and at the same time the customer receives notification that the transaction has been completed.

[0014] Preferably said means permitting the customer to communicate to an operator the identity of a vending machine consists of an identifying code of the vending machine at which the purchaser is located and transmitted by the purchaser to a web server of the operator through the Internet connection. This permits the unique code associated with the vending machine to be transmitted to the operator. The means permitting the customer to communicate to an operator the identity of the vending machine additionally comprises a first database (DB**1**) of the operator containing said identifying codes and the corresponding Internet addresses (IP) of the vending machines. Provision of the Internet address enables the operator to directly contact the vending machine.

[0015] Preferably the operator may assign an identity code to the vending machine and change that code at a specified time preferably after each purchase request from a customer. This ensure that a code given by a customer for a transaction will subsequently associate that transaction with that customer. Changing the code will then ensure any further transaction will only be associated with a future customer and not the customer who made the former transaction.

[0016] Preferably the web server is located at the vending machine itself but may be located at a position remote from the vending machine, for example at a site controller associated with a number of vending machines in a specific locality.

[0017] Advantageously the means to notify the purchaser comprises a database of the operator containing the identity codes of the authorised customers.

[0018] The invention is particularly applicable to purchasers having mobile communicators which are connected to the Internet through a cellular network. However it is also advantageous that the means for a customer to communicate to an operator the identity of a vending machine comprises a radio frequency interface able to automatically establish a bi-directional communication link between said vending machine and said communicator and to automatically transmit to the customer communicator an identity code when the customer communicator is in the vicinity of the machine. This enables automatic communication to take place without the requirement to use the cellular communication network, and it is particularly advantageous if the interface is able to connect the customer communicator to the Internet, this will avoid the customer having to use the cellular network.

[0019] Advantageously the system additionally comprises means to permit the customer to transmit via the Internet identifying data of a vending machine to an outside authorisation centre and comprises further means permitting the outside authorisation centre to transmit to the operator via the Internet an authorisation to make a sale. The system is advantageously employed in a gas station environment where the vending system may be a fuel dispenser or other peripheral device, for example a car wash or point of sale device associated with a quick serve restaurant or similar.

BRIEF DESCRIPTION OF THE DRAWINGS/FIGURES

[0020] Various embodiments of the present invention will now be described by way of example only with reference to FIGS. **1** to **7** in which like numerals are used to indicate like components and of which:

[0021] FIG. **1** illustrates a first embodiment where a code is read manually by a customer.

[0022] FIG. **2** illustrates a first alternative embodiment employing a radio link between the customer communicator and a vending machine.

[0023] FIG. **3** illustrates a second alternative embodiment where a web server is incorporated into the vending machine.

[0024] FIG. **4** illustrates a third alternative embodiment where a web server is incorporated into the vending machine.

[0025] FIG. **5** illustrates a fourth alternative embodiment where the local operator is incorporated into the vending machine.

[0026] FIG. **6** illustrates a fifth alternative embodiment including a remote authorisation centre.

[0027] FIG. **7** illustrates a sixth alternative embodiment based on that of FIG. **6**.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0028] Referring to FIG. **1** a vending system indicated generally as **1** according to the invention comprises:

[0029] a vending machine **2**, provided with an Internet connection **3**;

[0030] an Internet operator **4** able to communicate via the Internet **5** with the vending machines **2** and with a customer provided with a digital mobile communicator **6**. The communicator **6** will typically be a mobile phone but this could be any personal computing device such as a personal digital assistant, provided it has means to connect to and communicate information via a communication link enabled to a wireless bi-directional connection supporting Internet Protocol.

[0031] Preferably, the communicator is a WAP (Wireless Application Protocol) enabled cellular phone capable of being connected to the Internet by a network access point, for example a digital cellular network **7**.

[0032] The vending machine **2** is provided with a code **8** which the purchaser can read when he is in the vicinity of the vending machine, it being for example present on a display of the vending machine.

[0033] A different code is automatically assigned by the Internet operator **4** to the machine after each transaction, in order to avoid accidental purchase orders from a customer as can happen in prior art systems where a phone number of the vending machine has to be dialed by the customer to purchase a product or a service.

[0034] The operator **4** is provided with a first database DB**1** containing identifying data of the vending machines of the system and with a second database DB**2** containing identifying data of customers authorised to make a purchase.

[0035] The vending machine identifying data comprises vending machine identity numbers ID, codes and the Internet addresses of the vending machines.

[0036] The customer data of DB**2** comprises customer identity numbers and other account data which can be utilised to authorise a purchase to that customer.

[0037] When a purchaser having a suitable communicator **6** is in the vicinity of a vending machine **2** he can read the identifying code **8** corresponding to that machine and connect to the Internet through a network access point **7** in order to communicate with the operator **4** by a web server **9** of the operator, which is preferably an Internet "bookmark" on a display of the customer communicator **6**.

[0038] In this phase, the communicator **6** transmits to the web server **9** a customer ID so that the operator can verify whether the customer is a purchaser already identified in the second database DB**2**.

[0039] Once the purchaser identity has been verified the operator asks the customer to transmit the corresponding code **8** of the machine **2**.

[0040] The operator **4** then receives the code **8** and associates it to the corresponding IP address of the vending machine, both contained in the data base DB**1**, so that it can check, for example, the functioning state of the vending machine **2** and to authorise the machine to perform a sale.

[0041] The vending machine **2** is commanded by the operator **4** to supply the requested product or service and afterwards the purchaser is invoiced for the product or service and a message confirming a successful transaction is displayed on the display of the communicator **6** for example in the form of a SMS message which will act as a receipt of the transaction.

[0042] The communication to and from the operator **4** and to and from the communicator **6** are protected by encryption codes (for example SSL) and hence all the connected devices communicate in a secure manner for example through a Public key infrastructure (PKI).

[0043] FIG. **2** shows a second embodiment of the system, where the vending machine **2** is provided with a bi-directional radio: frequency RF interface **10** supporting a communication based on Internet protocol. In this embodiment the wireless connection is able to automatically connect the communicator **6** when the communicator **6** is close to the vending machine **2**.

[0044] A suitable RF interface is a Bluetooth™ enabled interface and a suitable communicator is a WAP/Bluetooth™ enabled cellular phone.

[0045] The RF interface **10** automatically transmits the code **8** to the customer communicator **6**. The communicator **6** is then connected through the Internet **5** with the web server **9**, thus the customer only has to ask for a desired product or service.

[0046] As a further advantage, in this case the vending machine does not need a display nor a printer to supply a receipt (given by the system in the form of a SMS message on the user handset) and the user interface is provided completely by the keypad of the communicator **6**.

[0047] A still further advantage consists in that in this embodiment the vending machine **2** is substantially maintenance-free and is less vulnerable to damage from vandals.

[0048] FIG. **3** shows a further embodiment of the system, where a web server **9** of the operator is located at the vending machine and the customer communicates directly with the vending machine **2**, which is provided with the customer database DB**2**.

[0049] With this solution there is no need for a remote operator **4** except for billing operations. However, as seen in FIG. **4**, in the case where a vending chain comprises several vending machines, a data base DB**2** and a remote operator **4** will still be required.

[0050] In FIG. **5** a further embodiment of the invention is shown where the vending system **1** is able to accept the order of any Internet customer accessing the operator **4** and there is no longer the need of the above mentioned customer database DB**2**.

[0051] In FIG. **5** the network access point consists of a cellular network **7** and an outside authorisation centre **11** connected to the operator **4** through the Internet **5**, with the authorisation centre **11** provided with a database DB**3** containing the identity numbers of the vending machines of the system. According to this embodiment, the user can access the web server **9** of the operator **4** without transmitting his ID to the operator. The web server then asks the user to communicate the code **8** of the vending machine and then sends back to the user an ID and the IP address of the vending machine **2** associated to the code **8**. The user is then able to contact the authorisation centre **11** (for example a credit card supplier)

transmitting a Personal Identification Number PIN code (for example the credit card number) together with the ID code and the IP address of the vending machine **2**. Once a transaction has been authorised the authorisation centre **11**, through the Internet **5**, authorises the operator **4** to command the identified vending machine **2** to supply the requested product or service. Advantageously, in this embodiment the user is guaranteed (protected) from possible fraudulent use of his data because the system does not receive any "private" data and the communication between user and authorisation centre can be encrypted by well known protocols (e.g., PPTP Internet protocol or SSL Secure Socket Layer).

[0052] With reference to FIG. **6** a system is shown which corresponds to the system of FIG. **5** where a bi-directional radio frequency interface **10** of the already discussed type is provided at the vending machine **2**.

[0053] In FIG. **7** a further embodiment of the system of FIG. **6** is shown, where the network access point NAP consists of the same RF interface **10** of the vending machine **2** connected to the Internet **5** through the IN connection **3**.

[0054] In this case the user accesses the Internet "through" the RF interface **10** and connects to the web server of the operator which, in this case, has to be located at the vending machine **2**.

[0055] In order to guarantee security to the user it is possible to restrict the Internet access of the user only to the connection to certain IP addresses (for example a number of authorisation centres) and to encrypt these connections by suitable encryption protocols.

[0056] The present invention has been described with reference to preferred embodiments, however, equivalent modifications can be made which will be within the scope of the invention as defined by the appended claims.

What is claimed is:

1. A vending system server for a vending system for selling products or services, from at least one vending machine connected to a network, to purchasers having mobile communicators configured to communicate with the network by wireless data packet network connection, the vending system server comprising:

an operator server, connected to the network by an operator network connection, and configured to:

(1) receive via the operator network connection a communication from a mobile communicator of identifying data of a vending machine at which the mobile communicator is located, without receiving personal identification information from the mobile communicator;

(2) transmit, via the operator network connection to the mobile communicator, vending machine identification information;

(3) receive, via the operator network connection, authorization information from an external authorization center; and

(4) authorize the vending machine to supply a good or service in response to the authorization information.

2. The vending system server according to claim **1**, wherein the identifying data of the vending machine at which the mobile communicator is located comprises an identifying code.

3. The vending system server according to claim **2**, wherein the operator server further comprises a first database including vending machine identifying codes and the corresponding Internet Protocol (IP) addresses of the at least one vending machine connected to the network.

4. The vending system server according to claim **2**, wherein the operator server further is configured to assign an identity code to the vending machine and to change the assigned identity code at a specified time.

5. The vending system server according to claim **4**, wherein the operator server further is configured to change the assigned identity code after each purchase request from a customer.

6. The vending system server according to claim **1**, wherein the operator server is located at the vending machine.

7. The vending system server according to claim **1**, wherein the operator server is located at a position remote from the vending machine.

8. The vending system server according to claim **1**, wherein the operator server further comprises a second database containing identity codes of authorized customers.

9. The vending system server according to claim **1**, wherein the operator server further is configured to transmit and receive encrypted data.

10. The vending system server according to claim **1**, wherein the operator server further is configured to notify the mobile communicator via the operator network connection that a transaction is complete.

11. A method for providing products or services to a consumer via a vending apparatus, comprising:

receiving, at an operator server, a first digital message in a transaction request exchange from a wireless device over a packet data network, wherein the first digital message includes a consumer identifier;

verifying, at the operator server, the received consumer identifier;

receiving, at the operator server, a second digital message in the transaction request exchange from the wireless device over the packet data network, wherein the second digital message includes a code associated with the vending apparatus;

transmitting, from the operator server, an authorization message for the transaction request to the vending apparatus; and

transmitting, from the operator server, a third digital message in the transaction request exchange to the wireless device, wherein the third digital message includes a transaction confirmation.

12. The method of claim **11**, further comprising:

transmitting, from the operator server, a message to the vending apparatus including a new code for use in a subsequent transaction with a consumer.

13. The method of claim **11**, wherein the third digital message is a short message service (SMS) message.

14. A method for providing products or services to a consumer via a vending apparatus, comprising:

receiving, at an operator server, a first digital message in a transaction request exchange from a wireless device over a packet data network, wherein the first digital message includes a code associated with the vending apparatus;

transmitting, from the operator server, a second digital message in the transaction request exchange to the wireless device, wherein the second digital message includes a communication identifier and a packet data network address associated with the vending apparatus;

receiving, at the operator server, a third digital message in the transaction request exchange from a remote authorization server, wherein the third digital message includes a transaction authorization; and

transmitting, from the operator server, an authorization message for the transaction request to the vending apparatus.

15. The method of claim **14**, further comprising:

transmitting, for the operator server, a fourth digital message in the transaction request exchange to the wireless device, wherein the fourth digital message includes a transaction confirmation.

16. The method of claim **14**, further comprising:

transmitting, from the operator server, a message to the vending apparatus including a new code for use in a subsequent transaction with a consumer.

17. The method of claim **14**, further comprising:

after the step of transmitting, from the operator server, a second digital message:

receiving, at the remote authorization server, a fourth digital message in the transaction request exchange at the remote authorization server, wherein the fourth digital message includes the communication identifier, the packet data network address associated with the vending apparatus, and a payment code associated with the consumer;

authorizing the requested transaction using the payment code associated with the consumer; and

transmitting, from the remote authorization server, the transaction authorization to a operator server.

18. A server for providing products or services to a consumer via a vending apparatus, comprising:

a vending transaction processor configured to:

receive digital messages in a transaction request exchange from a wireless device over a packet data network,

transmit an authorization message for the transaction request to the vending apparatus, and

transmit a transaction confirmation to the wireless device; and

a database associating a packet data network address of the vending apparatus to a code associated with the vending apparatus.

19. The server of claim **18**, wherein the vending transaction processor is further configured to:

communicate a message including a new code to the vending apparatus for use in a subsequent transaction with a consumer.

20. The server of claim **18**, further comprising:

a second database including identity codes of authorized consumers.

21. The server of claim **20**, wherein the vending transaction processor is further configured to:

verify the identity of the consumer requesting the transaction.

22. The server of claim **18**, wherein the vending transaction processor is further configured to:

transmit addressing information for the vending apparatus to the wireless device; and

receive a transaction authorization message from a remote authorization server.

23. A method for vending products or services, from at least one vending machine connected to a network to purchasers having mobile communicators configured to communicate with the network by wireless data packet network connection, the method comprising:

receiving, at an operator server connected to the network by an operator network connection, from a mobile communicator, identifying data of a vending machine at which the mobile communicator is located, without receiving personal identification information of the mobile communicator;

transmitting from the operator server, via the operator network connection to the mobile communicator, vending machine identification information;

receiving, at the operator server, via the operator network connection, authorization information from an external authorization center in communication with the mobile communicator; and

authorizing the vending machine to supply a good or service in response to the authorization information.

24. The method according to claim **23**, further comprising providing the identifying data of the vending machine at which the mobile communicator is located as an identifying code.

25. The method according to claim **24**, further comprising providing, from a first database to the operator server, vending machine identifying codes and the corresponding Internet Protocol (IP) addresses of the vending machines.

26. The method according to claim **24**, further comprising assigning an identity code to the vending machine and changing the assigned identity code at a specified time.

27. The method according to claim **26**, further comprising changing the assigned identity code after each purchase request from a customer.

28. The method according to claim **23**, further comprising locating the operator server at the vending machine.

29. The method according to claim **23**, further comprising locating the operator server at a position remote from said vending machine.

30. The method according to claim **23**, further comprising providing, from a second database to the operator server, identity codes of authorized customers.

31. The method according to claim **23**, further comprising connecting the mobile communicator to the Internet through a cellular network.

32. The method according to claim **23**, further comprising transmitting and receiving encrypted data between the operator server and the mobile communicator.

33. The method according to claim **23**, further comprising notifying the mobile communicator via the operator network connection that a transaction is complete.

34. A method for vending products or services, from at least one vending machine connected to a network to purchasers having mobile communicators configured to communicate with the network by wireless data packet network connection, the method comprising:

receiving at an operator server, from a mobile communicator via a wireless data packet network connection, identifying data of a vending machine at which the mobile communicator is located, without receiving personal identification information from the mobile communicator;

transmitting from the operator server, via the wireless data packet network connection, to the mobile communicator, vending machine identification information;

transmitting from the mobile communicator, via the wireless data packet network connection, to an external

authorization center, personal identification information and vending machine identification information;

receiving at the operator server, via the network, authorization information from an external authorization center in communication with the mobile communicator; and

transmitting from the operator server to the vending machine authorization to supply a good or service in response to the authorization information.

35. The method according to claim **34**, further comprising:

transmitting from the operator server, via the network and the wireless data packet network, to the mobile communicator, notification that a transaction is complete.

36. A computer readable storage medium storing program instructions thereon that, if executed by a data processing device, cause the data processing device to perform a vending method for selling products or services to purchasers having mobile communicators configured to communicate with a network by wireless data packet network connection, the method comprising:

receiving at an operator server, from a mobile communicator via a wireless data packet network connection, identifying data of a vending machine at which the mobile communicator is located, without receiving personal identification information from the mobile communicator;

transmitting from the operator server, via the wireless data packet network connection, to the mobile communicator, vending machine identification information;

transmitting from the mobile communicator, via the wireless data packet network connection, to an external authorization center, personal identification information and vending machine identification information;

receiving at the operator server, via the network, authorization information from an external authorization center in communication with the mobile communicator; and

transmitting from the operator server to the vending machine authorization to supply a good or service in response to the authorization information.

37. The computer readable storage medium according to claim **36**, wherein the method further comprises:

notifying the mobile communicator via the network that a transaction is complete.

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