

APPARATUS AND METHODS FOR PROCESSING AND ACQUIRING VEHICLE PARKING CONTENT OVER A NETWORK

FIELD OF THE INVENTION

5 The invention relates generally to the field of ticket-based or coupon-based vehicle parking systems. More particularly, the invention relates to an electronic parking coupon system, apparatus and methods for acquiring and processing vehicle parking content over a network.

BACKGROUND OF THE INVENTION

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Paper-based coupon parking systems have been used by authorities in countries such as Singapore for levying a charge on motorists or users who park their vehicles in designated parking spaces. A user purchases a booklet of paper die-cut coupons from an authority or a dealer authorised by the authority. The coupons may come in different monetary
15 denominations due to different parking fee rates being applied to parking spaces either because of the location of the parking space, the time of day or the type of vehicle. These rates are determined by the authority. To legally park the vehicle in designated parking spaces, the motorist is required to accurately indicate the date and when he parked the vehicle at the parking space by tearing off the appropriate tabs in the coupon. Each coupon
20 represents a predetermined unit of time for parking the vehicle in a designated parking space. For example, there are coupons which allow parking for 1 hour and coupons which allow parking for 30 minutes. If the motorist needs to park for more than a time allowed by a single coupon, multiple coupons are needed. In such case the user determines the starting time of subsequent coupons by taking into account the time value of the previous coupon
25 used. Another problem of the paper-based coupon parking system is that it is prone to human error when a myriad of parking coupons of different monetary denominations are used to pay for parking the vehicle for any particular period of time. Further, a common environmental effect of the paper-based coupon parking system is that paper-based coupons may disposed of improperly by errant motorists thereby generating litter. Printing of
30 paper-based coupons is also environmentally unfriendly as only a small portion of the paper coupon is used before it is disposed, resulting in waste of paper resources.

Alternative parking systems have been developed to address the inefficiencies and errors in paper-based coupon parking systems. For example, in Singapore, electronic parking

systems (Cash Card) and gantry operated parking systems are available in certain locations. However, such systems are costly to install. In other countries, parking meter systems are used to enable users pay their parking fees using a physical parking meter located along the kerb near the car park lot. Alternatively, SMS/Phone-to-Park Systems are available to allow
5 users to send a SMS or to phone an operator to pay the parking fee. However, if the vehicle is still parked in the parking space after the expiry of the paid for period, parking enforcement personnel must be present to issue a parking violation summons. Further, if the first vehicle leaves the parking space and a second vehicle parks in the parking space while there is still time left on the parking meter, then the second motorist gets a "free ride" on the parking fee
10 paid by the previous motorist. It can therefore be appreciated that prior art systems may also result in a potential loss of revenue for the parking authorities who administer the systems.

SUMMARY OF THE INVENTION

In an embodiment, there is a method for acquiring vehicle parking content over a network from a content server, the method comprising:

- 5 sending information to the content server from a device;
 acquiring content related to an electronic parking coupon based on the information sent to the content server, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

- 10 The content may be incorporated in a parking content object.

The content related to the electronic parking coupon may be generated, for output on an input/output device. The input/output device may be a display and the content is generated as one of: an image, an image with text, text.

- 15 Sending the information to the content server may include sending vehicle identifier information of a vehicle.

Acquiring the content may comprise:

- 20 acquiring an electronic parking coupon identifier code of the electronic parking coupon if the vehicle identifier information is related to a valid request received for the electronic parking coupon.

- The method may further comprise sending a modification request for modifying a parking
25 duration of the electronic parking coupon.

The method may further comprise receiving advertisement content from the content server.

- The method may further comprise, prior to acquiring the content, selecting one of a plurality
30 of electronic parking coupons located on the content server through the device.

The selecting one of a plurality of electronic parking coupons may comprise:

- accessing the content server from the device through the network.

- 35 Accessing the content server may include accessing through: a mobile browser web site; a web site; a non-browser application program operating on the device; a message exchanging facility; a direct connection from the device.

Acquiring the content may comprise acquiring a notification that there is no valid request received for the electronic parking coupon and the method may further comprise: sending a notification for a parking fine to a content server account.

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The method may further comprise sending a notification for a parking fine to a content server account if the electronic parking coupon does not register the vehicle as having valid vehicle parking rights.

10 Sending the information to the content server may include sending location information of the device.

Acquiring the content may comprise:

15 acquiring an application request link for an application program for accessing the content server if the location information of the device corresponds with geographical location data of a parking space in one of a plurality of parking areas administered by the authorized server.

The application program may include a non-browser application program.

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The application program may be configured for acquiring one of a plurality of electronic parking coupons located on the content server.

25 The application program may be configured for determining availability of an electronic parking coupon for a vehicle.

The application program may be configured for determining status of a plurality of electronic parking coupons in one of a plurality of parking areas

30 Acquiring the content may comprise:

 acquiring electronic parking coupon content related to one of a plurality of parking areas administered by the authorized server if the location information of the device corresponds with geographical location data of a parking space in the one of the plurality of parking areas.

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The electronic parking coupon content may includes information related to one of: availability of parking spaces in the one of the plurality of parking areas, a parking rate of one of a

plurality of electronic parking coupons applicable in the one of the plurality of parking areas, status of a plurality of electronic parking coupons in the one of the plurality of parking areas.

5 The method may comprise generating, for display on a display, a first graphical user interface configured for displaying the availability of parking spaces in the one of the plurality of parking areas. The first graphical user interface may be further configured for displaying an approximate waiting time for a parking space in the one of the plurality of parking areas.

10 The method may comprise generating, for display on the display, a second graphical user interface configured for displaying the parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas. The second graphical user interface is further configured for displaying an approximate waiting time for a parking space in the one of the plurality of parking areas.

15 The method may comprise, for display on the display, a third graphical user interface configured for displaying the status of the plurality of the electronic parking coupons, the third graphical user interface is configured for selecting one of the plurality of parking areas for inspection. The third graphical user interface may further include a user selectable screen object corresponding to the location information of the device.

20 In an embodiment, there is an apparatus for acquiring vehicle parking content over a network from a content server, the apparatus comprising:

a processor; and

25 a memory for storing one or more routines which, when executed under control of the processor, control the apparatus to:

send information to the content server;

acquire content related to an electronic parking coupon based on the information sent to the content server, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

30 The content may be incorporated in a parking content object.

The apparatus may be configured, under control of the processor to:

35 generate, for output on an input/output device, the content related to the electronic parking coupon.

The input/output device may include a display and the content may be generated as one of: an image, an image with text, text.

The information may include vehicle identifier information of a vehicle.

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The apparatus may be configured, under control of the processor, to acquire the content including an electronic parking coupon identifier code of the electronic parking coupon if the vehicle identifier information is related to a valid request received for the electronic parking coupon.

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The apparatus may be configured, under control of the processor, to send a modification request for modifying a parking duration of the electronic parking coupon.

The apparatus may be configured, under control of the processor, to receive advertisement content from the content server.

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The apparatus may be configured under control of the processor to, prior to acquiring the content, select one of a plurality of electronic parking coupons located on the content server.

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Selecting one of a plurality of electronic parking coupons may comprise:
accessing the content server through the network.

Accessing the content server may include accessing through: a mobile browser web site; a web site; an non-browser application program operating on the apparatus; a message exchanging facility; a direct connection from the apparatus.

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The apparatus may be configured under control of the processor to:

acquire the content including a notification for no valid request received for the electronic parking coupon; and

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send a notification for a parking fine to a content server account.

The apparatus may be configured under control of the processor to send a notification for a parking fine to a content server account if the electronic parking coupon does not register the vehicle as having valid vehicle parking rights.

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The information may include location information of the apparatus.

5 The apparatus may be configured, under control of the processor to acquire the content comprising an application request link for an application program for accessing the content server if the location information of the apparatus corresponds with geographical location data of a parking space in one of a plurality of parking areas administered by the authorized server. The application program may include a non-browser application program.

The application program may be configured for acquiring one of a plurality of electronic parking coupons located on the content server.

10 The application program may be configured for determining availability of an electronic parking coupon for a vehicle.

The application program may be configured for determining status of a plurality of electronic parking coupons in one of a plurality of parking areas

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Acquiring the content may comprise:

acquiring electronic parking coupon content related to one of a plurality of parking areas administered by the authorized server if the location information of the apparatus corresponds with geographical location data of a parking space in the one of the plurality of parking areas.

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The electronic parking coupon content may include information related to one of: availability of parking spaces in the one of the plurality of parking areas, a parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas, status of a plurality of electronic parking coupons in the one of the plurality of parking areas.

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The apparatus may be configured under control of the processor, to generate for display on the display, a first graphical user interface configured for displaying the availability of parking spaces in the one of the plurality of parking areas. The first graphical user interface may be further configured for displaying an approximate waiting time for a parking space in the one of the plurality of parking areas.

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The apparatus may be configured, under control of the processor, to generate for display on the display, a second graphical user interface configured for displaying the parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas. The second graphical user interface may be further configured for displaying an approximate waiting time for a parking space in the one of the plurality of parking areas.

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The apparatus may be configured under control of the processor, to generate, for display on the display, a third graphical user interface configured for displaying the status of the plurality of the electronic parking coupons, the graphical user interface is configured for selecting one of the plurality of parking areas for inspection. The third graphical user interface may further
5 include a user selectable screen object corresponding to the location information of the device.

In an embodiment, there is a graphical user interface for acquiring vehicle parking rights over a network from a server, the graphical user interface produced by an application program
10 operating on a computing device, comprising:

- an application program screen layout generated by the application program, the application program screen layout including:

- a first user selectable screen object for selecting an electronic parking coupon; and

- a second user selectable screen object for selecting a parking duration of the
15 selected electronic parking coupon, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register a vehicle as having vehicle parking rights.

In an embodiment, there is a computer program product, tangibly embodied in a machine-readable storage medium, including instructions for executing in a machine, a method for
20 acquiring vehicle parking content over a network from a content server, the method comprising:

- sending information to the content server from a device;

- acquiring content related to an electronic parking coupon based on the information sent to the content server, wherein the electronic parking coupon is configured to, upon
25 activation by an authorised server, register the vehicle as having vehicle parking rights.

In an embodiment, there is a content server for processing vehicle parking content over a network, the content server comprising:

- a processor;

- a memory for storing one or more routines which, when executed under control of the
30 processor, control the content server to:

- receive information from a first device; and

- process content related to an electronic parking coupon based on the information from the device, wherein the electronic parking coupon is configured to, upon activation by
35 an authorised server, register the vehicle as having vehicle parking rights.

The content server may be configured, under control of the processor to, incorporate the content related to the electronic parking coupon in a parking content object.

5 The content server may be configured, to generate, for output on an input/output device, the content related to the electronic parking coupon.

The input/output device may include a display and the content may be generated as one of: an image, an image with text, text.

10 The content server may be configured, under control of the processor, to transmit the content to a second device different from the first device.

The content server may be configured, under control of the processor, to transmit the content to the first device.

15 The content server may be configured to receive information including vehicle identifier information of a vehicle.

20 The content server may be configured, under control of the processor, to transmit the content comprising an electronic parking coupon identifier code of the electronic parking coupon if the vehicle identifier information is related to a valid request received for the electronic parking coupon.

25 The content server may be configured, under control of the processor, to transmit advertisement content from the content server.

The content server may be configured, under control of the processor, to activate the electronic parking coupon based on a parameter related to the content server account.

30 The parameter may include one of: a stored monetary value in a user account registered with a parking authority, and an individual parking fee purchase based on a parking duration and a parking rate of the electronic parking coupon.

35 The content server may be configured, under control of the processor, to receive a modification request for modifying a parking duration of the electronic parking coupon.

The modification request may include one of: a request to convert the parking duration based on a remaining value of the electronic parking coupon, a request to extend the parking duration.

5 The content server may be configured, under control of the processor, to process the content by:

determining availability of an electronic parking coupon for the vehicle; and

send a notification for a parking fine to the content server account based on one of:

10 the electronic parking coupon is not available, the electronic parking coupon is available but not valid.

The information from the first device may include location information of the first device.

15 The content server may be configured, under control of the processor to transmit the content comprising:

an application request link for an application program for accessing the content server if the location information of the first device corresponds with geographical location data of a parking space in one of a plurality of parking areas administered by the authorized server.

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The application program may include a non-browser application program.

25 The content server may be configured, under control of the processor, to process the content by determining status of a plurality of electronic parking coupons in one of a plurality of designated parking areas.

30 Determining the status may include generating a probability of illegal parking of the one of a plurality of parking areas by dividing a number of active electronic parking coupons in the one of a plurality of parking areas by a total number of parking spaces in the one of the plurality of designated parking areas.

The content server may be configured, under control of the processor, to send a notification for inspecting the one of a plurality of parking areas to the first device based on the status of the plurality of electronic parking coupons.

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The content server may be configured, under control of the processor, to generate, for display on a display, a first graphical user interface configured for displaying the status of the plurality of the electronic parking coupons.

- 5 The first graphical user interface may be configured for selecting one of the plurality of parking areas for inspection by a user.

The first graphical user interface may include a user selectable screen object corresponding to location information of the computing device.

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The content server may be configured, under control of the processor to process the content by determining if the location information of the device corresponds with geographical location data of a parking space in the one of the plurality of parking areas.

- 15 The content server may be configured, under control of the processor to process the content by determining availability of parking spaces in one of a plurality of designated parking areas.

- 20 The content server may be configured, under control of the processor, to determine availability of parking spaces by determining an approximate waiting time for a parking space in the one of the plurality of parking areas.

- 25 The content server may be configured, under control of the processor, to determine availability of parking spaces by calculating a probability of a motorist leaving a parking space in the one of the plurality of parking areas by the end of the parking duration related to the electronic parking coupon.

The content server may be configured, under control of the processor to:

- 30 generate, for display on the display, a second graphical user interface configured for displaying the electronic parking coupon content related to the availability of parking spaces in the one of the plurality of parking areas.

The content may include the parking rate of one of a plurality of electronic parking coupons applicable in one of a plurality of designated parking areas.

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In an embodiment, there is a method for processing vehicle parking content over a network, the method comprising:

receiving information from a device; and

processing content related to an electronic parking coupon based on the information from the device, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

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In an embodiment, there is a computer program product, tangibly embodied in a machine-readable storage medium, including instructions for executing in a machine, a method for processing vehicle parking content over a network, the method comprising:

receiving information from a device; and

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processing content related to an electronic parking coupon based on the information from the device, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

BRIEF DESCRIPTION OF DRAWING

Various embodiments of the invention will now be described, by way of example only, and with reference to the accompanying drawings in which:

FIG. 1A is a block diagram illustrating a server configured for processing vehicle parking content and apparatus for acquiring vehicle parking content connected to a network;

FIG. 1B is a block diagram illustrating a plurality of servers configured for processing vehicle parking content and apparatus for acquiring vehicle parking content connected to a network;

FIG. 1C is a block diagram illustrating a server configured for processing vehicle parking content and apparatus for acquiring vehicle parking content through accessing cloud-based applications;

FIG. 1D is a block diagram illustrating a server configured for processing vehicle parking content and apparatus for acquiring vehicle parking content through a plurality of different networks.

FIG. 2 is a diagram illustrating a parking coupon object including electronic parking coupon content;

FIG. 3A is a block diagram illustrating an apparatus for acquiring vehicle parking content from a content server over a network;

FIG. 3B is a block diagram illustrating an apparatus for acquiring vehicle parking content from a content server over a network;

FIG. 4A is a flow chart illustrating a method for acquiring vehicle parking content from a content server over a network;

FIG. 4B is a flow chart illustrating a detailed method for sending vehicle identifier information and acquiring vehicle parking content from a content server over a network;

FIG. 4C is a flow chart illustrating a detailed method for selecting and acquiring vehicle parking content from a content server over a network;

FIG. 4D is a flow chart illustrating a detailed method for sending location information and acquiring vehicle parking content from a content server over a network;

FIG. 5A is a flow chart illustrating a method for processing vehicle parking content;

FIG. 5B is a flow chart illustrating a detailed method for processing vehicle parking content;

FIG. 5C is a flow chart illustrating a method for transmitting vehicle parking content upon receipt of vehicle identifier information of a vehicle;

FIG. 5D is a flow chart illustrating a method for transmitting vehicle parking content upon receipt of location information from a device;

FIG. 6 is a graphical representation of an electronic device representing an embodiment of an apparatus for acquiring vehicle parking content from a content server over a network;

FIG. 7 is a graphical representation of an input terminal representing an embodiment of the an apparatus for acquiring vehicle parking content from a content server over a network;

FIG. 8 is a graphical representation of a computer representing an embodiment of an apparatus for acquiring vehicle parking content from a content server over a network;

FIG. 9A and FIG. 9B are graphical representations of an electronic parking coupon;

FIG. 10A to FIG. 10F are screen shots illustrating a graphical user interface for acquiring vehicle parking content in accordance to one or more embodiments;

FIG. 11A and FIG. 11B are screen shots illustrating a graphical user interface for acquiring vehicle parking content in accordance to one or more embodiments;

FIG. 12A to FIG. 12C are screen shots illustrating a graphical user interface for acquiring vehicle parking content related to expired vehicle parking rights in accordance to one or more embodiments;

FIG. 13A is a screen short illustrating a graphical user interface for facilitating acquiring vehicle parking content in an electronic parking coupon system;

FIG. 13 B and FIG. 13C are screen shots illustrating a graphical user interface for setting notifications for an electronic parking coupon in accordance to one or more embodiments;

FIG. 14A to FIG. 14C are flow charts illustrating methods for determining a number of available parking spaces in a designated parking area;

FIG. 15A is a process flow diagram illustrating a method for determining a number of available parking spaces in a designated parking area;

FIG. 15B, FIG. 15C and FIG. 15C are screen shots illustrating graphical user interfaces for displaying content related to the number of available parking spaces in a designated parking area;

5 FIG. 16 is a block diagram illustrating a server configured for processing vehicle parking content and apparatus for acquiring vehicle parking content from the server within a specified location;

FIG. 17A is a flow chart illustrating a method of transmitting an application request link for an application program for acquiring electronic parking coupon content based on location information;

10 FIG. 17B is a flow chart illustrating a detailed method of transmitting an application request link for an application program for acquiring electronic parking coupon content based on location information;

FIG. 18 is a flow chart illustrating a detailed method of removing electronic parking coupon content from a device;

15 FIG. 19A and FIG. 19B are block diagrams illustrating servers for processing vehicle parking content and inspection apparatus for acquiring vehicle parking content for inspection;

FIG. 20 is a flow chart illustrating a method of issuing a notification for a parking fine;

FIG. 21A is a flow chart illustrating a method of inspecting electronic parking coupon content through a device;

20 FIG. 21B is a flow chart illustrating a method of issuing a notification for a parking fine through a content server;

FIG. 21C is a flow chart illustrating a method of issuing a notification for a parking fine through an operator accessing a content server;

25 FIG. 22 is a block diagram illustrating a server for processing vehicle parking content based on location information of an inspection apparatus for acquiring vehicle parking content for inspection;

FIG. 23 is a flow chart illustrating a method of transmitting content related to status of electronic parking coupon in a designated parking area;

30 FIG. 24 is a flow chart illustrating a method of determining status of electronic parking coupon content in a designated parking area; and

FIG. 25 is a graph illustrating a probability of a motorist occupying a parking space without valid parking rights over a time period;

FIG. 26 is a screen shot illustrating a graphical user interface for displaying status of electronic parking coupon content in a designated parking area; and

- 5 FIG. 27 is a block diagram illustrating a detailed view of a screen object configured to display status of electronic parking coupon content in a designated parking area.

DETAILED DESCRIPTION

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More people have become connected through computing devices capable of connecting to a network. People on the move such as motorists generally have network enabled electronic devices such as mobile phones which are connected to a network. Using the techniques, and apparatus described in the description below, motorists can acquire vehicle parking
15 rights for parking a vehicle in a parking area in the form of an electronic parking coupon through their mobile phones and/or extend their electronic parking coupons from any location. Consequently, this eliminates the inconvenience of having to go to an authorised distributor of paper-based parking coupons to purchase the coupons and to display a paper-based parking coupon on the vehicle to show that the vehicle has valid vehicle parking rights
20 in the parking area.

While exemplary embodiments pertaining to the invention have been described and illustrated, it will be understood by those skilled in the technology concerned that many variations or modifications involving particular design, implementation or construction are
25 possible and may be made without deviating from the inventive concepts described herein.

FIG. 1A is a block diagram illustrating a server 4 configured for transmitting vehicle parking content to an apparatus 2 or a plurality of apparatus 2, 3 configured for acquiring vehicle parking content. The apparatus 2, 3 may include an electronic device or a computing device
30 2, 3. The network 5 may be a network such as a GPRS network, a GSM network, the Internet, a local area network, or the like, or a combination of network, infrastructure and access elements that form what is known to those skilled in the art as the communications and computing "cloud". The server 4 has a network interface 6 configured to receive and

send data over the network 5, a memory 8 for storing digital content related to a plurality of electronic parking coupon items, and a processor 7. The server 4 may be configured to facilitate electronic parking coupon transactions, transmit and store content 9, 10 related to an electronic parking coupon over the network 5. It will be appreciated that by "electronic parking coupon" or "electronic parking coupon item" generally relate to a digital record of parking coupon information stored on a server. For example, the parking coupon information may include information related to various types of parking coupons categorised based on the respective parking rate determined by the parking authority. For example, an electronic parking coupon may include one of: hourly parking coupon, half hourly parking coupon, day parking coupon, night parking coupon, monthly parking coupon. The electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

The electronic parking content 9, 10 may be generated in several output formats such as for example, as an image, an image with text, as text, as an audio file, or as an email with an image with text or an application request link for accessing the electronic parking coupon stored on the content server 4. The following examples illustrate how the electronic parking content 9, 10 may be generated for display on an input/output device.

A. Electronic Parking Coupon Content as an Image

The server 4 may be configured to render the electronic parking coupon content into a flat image (with no data fields) and send it to the apparatus 2. The server 4 may be configured to generate a default background template and include content such as the parking coupon information that was collected and stored during an electronic parking coupon transaction in the background template to create the electronic parking coupon content as an image for transmitting to the apparatus 2.

Alternatively, the electronic parking coupon content may be processed by the server 4 by a rendering module for rendering the electronic parking coupon content using known rendering processes or techniques into a digital image. It will be appreciated by the skilled person in the art that such known rendering techniques may include but are not limited to, industry standard 3D rendering software for digital graphics.

B. Electronic Parking Coupon Content in a File containing Image and Text

The apparatus 2 may be configured to store default background templates with selected data fields. When a user selects an application request link for an electronic parking

coupon, the apparatus 2 may be configured, to generate for display on a display connected to the apparatus 2, the background template and to send a request to the server for the parking coupon information related to the electronic parking coupon. If the server 4 verifies that a valid request is received for the electronic parking coupon, the server 4 will transmit content related to the electronic parking coupon to the apparatus 2 and generate, for display, on the display, the content in the corresponding data fields (i.e. duration of parking) of the background template.

C. Electronic Parking Coupon Content in Text

The electronic parking coupon content may be generated as text only, i.e. an SMS, a text notification, or a simple text-only screen that shows information pertaining to the electronic parking coupon bought by the user.

D. Electronic Parking Coupon Content as an Audio File

The server 4 may be configured, under control of the processor 7, to generate the electronic parking coupon content as a digital audio file (mp3, wav, or any audio format) including the parking coupon information that was collected and stored during an electronic parking coupon transaction.

Alternatively, the server 4 may send the electronic parking coupon content to the apparatus 2 wherein the apparatus 2 is configured with applications that utilize native features of the apparatus 2 for generating, for output on an input/output device on the apparatus 2, the electronic parking coupon content. For example, where the apparatus 2 is a mobile phone having a built-in speech function or a virtual speaking function, the electronic parking coupon content may be generated in a speech format that can be output on a speaker device of the mobile phone.

Alternatively, the server 4 may be configured to transmit the electronic parking coupon content to the apparatus 2 in an audio file for audio output to the user. For example, the server 4 may be configured, under control of the processor 7, to obtain the electronic parking coupon content related to the information received from the apparatus 2 and transfer the content to a text-to speech module for processing the content and to generate for transmitting to the apparatus 2. The audio file may include relevant coupon information includes recitation of the parking date, parking rate selected, parking duration chosen, total amount paid and remaining time on the electronic parking coupon. Still further, the user may call an operator who can access the server 4 to request for content related to the electronic parking coupon.

E. Electronic Parking Coupon Content as Email containing Image + Text

The user may receive the EPC object via a designated email account in the form of text or
5 images or a combination of both. In this scenario, the EPC object might be transmitted to the designated email account, with/or without being transmitted to the EPC application.

In an embodiment, motorists may purchase an electronic parking coupon for a minimum
duration of time and subsequently extend the duration of time if required or to avoid incurring
10 a parking fine. The computing device 2 may be configured with a user interface to enable a user having an account in a system 1 for processing vehicle parking rights to select an electronic parking coupon located on the server 4 by sending vehicle identifier information such as a vehicle identifier code to the server 4.

The vehicle identifier code may be associated with a vehicle to be parked or parked in a
15 parking area regulated by a parking authority. The vehicle identifier code may be a vehicle number, a number of an in-vehicle unit (IU) installed in the vehicle, or vehicle identification number such as a vehicle engine number issued by the vehicle manufacturer.

Referring to FIG. 1B, a system 20 may be configured for processing vehicle parking content
over a network 22 in a master server 21 and a plurality of servers 23, 24, 25, 26, 27 and
20 transmitting the vehicle parking content to apparatus 29 for acquiring vehicle parking content connected to a network 28. The plurality of servers 23, 24, 25, 26, 27 may be configured to perform different processes related to processing vehicle parking content. For example, the server 23 may be configured for managing network security in the system 20. The server 24 may be configured for storing content related to electronic parking coupons and vehicle
25 parking information. Further, the server 25 may be configured for activating an electronic parking coupon. The server 26 may be configured for tracking status of the electronic parking coupons and the server 27 may be configured for managing electronic parking coupon transactions. Still further, the server 25 may be configured to be synchronized with the server 27 to activate an electronic parking coupon upon receiving a request for purchase
30 at the server 27.

It will be appreciated that the servers 23, 24, 25, 26, 27 may be configured or set up as
"cloud" servers to process vehicle parking content. For example, as shown in FIG. 1C, a
system 30 may be configured for transmitting vehicle parking content over a network from a
server 31 to an apparatus 32 for acquiring vehicle parking content. Users may access
35 electronic parking coupon content stored on the server 31 through cloud-based applications for processing or acquiring electronic parking coupons located on a cloud server 33. An

advantage is that users do not need to download the applications on the device and reducing use of memory on the device. Another advantage is that software updates can be implemented at a single location and distributed to all users quickly and efficiently.

5 Alternatively as shown in FIG. 1D, a system 40 may be configured for processing vehicle parking content on a server 41 connected to a plurality of networks 42, 43, 44. For example, users may purchase an electronic coupon through a device 45 such as a portable computing device (e.g. smart phone) connected to the network 42. Further, electronic parking coupons may be purchased by accessing a website located on the server 41 connected to the
10 network 43. Still further, electronic parking coupons may be purchased through accessing an application program for acquiring electronic parking coupons installed in an input terminal 47 such as a self-service kiosk 47.

In an embodiment, the server 4 may be configured to incorporate content related to an electronic parking coupon in a file that contains objects in a strictly defined data structure
15 such as an object. FIG. 2 is a diagram illustrating electronic parking coupon content 9 incorporated in a parking coupon object 10. Instructions may be stored in the memory 8 which, when executed under control of the processor 7, control the server 4 to incorporate vehicle parking content such as a vehicle identifier code 50, a selected electronic parking coupon item 51 and a parking duration 52 into a parking coupon object 10 wherein the
20 parking coupon object 10 is associated or related to the account. The parking coupon object 10 may incorporate one of the following information relating to the electronic parking coupon such as, but not limited to:

- Active coupon information with vehicle number, type of parking coupon and duration purchased;
- 25 • Expired coupon information with vehicle number, type of parking coupon and duration purchased

The selected parking coupon item 51 may be associated with vehicle parking rights registered for the vehicle based on a parameter associated with the account. The account may be for example, an electronic parking account and the user may be an individual
30 subscriber (in the instance of a vehicle privately owned by a motorist), a corporate subscriber (in the instance of a vehicle owned by a company such as a car rental company), or account holder or the like. The parameter associated with the account may include a payment account such as a stored monetary value account through which a user may make payment for an electronic parking coupon item. The payment account may also include

credit card and bank account details related to a third-party mobile payment platform. Alternatively, the parameter associated with the account may include an individual purchase associated with one electronic parking coupon item or a plurality of electronic parking coupon items.

5 Upon receiving the vehicle identifier code 50 from the computing device 2, the server 4 may transmit the parking coupon object 10 to the computing device 2 if the vehicle identifier code 50 is verified to be related to a valid request for the electronic parking coupon 51. The server 4 may be configured, under control of the processor 7, to activate the electronic parking coupon 51 based on a time determined by the server 4 or based on a parameter
10 related to a content server account. The parameter may include one of: a stored monetary value in a user account registered with an authority regulating the parking area, and an individual parking fee purchase based on the parking duration and the parking rate in the user request. The server 4 may be further configured, under control of the processor 7, to verify authenticity of registered vehicle parking rights such as the electronic parking coupon
15 item in response to a search request. The search request may include a transaction ID related to the electronic parking coupon item. In the instance whereby an employee wishes to make an expense reimbursement claim, the employer may verify the authenticity of the electronic parking coupon (sent in via email or a submitted hardcopy) by submitting a transaction ID such as an electronic parking coupon identifier code to the server 4. The
20 server 4 may be further configured to send a one-time receipt for submitting a claim for a payment fee associated with the electronic parking coupon. For example, if a second request is made for a receipt for submitting a claim, the server 4 may be configured to incorporate a notification that a claim has been made on an electronic parking coupon located on the server into a parking coupon object, and a receipt will not be issued in
25 response to the second request.

FIG. 3A is a block diagram illustrating components of an apparatus 2 of FIG. 1. Specifically, the apparatus 2 has a network interface 53 for connecting to a network, and a memory 54 and a processor 55. Instructions such as one or more routines may be stored in the memory
30 54 which, when executed under control of the processor 55, controls the apparatus 2 to send information such as a vehicle identifier code of a vehicle to the content server 4. The vehicle identifier code may be related to an account registered with an authorised server or the content server. If the vehicle identifier code is related to the account, the apparatus 2 may be configured to receive a parking coupon object including an electronic parking coupon item
35 and a duration of use of the electronic parking coupon item from the content server, wherein

the electronic parking coupon item is associated with vehicle parking rights registered for the vehicle based on a parameter associated with the account. The parameter associated with the account may include one of: payment account details associated with the account, an individual purchase associated with one of the plurality of electronic parking coupon items.

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The apparatus 2 may be further configured to generate for display on a display, a graphical user interface to enable a user such as a motorist to send a request for purchasing an electronic parking coupon. For example, the apparatus 2 may comprise a display unit wherein the apparatus 2 is configured, under control of the processor 55, to generate, for display on the display unit, a graphical user interface configured for selecting an electronic parking coupon item. An embodiment of an exemplary graphical user interface will be described in detail with reference to FIG. 10A to 10F. For example, the graphical user interface may include a first input element configured for selecting one of a plurality of electronic parking coupon items located on the content server and a second input element configured for selecting a parking duration of the one of the plurality of electronic parking coupon items. The apparatus 2 may further comprise an input unit configured for receiving a user input to select an electronic parking coupon item. For example, the input unit may be a touch panel formed on the display unit.

20 The request may include a vehicle number, a selected electronic parking coupon, a parking duration of the selected electronic parking coupon, and details of an account such as an outstanding monetary value in the account. Still further, the apparatus 2 may be configured to determine whether a motorist has paid the correct parking rate or whether the stipulated parking duration of the registered vehicle parking rights allocated by the electronic parking coupon has not expired.

Still further, the system 1 may incorporate a global positioning system or a location detection system for identifying a parking area or a car park in which a vehicle is parked. The server 4 may be configured, under control of the processor, to receive location information from a device such as the apparatus 3. Referring to FIG. 3B, the apparatus 3 may include a receiver 59 for receiving and transmitting location information to the server 4. The apparatus 3 also includes a memory 57, a network interface 56 and a processor 58 similar in configuration to the memory 54, the network interface 53 and the processor 55 of the apparatus 2 in FIG. 3A.

35 For example, a motorist may send a location detection request via the apparatus 3 to the server 4. The server 4 identifies the motorist's location through the global positioning system

and based on the location information received from the apparatus 3. A search for the nearest car park or parking area within a specified distance (by the server 4 or by the motorist, e.g. 1 kilometre) from the apparatus 3 may be conducted by the server 4 and information related all parking areas within the specified distance may be transmitted to the apparatus 3 to enable the motorist to select a parking area. Selection of the parking area may trigger a request to the server 4 for parking information such as parking rates applicable in the selected parking area. Such parking information may be stored in a storage server connected to the server 4 or on the server 4 and may be transmitted to the apparatus 3. Embodiments of exemplary servers and methods for processing vehicle parking content based on location information will be described in detail with reference to FIG. 16 to FIG. 18, and FIG. 22 to FIG. 27.

The server 4 may be configured, under control of the processor 7, to send a notification for a parking fine to the account automatically or upon request from a parking inspector or warden if the server 4 performs a determination check and it is determined that there is no parking coupon object related to the account or registered parking rights associated with the selected parking coupon item in the parking coupon object expired. For example, the user of the apparatus 2, 3 is a parking warden and the apparatus 2, 3 may be an electronic parking coupon inspection device. Consequently, the server 4 may be configured to incorporate real-time or live information in the content to be transmitted to the apparatus 2, 3 when the server 4 receives a vehicle identifier code, such as for example, a vehicle number from a parking warden. The parking warden may send the vehicle identifier code to the server 4 by either keying in the vehicle identification number in the apparatus 2, 3 or use an image device incorporated in the apparatus 2, 3 to capture the vehicle identification number via the vehicle's number plate. For example, the apparatus 2, 3 may be configured to detect a vehicle identifier code by for example, "pinging" the vehicle's IU to acquire the unique IU identification number which will then be used to determine the vehicle's identification number.

The apparatus 2, 3 may be configured to generate for display on a display, information relating to the electronic parking coupon. For example, if the information relating to the electronic parking coupon show that the electronic parking coupon has expired, the parking warden may issue a summon ticket or a parking offense notification for the vehicle related to the electronic parking coupon by sending a summon request from the apparatus 2, 3 to the server 4.

The summon request may include one of the following information:

- Date and/or time of parking offence
- Details of parking offence (i.e. parking over the stipulated coupon duration)
- Vehicle identifier code such as the vehicle number
- Information relating to the expired electronic parking coupon

Upon receiving a summon request, the server 4 may be configured to send a parking offence notice to a person associated with the account, such as the motorist. The parking offence notice may include the details of the parking offence, parking fine amount payable for the parking offence and the due date for paying the parking fine.

Alternatively, the server 4 may incorporate an audio processing module configured to receive a vehicle number from a parking warden through a phone call. Alternatively, the parking warden may communicate with an operator operating the server 4 whereby the operator determines whether the vehicle number has an account and whether there is a valid parking coupon item related to the vehicle number and a parking offence notification may be issued from the server 4 upon a request by the operator if the operator determines that the parking coupon item is invalid or has expired.

In an embodiment, the apparatus 2 may be configured to determine whether a parking offence notice is to be issued to a person associated with the account based on the information related to the electronic parking coupon. For example, the apparatus 2 may be configured, under control of the processor 55, to issue a parking offence notification upon detection or input of a vehicle identifier code that is not related to an electronic parking coupon or a valid request for an electronic parking coupon. In an embodiment, the server 4 may be configured to receive location information from a satellite equipped with the global positioning system for identifying the location of vehicles using electronic parking coupons.

The server 4 may be further configured to determine whether a vehicle has exceeded a stipulated parking duration by retrieving information related to an electronic parking coupon object related to an account on the server 4 and performing a comparison with the location of the vehicle identified by the global positioning system and a vehicle identifier code of the vehicle. For example, if the server 4 determines that a electronic parking coupon item on the current date of parking has expired, the information relating to the expired electronic parking coupon item may be incorporated into a parking coupon object and transmitted to an electronic device of parking wardens who can proceed to the location of the vehicle and issue a parking offence notification if necessary. For example, the user of Car A has purchased an electronic parking coupon that allows him or her to park his or her vehicle for a

parking duration of 2 hours at a designated parking area. Should the server 4 determines that Car A has exceeded the parking duration based on location information received from a global positioning system and a server network time, the server 4 may send a notification to a parking warden in the vicinity of the designated parking area to check on the vehicle to see if the vehicle owner is in his car. If the vehicle owner is absent, the parking warden may then send a request for a parking summon to be issued to the account holder for the parking offence. The server 4 may be further configured to process images received from an imaging device located in the designated parking area to determine whether the vehicle in the parking area has occupants and a parking offence notification may be transmitted to the account holder automatically without the need of parking wardens. Still further, the server 4 may be configured to convert a parking rate of a selected electronic parking coupon item based on a user request. For example, the apparatus 2 may be configured to send a request for conversion of parking coupons if for example, a user may have an electronic parking coupon based on a parking rate of \$1.00/half hour and has parked at a \$1.00/half hour parking lot and has 15 minutes left. Before leaving the parking lot or shortly after leaving the parking lot, a request for conversion of parking coupons may be sent from the apparatus 2 to the server 4 and the server 4 may send a converted electronic parking coupon to the apparatus 2 wherein the converted electronic parking coupon has a converted parking duration of 66 minutes based on calculating a monetary value of the electronic parking coupon based on the remaining time of the parking duration before conversion. The user may then drive to a parking space having a parking rate of \$0.50 for half hour and park in the parking space for a converted parking duration of 66 minutes. An example of formulae for the conversion of parking coupons is described below in the following steps.

Step 1) Calculating remaining coupon value based on:

Remaining Coupon Value
 = (Remaining Parking Duration) x (Prevailing Parking Rate) ---- Formula (1)

Step 2) Calculating New Parking Duration (@ New Parking Rate):

New Parking Duration = $\frac{\text{Remaining Coupon Value}}{\text{New Parking Rate}}$ ----- Formula (2)

Example

Mr. A purchased one hour's worth of electronic parking coupons for a \$1 per $\frac{1}{2}$ hour carpark in an electronic parking coupon having a total coupon value of \$2. With 33 mins remaining on the electronic parking coupon, he decides to send a request to the server 4 to convert the parking duration of the electronic parking coupon based on a parking rate of \$0.50 per $\frac{1}{2}$ hour.

Hence, the server 4 may be configured to convert the parking duration by performing the following steps:

- 5 Step 1) Calculating remaining coupon value:

$$\begin{aligned}\text{Remaining Coupon Value} &= \frac{33}{60} \text{ hour} \times \$1\frac{1}{2}\text{hr} \\ &= \underline{\$1.10}\end{aligned}$$

- 10 Step 2) Calculating New Parking Duration (@ New Parking Rate):

$$\begin{aligned}\text{New Parking Duration} &= \frac{\$1.10}{\$0.50} \times 30\text{mins} \\ &= \underline{66 \text{ minutes}}\end{aligned}$$

- 15 FIG. 4A is a flow chart illustrating a method 60 for acquiring vehicle parking rights from a content server over a network. The method 60 may begin at step 61 and the apparatus 2 sends information to the content server 4 at step 62. Based on the information, the apparatus 2 acquires content related to an electronic parking coupon from the content server 4 at step 63 and the method 60 ends at step 64.

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FIG. 4B is a flow chart illustrating a detailed method 70 for acquiring vehicle parking rights from a content server over a network. The method 70 may begin at step 71 and information such as a vehicle identifier code of a vehicle is sent to the content server 4 at step 72. The vehicle identifier code may be capable of being related to an account on the content server.

- 25 Based on a determination of whether the vehicle identifier code is related to a valid request received for the electronic parking coupon at step 73, the apparatus 2 may receive content related to an electronic parking coupon at step 74 such the parking coupon object includes an electronic parking coupon item and a duration of use of the electronic parking coupon item from the content server wherein the electronic parking coupon item is associated with
- 30 vehicle parking rights registered for the vehicle based on a parameter associated with the account. If it is determined at step 73 that the vehicle identifier code is not related to a valid request received for the electronic parking coupon, the method 70 ends at step 75.

- FIG. 4C is a flow chart illustrating a detailed method 80 for acquiring vehicle parking rights
- 35 from a content server over a network. The method 80 may begin at step 81 and the apparatus 2 may be configured to select an electronic parking coupon item located on the content server in step 82 and to select a parking duration of the electronic parking coupon item in step 83. A request for the electronic parking coupon item may be generated in step 84 for sending a vehicle identifier code to the content server. The request may include the

vehicle identifier code, the selected electronic parking coupon item and the selected parking duration of the electronic parking coupon item. If it is determined by the server 4 in step 85 that the vehicle identifier code is related to a valid request for the electronic parking coupon item, the apparatus 2 receives content related to the electronic parking coupon from the server in step 86. Alternatively, the content may be incorporated in an electronic parking coupon object on the server and acquired by the apparatus 2 in step 86. If it is determined by the server 4 in step 85 that the vehicle identifier code is not related to a valid request for the electronic parking coupon item, the method 80 ends in step 87.

FIG. 4D is a flow chart illustrating a detailed method 90 for sending location information and acquiring vehicle parking content from a content server over a network. The method 90 may begin at step 91 and the apparatus 3 may be configured to send location information of the apparatus 3 through the receiver 59 to the content server 4 in step 92. The server 4 may be configured to store geographical location data of all the public parking spaces and their corresponding parking rates. If it is determined by the server 4 in step 93 that the location information corresponds with geographical location data of a designated parking area such as a public parking area managed by the content server or an authorised server, the apparatus 3 acquires content related to an electronic parking coupon from the server 4 in step 94. If it is determined by the server 4 in step 93 that the location information does not correspond with geographical location data of a designated parking area, the method 90 ends in step 95.

Alternatively, upon the initiation of an electronic parking coupon application by the user, the apparatus 2 or 3 may be configured to identify the current location of the apparatus 2, 3 and send the location information of the apparatus 2, 3 over the network to the server 4. The server 4 may be configured to compare the location information received with the geographical location data regarding public parking spaces to determine if the location information falls within the geographical location data of any public parking space. Should the location information provided by the apparatus 2, 3 fall within the geographical location data of a public parking space, the server 4 may be configured to automatically filter and only provide customized electronic parking coupon content applicable and relevant to public parking spaces based on the location information of the apparatus 2, 3 (i.e. the parking rate of that particular public parking space).

If the server 4 is unable to determine the specific car park the user is in using the location information provided, the server will automatically provide the "Nearest Available Car park(s)" within 1 km of the user's location. From the options, the user can then select the car

park he parked his vehicle in and the server will proceed to determine the corresponding parking rate for that car park.

In an embodiment, location information may be received from a first device such as an in-vehicle transponder unit of a vehicle. The server 4, upon receiving real-time location information from the transponder unit, may be configured to compare the location information provided with the geographical location data of all the public parking spaces and determine the corresponding parking rate for the car park the vehicle is in. Subsequently, content related to an electronic parking coupon may be transmitted to a second device different from the first device. An embodiment of an exemplary electronic parking coupon system for processing vehicle parking content based on location information will be described in detail with reference to FIG. 22 to 27.

FIG. 5A is a flow chart illustrating a method 100 for processing vehicle parking content. The method 100 may begin at step 101 and the content server 4 receives information from a device at step 102. Based on the information, the server 4 processes content related to an electronic parking coupon at step 103 and the method 100 ends at step 104. In another embodiment, FIG. 5B is a flow chart illustrating a detailed method 110 for processing vehicle parking rights. The method 110 may begin at step 111 and upon receiving information from a device at step 112, the server 4 processes content related to an electronic parking coupon in step 113. The server 4 may be configured to incorporate the content in a parking coupon object in step 114 and the method 100 ends at step 115.

FIG. 5C is a flow chart illustrating a method 120 for transmitting vehicle parking content upon receipt of vehicle identifier information of a vehicle. The method 120 may begin at step 121 and the server 4 receives vehicle identifier information of a vehicle in step 122. The server 4 performs a determination check in step 123 to determine whether the vehicle identifier code is related to an account. If it is determined in step 123 that the vehicle identifier code is related to a valid request received for an electronic parking coupon, content related to an electronic parking coupon is transmitted to the apparatus 2 at step 124. If it is determined by the server 4 in step 123 that the vehicle identifier code is not related to a valid request received for an electronic parking coupon, the method 120 ends at step 125. The server 4 may be configured, under control of the processor 7, to generate for display on a display, content related to the electronic parking coupon. The display may be for example, a display

unit of the apparatus 2 or an electronic device from which the vehicle identifier code is received.

Alternatively, the server 4 may be configured to receive location information from a device and process content related to an electronic parking coupon according to an exemplary method 130 for transmitting vehicle parking content upon receipt of location information from a device as shown in FIG. 5D. The method 130 may begin at step 131 and the server 4 receives location information from a device at step 132. The server 4 may be configured, under control of the processor, to determine if the location information corresponds with the geographical location data of a parking space or area in step 133. If it is determined in step 133 that the location information corresponds with the geographical location data of a parking space, the server 4 transmits content related to an electronic parking coupon to the apparatus 2 in step 134. If it is determined in step 133 that the location information does not correspond with the geographical location data of a parking space, the method 130 ends at step 135.

FIG. 6 is a graphical representation of an electronic device 140 representing an embodiment of the apparatus 2 of FIG. 3A. The electronic device 140 may include a display 141, an input/output interface 142 such as a touch panel formed on the display 141, and an user selectable screen icon 143 representing an electronic parking coupon function module or application that may be initiated by a user.

FIG. 7 is a graphical representation of an input terminal 150 representing an embodiment of the apparatus 2 of FIG. 3A. The input terminal 150 may be a network-enabled kiosk configured for acquiring vehicle parking rights over a network from a content server. Similarly, the input terminal 150 may include a touch screen interface or panel 142 formed on a display 141 and the input terminal 150 may be configured to generate for display on the display 141, an user selectable icon 143 for initiating an electronic parking coupon application. The input terminal 150 may be installed in every car park and configured to generate a graphical user interface for enabling users to acquire electronic parking coupons over a network from a content server. Although fixed costs may be incurred by installation of such input terminals 150 in designated parking locations, the input terminal 150 may be configured to incorporate multiple levels of redundancy designed in the system for processing vehicle parking rights. For example, the input terminal 150 may be connected to the content server over a secured network different from mobile networks. Hence, in the

event of a mobile network breakdown, users may still acquire electronic parking coupons from the content server.

FIG. 8 is a graphical representation of a computer 160 representing an embodiment of the apparatus 2 of FIG. 3A. The computer 160 is similar in configuration to the apparatus 2, and in addition, the computer 160 may include an input unit for receiving a user input to select an electronic parking coupon item. Additionally, the computer 160 may be configured for acquiring vehicle parking rights over a network from a content server via accessing a website providing an electronic parking coupon service wherein the website is located on the content server. For example, a motorist reaches a parking destination but does not have access to an apparatus 2 or a mobile device for acquiring vehicle parking rights, so he calls another person having a desktop computer with internet access to purchase electronic parking coupons for him based on a vehicle identifier code such as a vehicle number, type of electronic parking coupon and parking duration.

FIG. 9A and FIG. 9B are graphical representations of content related to an electronic parking coupon 9 such as for example, an electronic parking coupon item 9. The electronic parking coupon item 9 includes an electronic parking coupon identifier code 170 such as for example, a transaction ID 170, and coupon information 171 relating to the electronic parking coupon item 9. The coupon information 171 includes a vehicle identifier code 172 such as a vehicle number, a coupon value 177 and data related to the electronic parking coupon item 9 including a purchase date 173, a running time 174 which indicates a start time and a stop time of the electronic parking coupon 9, a parking duration 175, a parking rate 176, and a coupon status indicator 179. As shown in FIG. 9A, the coupon status indicator 178 is based on real-time information located on the server 4 and shows that the electronic parking coupon item 9 is active and valid because there is time remaining in the electronic parking coupon item 9. On the hand, if there is no time remaining in the electronic parking coupon item 9, then the coupon status indicator 178 is updated to indicate the date of expiry of the electronic parking coupon item. The server 4 may be configured to generate a banner object 179 to be incorporated in the electronic parking coupon item 9 to indicate that the electronic parking coupon item 9 is expired.

FIG. 10A to FIG. 10F are screen shots illustrating a graphical user interface for acquiring vehicle parking rights in accordance to one or more embodiments. FIG. 10A shows a graphical user interface 141 generated on a display 142 with a user selectable icon 143 for

initiating an electronic parking coupon application. Alternatively, a user may acquire vehicle parking rights through accessing a website located on the content server through a browser.

FIG. 10B show a graphical user interface 180 for enabling a user to access or login to an account on the content server. The graphical user interface 180 includes a first input element 181 for receiving a user input related to a username of the account, a second input element 182 for receiving a user input related to a password of the account, and a third input element 185 for enabling a user to login to an account located on the content server. Alternatively, if the user is a first time user of the electronic parking coupon system, the user may also register an e-parking account through a direct link represented by a link element 186 on the graphical user interface 180. Further, the user interface 180 may include a fourth input element 184 for allowing a user to store the login details for generating on a display in a subsequent activation of the electronic parking coupon application. This allows the user to access his account without the hassle of logging in every single time. It will be appreciated that a user may login using different mechanisms related to an account such as a unique vehicle number, government designated username (e.g. Singpass), a newly created (custom) username, any other relevant types of login ID or the like. Still further, the user interface 180 may include a link element 187 to enable a user to send a request to reset the password if he forgot the password.

FIG. 10C illustrate a graphical user interface 190 having a user selectable screen object 191 for purchasing electronic parking coupons, a user selectable screen object 192 for displaying data or information related to purchased electronic parking coupons, and a user selectable screen object 193 for modifying details or a parameter associated with the account such as for example, top up of a payment account related to the account. There is an information bar 194 showing details of a function selected by a user and FIG. 10C shows data displayed based on a user selecting the user selectable screen object 193 for modifying details associated with the account. An account value 195 may be retrieved from the server 4 and generated for display on the user interface 190 and a user selectable input element 196 may be provided to facilitate selection of an amount for the top up of the payment account. The top up amount values may be in denominations of \$10, \$20, \$50 or the like. Payments can be made by selecting a plurality of user selectable screen objects associated with payment methods 197 through mobile payment platforms or services operated by financial institutions and/or credit card companies. The graphical user interface 190 has a user selectable screen object 198 for enabling the user to proceed with the process of acquiring an electronic parking coupon. In an embodiment, after users top up their payment accounts via a mobile payment platform (e.g. a payment service operated by a credit card company), the payment made to the server 4 may be stored as a cash float which can be sent to and be

held by various organisation including: 1) Government agencies managing or authorised to manage the electronic parking coupon system, 2) authorised Banks and 3) authorised third party organisations.

Alternatively, a user might purchase a plurality of electronic parking coupons for anticipated or future usage without needing to pay immediately and/or activating the electronic parking coupons. For example, for electronic parking coupons purchased beforehand prior to the stipulated activation time, the server will only activate the electronic parking coupon upon a user request or at the stipulated time based on the type of the parking coupon. For example, night parking coupons can be purchased any time during the day yet it will only be activated by the server 4 at a designated time for example, 10.30 p.m. Such coupons might be displayed on the apparatus 2 as inactive coupons or not displayed altogether until close to or at the stipulated activation time.

The server 4 may be configured to track of the user's expenditure and a bill will then be issued to the user for payment at any time period (i.e. weekly, bi-weekly, monthly etc.). The bill can then be paid electronically by sending the payment from the computing device through a payment module in the electronic parking coupon application, website or 3rd party machine (i.e. a payment service machine operated by a financial institution). The bill can also be paid via a banking facility or payment service or a direct payment such as cash or the issuance of a cheque.

Alternatively, a user may select to purchase coupons by selecting the user selectable screen object 191 without top up of the account. FIG. 10D shows a graphical user interface 200 for purchasing an electronic parking coupon. In the graphical user interface 200, a login date 201 and login time 202 may be displayed and optionally if there is a payment account associated with the account, an account value 203 of the payment account may be displayed. An input element 204 is provided for input of a vehicle identifier code such as a vehicle number. Optionally, the user may select a user selectable screen object 205 for storing the vehicle number on the content server. The graphical user interface 200 has a user selectable screen object 206 for enabling the user to proceed with the process of acquiring an electronic parking coupon. In a graphical user interface 300 as shown in FIG. 10E, user screen selectable items 302 are generated to facilitate selection of an electronic parking coupon item. For example, in Singapore, there are different types of parking coupon items associated with different parking rates. Therefore there may be a plurality of electronic parking coupons and each electronic parking coupon may include one of: a "50¢ per ½hr" parking coupon 303, a "\$1.00 per ½ hr" parking coupon 304, a "Whole Day Parking" parking

coupon 305, a "Night Parking Scheme" parking coupon 306, a "65¢ per Day/Night" parking coupon 307 (for motorcycles). There is a back function element 301 to enable a user to return to a previous user interface.

FIG. 10F show a graphical user interface 310 for selecting a parking duration of the selected electronic parking coupon, such as a number of minutes/hours/day. The graphical user interface 310 shows a vehicle identifier code 312, the details of the selected electronic parking coupon 313, and a user selectable screen input element 314 for selecting the parking duration of the selected electronic parking coupon 313. A user selectable screen object 315 may be generated to enable a user to send a request to purchase the selected parking coupon 313 based on the selected duration. Optionally, a request to activate the selected electronic parking coupon may be sent together with the request to purchase by selecting a user screen selectable screen object 315 and the electronic parking coupon will be activated immediately upon purchase. An advantage is that users no longer need to select the date and starting time of the parking coupons as the start time is dependent on the time the request for activation is sent to the server and the end time or the upper timestamp is synchronised to a network time of the server 4.

FIG. 11A and FIG. 11B are screen shots illustrating a graphical user interface for processing vehicle parking rights in accordance to one or more embodiments. Referring to FIG. 11A, users may review a status of purchased parking coupons by selecting the user selectable screen object 192 to generate a graphical user interface 320. The graphical user interface 320 includes an active status list 321 and an expired status list 322. For example, by selecting the active status list 321, the apparatus 2 may be configured under control of the processor to generate for display, a list of purchased coupons whereby the status is active, i.e. the purchased coupons are in use or may be used and coupon properties 325 associated with each of the purchased coupons. A time data 324 and coupon details 323 may be generated for an electronic parking coupon item associated with the account to indicate for example, a remaining time 327 of a parking duration and details 326 associated with the electronic parking coupon item. For example, a user selectable screen object 328 may be generated to enable a user to view more detailed information related to the electronic parking coupon as shown in a graphical user interface 330 of FIG. 11B.

FIG. 11B shows a data of an electronic parking coupon item 9 generated for display on the graphical user interface 330 with a coupon status indicator 178 show a time remaining of the parking duration. The server 4 may be further configured, under control of the processor 7, to extend a parking duration of the electronic parking coupon item based on a request sent

by a computing device while a status of the electronic parking coupon item is active. Hence, there may be a user selectable screen object 332 provided in the graphical user interface 330 to enable a user to select a length of an extension of a parking duration of the electronic parking coupon 9 and the user may send a request for the selected extension of the parking duration associated with the electronic parking coupon 9 to the server 4 by selecting a user selectable screen object 333. It will be appreciated that the time extension for a parking duration of an active electronic parking coupon may be denominated in any block of timing ranging from per minute parking to per half hour parking to per day parking or the like.

FIG. 12A to FIG. 12C are screen shots illustrating a graphical user interface for processing vehicle parking rights which have expired in accordance to one or more embodiments. Similar to FIG. 11A, by selecting an expired status list 342, the apparatus 2 may be configured under control of the processor to generate for display, a list of purchased coupons whereby the status is expired, i.e. the purchased coupons are expired and coupon properties 345, 346 associated with each of the purchased coupons. An electronic parking coupon transaction history related to an account may be stored on a database connected to or located in the server wherein such transaction history may be incorporated in an electronic parking coupon object to be transmitted to a user whereby the electronic parking coupon object is associated with an account. Still further, details of the account such as data relating to account top-up history or account transactions may be incorporated in an electronic parking coupon object for transmitting to an electronic device upon a user request.

A time data 343 such as a date of expiry and coupon details of the expired electronic parking coupon may be generated for an electronic parking coupon item associated with the account to indicate for example, the date of expiry of a parking duration and details associated with the electronic parking coupon item. For example, a user selectable screen object 347, 348 may be generated to enable a user to view more information related to each electronic parking coupon as shown in a graphical user interface 350 of FIG. 12B. FIG. 12B shows a data of an electronic parking coupon item 9 generated for display on a graphical user interface 350 with a coupon status indicator 178 updated to show the date of expiry of the electronic parking coupon item 9. Optionally, there may be a user selectable screen object 352 provided in the graphical user interface 350 to enable a user to send a request for a receipt of purchase associated with the electronic parking coupon 9 to the server 4. For example, the apparatus 2 may be configured to generate a request for sending an email incorporating an electronic receipt to an email address related to an employer from the server 4 or print out a physical receipt from the apparatus 2 for submission to his employer.

A code which only allows receipts to be emailed or printed once might be incorporated in the electronic parking coupon receipt so as to prevent abuse of the system by claimants whereby multiple expense reimbursement claims might be made using a single electronic parking coupon. For example, the electronic parking coupon receipt incorporates a transaction ID of the electronic parking coupon.

In FIG. 12C, the graphical user interface 360 may be configured to incorporate a user selectable screen object 361 to delete expired electronic parking coupons stored on the apparatus 2. Alternatively, the apparatus 2 may be configured to delete such coupons after a designated time period. The user interface 360 may include a user selectable screen object 194 for accessing information or services located on the server 4 to facilitating acquiring vehicle parking rights in an electronic parking coupon system as shown in a graphical user interface 370 of FIG. 13A.

The graphical user interface 370 has a user selectable screen object 372 for accessing a mobile version of an Electronic Parking Coupon System User Guide located on the content server 4, and a user selectable screen object 373 for accessing a *FAQ* (frequently asked questions) web page located on the content server 4. Users can log out of their e-parking account by selecting a user selectable screen object 376 and the apparatus 2 or the mobile device may be used by another person to access a different account located on the content server 4. This eliminates the need for every user to have a mobile device in order to acquire vehicle parking rights or to purchase an electronic parking coupon.

Further, there is a user selectable screen object 374 for modifying notification settings related to electronic parking coupon items in an electronic parking coupon object to generate a graphical user interface 380 for modifying notification settings for an electronic parking coupon as shown in FIG. 13B. There is a user selectable screen object 381 for selecting a notification or an alert to be sent to the apparatus 2 regarding time remaining of the parking duration of an electronic parking coupon. The time remaining of the parking duration may also be displayed in a bar 382 of the graphical user interface 380. The time at which a notification will be issued regarding the expiry of the electronic parking coupon can be customized, i.e. a notification alert will be issued when the electronic parking coupon is expiring in "x" minutes. The alert style may be selected through user selectable screen objects 383. FIG. 13C shows a graphical user interface 390 showing an alert object 392 generated on the display 141 to indicate that the notification setting is activated. Details 391 of the alert 392 may be generated for display on the top of the display 141 upon a user input from an input device positioned over the alert object 392.

In all the above embodiments, the server 4 may be configured to transmit to an account, warnings regarding late payment of fines either via a notification to the computing device 2 through a text messaging facility, email, or an application notification.

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Due to the design of public parking areas, motorists may not be able to quickly locate an available parking space in the parking area upon arrival. A system may be configured for facilitating motorists to quickly and accurately locate an available parking space based on electronic parking coupon content stored on the server 4 and by incorporating a global positioning system (GPS) within the system. It will be appreciated that depending on developments in GPS technologies, the server may be configured to display the approximate number of parking lots available and highlight which particular parking lots are available on a graphical map interface.

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The server 4 may be configured to process the content by determining availability of parking spaces in one of a plurality of designated parking areas such as for example, roadside public parking areas or a public car park. An advantage of helping vehicles to quickly and accurately locate an available parking space is that there will be fewer vehicles on the road and this will reduce the chronic problem of congestion especially in areas with essential amenities. FIG. 14A to FIG. 14C are flow charts illustrating methods for determining a number of available parking spaces in a designated parking area.

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As shown in FIG. 14A, a method 400 for processing vehicle parking content may begin in step 401 through an initialization process of the electronic vehicle parking system. The server 4 may be configured to receive purchase information of an electronic parking coupon in step 402 and location information of a vehicle associated with the electronic parking coupon in step 403. Specifically, upon the purchase of an electronic parking coupon by a motorist, the location of the vehicle related to the electronic parking coupon is determined by the server 4. The purchase information related to the electronic parking coupon will be transmitted to the server 4 or a dedicated data server such as the server 27 in FIG. 1B which will aggregate all e-coupons bought in a particular area and cross reference the aggregated data with data pertaining to the total number of parking lots in the particular area to provide information regarding the approximate number of available parking lots in the particular area.

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When an application for determining available of parking spaces located on the content server 4 is initiated, the server 4 may be configured to determine the location of the vehicle

and the corresponding parking rate of a parking area in which the vehicle is located through an location mapping function module located on the server 4 and determine a number of available parking spaces in the parking area at step 404. For example, the number of available parking spaces may be determined by subtracting the number of active electronic parking coupons related to vehicles parked in the parking area from the total number of parking spaces in the parking area.

When there are no parking lots available in a particular car park or road, the content server may be configured, under control of the processor, to determine availability of parking spaces by determining an approximate waiting time for a parking space in the one of the plurality of parking areas as shown in a detailed method 410 illustrated in FIG. 14B. Similar to the method 400, the method 410 begins in step 411 and the server 4 may be configured to receive purchase information of an electronic parking coupon at step 412 and location information of a vehicle associated with the purchased electronic parking coupon at step 413. The server 4 then determines in step 414 a number of available parking spaces. If the server 4 determines in step 415 that there is at least one available parking space, the method 410 ends in step 417. However, if there is no available parking space, the server 4 may be configured to determine an approximate waiting time for an available parking space in step 416. "Approximate Waiting Time" may refer to the duration within which a probability of obtaining an available parking lot is greater than a predetermined percentage (δ) such as for example, where $\delta > \frac{1}{2}$. δ may be determined by the server 4. FIG. 14C shows a flow chart illustrating a detailed method 420 for determining an approximate waiting time for an available parking space is illustrated in a flow chart of FIG. 14C.

Similar to the method 400, the method 420 begins in step 421 and the server 4 may be configured to receive purchase information of an electronic parking coupon at step 422 and location information of a vehicle associated with the purchased electronic parking coupon at step 423. The server 4 then determines in step 424 a number of available parking spaces in a parking area. If the server 4 determines in step 425 that there is at least one available parking space in the parking area, the method 420 ends. However, if there is no available parking space, the server 4 may be configured to determine an approximate waiting time for an available parking space in the parking area by determining an electronic parking coupon's duration to expiry in step 426 and ranking all the vehicles in terms of their electronic parking coupons' duration till expiry. For example, a vehicle whose electronic parking coupon is expiring in 10 minutes will be placed before a vehicle whose e-coupon is expiring in 20 minutes. An example of the ranking of vehicles in accordance to the parking duration till expiry related to the electronic parking coupons is shown in Table 1.

Table 1

No.	Vehicle	Duration Till Expiry
1.	XXXXXXX	10 mins
2.	YYYYYYY	20 mins
3.	ZZZZZZZ	30 mins
:	:	:

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It will be appreciated that the ranking process of vehicles in terms of their electronic parking coupons' duration till expiry carried out by the server 4 is dynamic and subject to change in the status of the electronic parking coupons. For example, if a motorist having an electronic parking coupon which is close to expiry makes an extension on the duration of the electronic parking coupon, the vehicle will be re-ranked by the server 4 based on the extended duration or new parking duration till expiry.

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15 The server 4 may be configured to calculate a probability of a motorist making an Nth extension to the electronic parking coupon's parking duration in step 427. The probability of the motorist making an Nth extension may be calculated according to any history of extensions made in relation to the electronic parking coupon as described in the following examples:

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- (i) P (a motorist will make 1 extension given that he has made 0 extensions)
- (ii) P (a motorist will make a 2nd extension given that he has made 1 extension)
- (iii) P (a motorist will make a 3rd extension given that he has made 2 extensions)
- (iv) P (a motorist will make a Nth extension given that he has made N-1 extensions)

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The maximum number of extensions a motorist can make may be determined by the server 4 and may be for example 47. This is because the minimum parking duration available for a single extension is 0.5 hours and the minimum parking duration available at initial purchase is 0.5 hours, a motorist can make a maximum number of 47 extensions.

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The method of deriving the above probabilities of a motorist making a Nth extension is described in detail below.

a) To derive P (a motorist will make 1 extension given that he has made 0 extensions):

$P(\text{a motorist will make 1 extension given that he has made 0 extensions}) =$

$$\frac{\text{Total number of } e - \text{coupons purchased in a given time frame whereby 1 extension is made given that 0 extensions have already been made}}{\text{Total Number of } e - \text{coupons purchased in a given time frame}}$$

5 ----- (Equation 1.1)

B) To derive P (a motorist will make a 2nd extension given that he has made 1 extension):

$P(\text{a motorist will make a 2}^{\text{nd}} \text{ extension given that he has made 1 extension}) =$

$$\frac{\text{Total number of } e - \text{coupons purchased in a given time frame whereby a 2nd extension is made given that 1 extension has already been made}}{\text{Total Number of } e - \text{coupons purchased in a given time frame whereby 1 extension is made}}$$

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----- (Equation 1.2)

It will be appreciated that all data and content obtained in the probability determination may be compiled and stored by the content server 4 and the latency of the approximate waiting
15 time function module may depend on the availability of such data.

The probability of a motorist making an extension [P(extension)] may be directly correlated to the probability of a motorist making an underestimation [P(underestimation)]. With each subsequent extension made, the motorist has access to more and more situational
20 information and the P(underestimation) decreases. As such, the more number of extensions made by a motorist, the lower the probability of the motorist making a further extension. It follows that another motorist who has made a lesser number of extensions is likely to make an underestimation in view of inadvertent situations and therefore the [P(extension)] will be higher and may be represented by the following expression.

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$P(\text{a motorist will make } N^{\text{nd}} \text{ extension given that he has made } N-1 \text{ extensions}) > P(\text{a motorist will make a } (N+1)^{\text{nd}} \text{ extension given that he has made } N \text{ extension})$

This is perhaps best illustrated with the following Example 1:

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Example 1

A lady has a consultation session at the hospital and parks at the nearby public car park. She initially purchases an electronic parking coupon with a parking duration corresponding to the minimum expected duration of stay such as for example, 3 hours which is an estimation due to lack of situational information on the approximate waiting time for her consultation session. After waiting for 2.5 hours, the lady is informed that the doctor will be delayed for approximately 0.5 hours as he has to attend to an emergency. At this juncture, the lady knows she will have to make an extension to her electronic parking coupon. She has been observing that a consultation session last for approximately 0.5 hours. She also observes that there is a waiting time of 0.5 hours to make payment and to collect medication at the pharmacy. She makes an extension of 1.5 hours based on allowing for a "buffer parking duration" of 0.5 hours. Her time estimation at this juncture is much lower compared to previously, upon initial arrival, as she has access to more situational information (i.e. average consultation time, average waiting time for medicine collection and payment, doctor's schedule etc.).

Therefore, the P (the lady needs to make an extension a second time given that she has already made 1 extension) is much lower compared to the P (the lady needs to make an extension given that she has made 0 extensions).

Upon calculating the probability that a motorist will make an extension in step 427, the server 4 may be configured to calculate and determine a probability of an available parking lot or a probability of a motorist leaving a parking space in the one of the plurality of parking areas by the end of the parking duration related to the electronic parking coupon in step 428. An example of deriving the probability of an available parking lot is shown in equation 2 below.

$$P(\text{a motorist will leave around his e-coupon's duration till expiry}) = 1 - P(\text{a motorist will make an extension}) \text{ ----- Equation 2}$$

Based on the probabilities obtained, the approximate waiting time is determined in step 439, details of deriving the approximate waiting time is described in FIG. 15A which is a process flow diagram illustrating a method 430 for determining probability of an available parking lot in a designated parking area in an approximate waiting time.

In step 431 for Vehicle A, using equation 2, the probability P (the motorist owning Vehicle A will leave around 10 minutes (i.e. ± 10 minutes)) = $1 - P$ (the motorist owning Vehicle A will make an extension). A probability of an available parking lot in a predetermined amount of time may be derived as shown in Example 2:

Example 2 - Deriving P (there will be an available parking lot in “X” mins)

Within the duration of around 10 minutes, P (there will be an available parking lot in 10 minutes) = P (the motorist owning Vehicle A will leave around 10 mins)

Within the duration of around 20 minutes, P (there will be an available parking lot in 20 minutes) =

P (the motorist owning Vehicle A will leave) + {P (the motorist owning Vehicle A will make an extension) x P (the motorist owning Vehicle B K will leave)}

Within the duration of around 30 minutes, P (there will be an available parking lot in 30 minutes) = P (the motorist owning Vehicle A will leave) +

{P (the motorist owning Vehicle A will make an extension) x P (the motorist owning Vehicle B will leave)} +

{P (the motorist owning Vehicle A will make an extension) x P (the motorist owning Vehicle B will make an extension) x P (the motorist owning Vehicle C will leave)}

The above probabilities may be calculated and processed on the server 4 which may be configured to display the results in for example, Table 2 below.

TABLE 2

Approximate Waiting Time (AWT, minutes)	Probability of Available Parking Lot in AWT minutes where $\delta > \frac{1}{2}$.
10 minutes	$< \delta$
20 minutes	$< \delta$
30 minutes	$> \delta$

Based on the results of Table 2, the approximate waiting time for an available parking lot is 30 minutes because the probability of available parking lot in 30 minutes is greater than δ .

It will be appreciated that the determination of the above probabilities is dynamic because of the changing conditions within a parking area such as described in the following three instances:

1. The motorist leaving a little prematurely (i.e. the motorist leaves a short duration before his stipulated time of expiry of his electronic parking coupon).
2. The motorist waits in his vehicle after the expiry of his electronic parking coupon.
3. The motorist exceeds his stipulated parking duration after the expiry of his electronic parking coupon.

The server 4 may be configured, under control of the processor, to generate for display on a display, information related to the available parking spaces in the form of a graphic map interface as shown in FIG. 15B, FIG. 15C and FIG. 15D. For example, if a motorist purchases an electronic parking coupon on a parking space E, a status of the parking space E will be indicated as unavailable on the graphical map interface. When the electronic parking coupon expires and no extension is made, the status of the parking space E will be indicated as available. For easy visualization by users, the status of the parking spaces might generated in colour on the display such as by colour-coding of block elements representing the parking spaces (i.e. Green = Available and Red = Unavailable).

FIG. 15B shows a graphical user interface 450 showing information related to available parking spaces in a designated parking area located on the content server. The graphical user interface 450 may be configured to generate a graphic map 451 of a geographical region such as for example, a designated parking area. The designated parking area may include a plurality of roads A, B, C, D in which there are parking lanes 452, 453, 454, 455 respectively. Parking information is displayed on the graphic map 451 to enable motorists entering the designated parking area to determine a number of available parking spaces in any of the parking lanes 452, 453, 454, 455. How the server generates the information related to available parking spaces for display on the graphical user interface 450 is perhaps best illustrated with the following Example 3 with reference to FIG. 15B, FIG. 15C and FIG. 15D.

Example 3 – Designated Parking Area including Roadside Parking, Public Car Parks excluding HDB Car Parks

For example, there are 30 parking spaces in each of the parking lanes 452, 453, 454, 455. Data related to the parking spaces may be stored on a data storage server to be retrieved by the content server to generate for display on a graphical user interface 461 as shown in FIG. 15C. The graphical user interface 461 may be configured to generate a detailed graphic

map 462 of a selected region within a designated parking area, for example, to show a plurality of parking spaces 464, 465, 466, 467, 468 in the parking lane 452.

When a motorist buys an electronic parking coupon for parking in a parking space at the parking lane 452 through a device such as for example a mobile phone, the server may be configured to receive information related to the purchased electronic parking coupon and to map the information related to the purchased electronic parking coupon such as for example, the vehicle identifier code to the location information of the vehicle having the vehicle identifier code to derive the location of the parking space occupied in the parking lane 452. Accordingly, the server may be configured to map content related to the electronic parking coupon to the parking space and to indicate a status of the parking space as occupied and based on the status of the parking spaces, the server may be configured to calculate a remaining number of parking spaces available in the parking lane 452 by deducting the occupied parking space from the total number of parking spaces in the parking lane 452 and generating for display on the graphical user interface 450, content related to available parking spaces in the parking lane 452 as shown in screen object 456. Similarly content related to available spaces in the parking lanes 453, 454, 455 may be generated for display in a similar way as screen objects 457, 458, 459. An advantage of displaying the content related to available parking spaces in the parking lanes 452, 453, 454, 455 to a user such as a motorist is that the motorist can determine where there may be available parking spaces without driving to every lane.

It will be appreciated that the content related to the available number of parking spaces may be displayed in several graphical representations using known rendering techniques. For example, the approximate total number of available parking spaces might be displayed using a graphic map interface and different colour coding might be used to indicate the status of parking spaces in the parking lane. For example, if a particular parking lane has a high (Green; 30 parking lots available), moderate (Yellow; 15 parking lots available) or low (Red; 0 or 5 parking lots available) number of available parking lots.

When a particular vehicle's electronic parking coupon expires, the status of the electronic parking coupon is updated by the server. As the server may be configured to link the status of the electronic parking coupon to the respective parking space in a designated parking area, accordingly the server regenerates an approximate total number of available parking lots based on the status of the electronic parking coupon.

Referring to FIG. 15B, if there be no available parking lots in the parking lane 455 as indicated by the screen object 459, the system might be able to display an approximate waiting time for an available parking space in a screen object 460. The server may be configured to calculate the approximate waiting time for an available parking space based on content related to the electronic parking coupons such as for example, content related to active electronic parking coupons. For example, the approximate waiting time can be calculated using the remaining time of electronic parking coupons of vehicles parked in the parking lane 455. If a parking duration of an electronic parking coupon of a vehicle in a parking space in the parking lane 455 is expiring in 15 minutes, the server may be configured to display an approximate waiting time of 15 minutes on the graphical user interface 450 through the screen object 460. It will be appreciated that the server may be configured in various other ways to calculate an approximate waiting time including but not limited to assigning probabilities that a car might leave and not extend based on the number of extensions made or the duration of stay whereby the longer time of stay entails a higher possibility of leaving). The waiting time might also displayed in a list to rank electronic parking coupons according to the expiry of the parking duration of the electronic parking coupons, for example, the server may be configured to display the top "N" electronic parking coupons close to expiry (i.e. the electronic parking coupons closest to expiry are 5 minutes, 10 minutes and 15 minutes and thus there might be an available lot in 5 minutes, another available lot in 10 minutes or the like).

In the following Example 4 illustrated with reference to a graphical user interface 480 as shown in FIG. 15D, a motorist rushing to Destination "X" is determining whether to park at either of the parking lanes 452, 453, and 454.

Example 4

Similar to the graphical user interface 450 of FIG. 15B, the graphical user interface 480 may be configured to generate a graphic map 481 of a geographical region such as for example, a designated parking area including a plurality of roads A, B, C, D in which there are parking lanes 452, 453, 454, 455 respectively. Based on the content related to the electronic parking coupons associated with vehicles parked in the parking lanes, the server may be configured to transmit parking information to motorists through the graphical user interface 480. For example, the graphical user interface 480 may include for the parking lane 452, a screen object 482 for displaying the number of available parking spaces. If there are no available parking spaces in the parking lane 452, the server may be configured to calculate an approximate waiting time for a parking space in the parking lane 452, and generate for

display, a screen object 483 showing the approximate waiting time for a parking space in the parking lane 452. Similarly, the server may be configured to generate a screen object 485 for displaying the number of available parking spaces in the parking lane 453. If there are no available parking spaces in the parking lane 453, the server may be configured to calculate an approximate waiting time for a parking space in the parking lane 453, and generate for display, a screen object 486 showing the approximate waiting time for a parking space in the parking lane 453.

If for example, the server displays on the graphical user interface 480 that there are available parking spaces in the parking lane 454 as shown in FIG. 15D as screen object 486, the server may be configured to calculate a travelling time "Y minutes" required to reach Destination "X" as shown in screen object 487.

Assuming *ceteris paribus*, the motorist may decide to park at the parking lane 454 instead of waiting for a parking space in the parking lane 453 because the approximate waiting time for a parking space in the parking lane 453 (displayed in the screen object 484) is more than a travelling time "Y minutes" required to reach Destination "X" as shown in the screen object 487. However, if the screen object 487 displays that "Y minutes" is more than the approximate waiting time for a parking space in the parking lane 453, the motorist may still decide to park in the parking lane 454 in the event of other real-time situational factors including but not limited to the following situations:

- a queue existing in the parking lane 453
- a heavy downpour, and there is no shelter connecting the parking lane 453 to Destination "X" but there is shelter connecting the parking lane 454 to Destination "X"

It will be appreciated that the content related to the number of available parking spaces and the approximate waiting time is dynamic and not static. In other words, the closer the motorist is to a particular parking space, the more accurate the content provided by the server will be because the chances of the content changing before the motorist reaches the parking space is low. In contrast, if a motorist is far away, for example, 30 minutes away from a parking space, the content is likely to have changed by the time the motorist arrives at the parking space in view of the dynamic nature of vehicle movement and parking conditions in the parking area.

Referring to FIG. 16, a system 490 may be configured for transmitting content related to an electronic parking coupon over a network 493 from a server such as a content server 494 to

a device such as a computing device 492 based on location information of the device 492 within a specified area of geographical coverage 491. The area 491 may be one of a plurality of parking areas regulated by an authority wherein geographical data of the one of the plurality of parking areas may be stored in a content server administered by the authority.

In an embodiment, the server 494 may be configured, under control of the processor, to transmit electronic parking coupon content including an application request link for an application program for accessing the content server 494 to the device 492 over the network 493 if the location information of the device 492 corresponds or falls within the area 491. For example, the server 494 may be configured, under control of the processor, to transmit an application request link for an application program for acquiring an electronic parking coupon to the device 492 when the server 494 receives location information of the device 492. It will be appreciated that location information of the device 492 may be sent to the server 494 through triangulation methods using global positioning systems connected to the system 490 or through location mapping applications stored in the device 492 using the network 493. Methods for transmitting content related to an electronic parking coupon over a network 493 from the content server 494 to the computing device 492 based on location information of the device 492 will be described with reference to FIG. 17A and FIG. 17B.

As shown in FIG. 17A, a method 510 for processing vehicle parking content may begin in step 511 through an initialization process of the system 490. The server 494 may be configured, under control of the processor, to receive location information of the device 492 in step 512 and to process content related to an electronic parking coupon based on the location information. Specifically, the server 494 may be configured to process the content by comparing the location information of the device 492 with geographical location data of the area 491 in step 513 to determine if the location information of the device 492 falls within the geographical location information of the area 491. If the server 494 determines in step 514 that the location information of the device 492 does not fall within the geographical location information of the area 491, the method 510 ends in step 516. If the server 494 determines in step 514 that the location information of the device 492 falls within the geographical location information of the area 491, the server 494 may be configured to transmit content related to an electronic parking coupon such as an application request link for an application program for acquiring electronic parking coupon content to the device 492 in step 515. The server 494 may also be configured to transmit content related to an electronic parking coupon relevant to the area 491, such as for example, parking rates

applicable in the area 491, to the device 492 in step 515 to facilitate selection of a parking rate of the electronic parking coupon.

Still further, the server 494 may be configured to transmit content including advertisements such as promotions from shops or restaurants or commercial establishments within or around the area 491 to the device 492. Such advertisements may be delivered via a multitude of mediums, including but not limited to SMS alerts, in-app notifications or emails. The advertisements may be text-based, image-based, audio-based or a combination of the aforementioned.

It will be appreciated that subject to a mobile presence or network speed in the geographical region in which the system is implemented, the server 494 may also be configured to transmit or stream an application program for acquiring electronic parking coupon content to the device 492. FIG. 17B is a flow chart illustrating a detailed method 520 of transmitting an application request link for an application program for acquiring electronic parking coupon content based on location information. Similar to the method 510, the method 520 may begin in step 521 through an initialization process of the system 490. The server 494 may be configured, under control of the processor, to receive location information of the device 492 in step 522. The server 494 then processes content related to an electronic parking coupon based on the location information in step 523 by comparing the location information of the device 492 with geographical location data of the area 491 to determine if the location information of the device 492 falls within the geographical location information of the area 491. If the server 494 determines in step 524 that the location information of the device 492 falls within the geographical location information of the area 491, the server 494 may be configured to transmit content related to an electronic parking coupon such as an application request link for an application program for acquiring electronic parking coupon content to the device 492 in step 525. Further, the server 494 may be configured to determine in step 526 if a request for an electronic parking coupon is received from the device 492. If the server 494 does not receive a request for the electronic parking coupon from the device 492, the server 494 may be configured to receive location information of the device 492 in step 527 and determine in step 528 whether the location information of the device 492 falls within the geographical location information of the area 491. If the server 494 determines in step 528 that the location information of the device 492 does not fall within the geographical location information of the area 491, the server 494 may be configured to remove the content related to an electronic parking coupon from the device 492 in step 529.

A detailed method 530 of the content related to an electronic parking coupon from the device 492 is illustrated in a flowchart of FIG. 18. The server 494 may be configured to determine in step 531 to receive information from the device 492 including a request for the electronic parking coupon. If the server 494 receives a request for the electronic parking coupon from the device 492, the device 492 may no longer send location information to the server 494. If it is determined in step 532 that the electronic parking coupon requested by the device 492 has expired for more than a predetermined duration of time, the server 494 may be configured to remove the content related to the electronic parking in step 533. An advantage is that there is less usage of resources on the device 492 and a user of the device 492 can receive content related to the electronic parking coupon as needed in a geographical location where the user is in.

There are several advantages associated with acquiring an electronic parking coupon. As data plans are ubiquitous with today's mobile devices, motorists can purchase and extend their electronic parking coupons wherever they are without having to be physically at their vehicles. As the parking duration of the electronic parking coupons may be extended by sending a request for extension of a parking duration from a computing device such as a smart phone to the content server, motorists need only purchase an electronic parking coupon for a minimum parking duration and extend the parking duration as required. Similarly, as the request for the parking duration can be submitted to the content server from any location with network connectivity to the content server, motorists do not have to be physically at the vehicles to extend the parking duration. In all embodiments, the content server may be configured to send notifications of parking duration expiry of the electronic parking coupon to the device of the motorist. Therefore, this facilitates in reminding a motorist to extend the parking duration of the electronic parking coupon if needed.

Further, in contrast to the tedious and time-consuming steps one has to undergo to tear conventional paper-based parking coupons, the electronic parking coupon is significantly easier to use and eliminates the problem whereby a motorist accidentally tears off the wrong tabs on a paper parking coupon. Most importantly in the fast paced society where time is of the essence, acquiring valid vehicle parking rights conferred by an electronic parking coupon requires less mental effort in that a motorist only needs to access content related to an electronic parking coupon located on the content server through sending vehicle identifier information such as a vehicle identifier code from a computing device, and content related to the electronic parking coupon will be transmitted to the motorist. As a result, people can acquire electronic parking coupons on the go easily and efficiently anytime, anywhere.

To acquire an electronic parking coupon, a motorist may access a content server account, and upon transmitting the vehicle identifier information to the content server, the motorist may submit a request for an electronic parking coupon having a corresponding parking rate for the parking area and a parking duration of the electronic parking coupon to the content server. Alternatively, the content server may be configured, to transmit upon receiving the vehicle identifier information, all available types of electronic parking coupons to a device. Hence, a motorist may purchase in advance, a whole day electronic parking coupon in the evening to be used in the following day. Further, the server may be configured to rely on the universal server time to determine electronic parking coupons applicable for use at the time of receiving vehicle identifier information from a device by filtering electronic parking coupons which are not applicable for use at the universal time from all available types of electronic parking coupons, and transmit content related to the electronic parking coupons to the device. Still further, the server may be configured to generate for display, a "Show all hidden options" function to allow users to see and select all available coupon types including those that were filtered by the server. Further, the server may be configured to retrieve information relating to the type of vehicle corresponding to the vehicle identifier code from a third party server and transmit the electronic parking coupon with the parking rate applicable for the vehicle type based on the vehicle identifier code to the device. For example, when the server receives a vehicle identifier code, i.e. XXXXX, the server is able to identify if it is a motor vehicle or a motorcycle and as such only transmit the appropriate parking rates to the device.

An electronic parking coupon may be configured to include a predetermined start time, for example, all-day or night parking coupons which are to be used after a predetermined start time. The server may be configured to activate the electronic parking coupon based on the predetermined start time of the electronic parking coupon if the request for the electronic parking coupon is received after a predetermined start time of the electronic parking coupon. Should a request for an electronic parking coupon be received before the predetermined start time, the server may be configured to generate a status of the electronic parking coupon as "pending activation on or after a predetermined start time e.g. 7 pm" and subsequently, activate the electronic parking coupon at the predetermined start time. Hence, the start time of the electronic parking coupon is controlled and determined by the server. Motorists no longer require to determine a start time or a time at which the electronic parking coupon is activated.

The content server upon determining that the request is valid, may transmit the electronic parking coupon or generate for display on a display connected to a device of the motorist, content related to the electronic parking coupon. The time taken in acquiring an electronic parking coupon in a single request for obtaining vehicle parking rights for a long time period such as for example, 9 hours, is likely to be less than a time taken to tear paper-based parking coupons because the motorist needs to ensure that the correct tabs are torn off to indicate a start time for each parking coupon. In contrast, a motorist using the electronic parking coupon does not require to indicate a start time of the electronic parking coupon because the content server is configured to activate the electronic parking coupon upon receipt of the request. Therefore the start time and stop time of the electronic parking coupon is determined by the content server.

In an embodiment, electronic parking coupons may be acquired by registering a content server account such as for example, an electronic parking coupon account, with the content server and acquiring electronic parking coupons by accessing content related to an electronic parking coupon through the content server account. It will be appreciated that the electronic parking coupon account may be associated with a user identification including a smart phone. Therefore, in countries such as Singapore where smart phone ownership is high, one can always borrow a smart phone from a friend, use it to access his own electronic parking coupon account and make a purchase of an electronic parking coupon. Alternatively, the motorist can get his friend to make the purchase through his electronic parking coupon account. As parking information and vehicle parking rights related to electronic parking coupons are stored on the content server, motorists such as motorcyclists no longer need to worry about weather conditions which damage paper-based parking coupons.

FIG. 19A and FIG. 19B are block diagrams illustrating servers for processing vehicle parking content and inspection apparatus for acquiring vehicle parking content for inspection. FIG. 19A shows a system 580 configured for transmitting content related to an electronic parking coupon over a network 587 from a content server 588 to an inspection apparatus 585 based on information received from a in-vehicle transponder unit 584 of a vehicle 582 parked in a parking space 583 at a parking lane 581. The inspection apparatus 585 may be mounted in an inspection vehicle (manned or unmanned). As the inspection vehicle travels down the parking lane 581, the inspection apparatus 585 may be configured to receive information such as vehicle identifier information of the vehicle 582 stored in the in-vehicle transponder unit 584.

FIG.19B shows a system 590 for inspecting vehicle parking rights in a specified area of geographical coverage such as a car park 593. Similar to the system 580 of FIG. 19A, the

system 590 may be configured for transmitting content related to an electronic parking coupon over a network 592 from a content server 591 to an inspection apparatus 597 based on information received from a in-vehicle transponder unit 596 of a vehicle 595 parked in a parking space 594 in the car park 593. The inspection apparatus 597 may be mounted in an inspection vehicle 598 (manned or unmanned). As the inspection vehicle 598 travels around the car park 593, the inspection apparatus 597 may be configured to receive information such as vehicle identifier information of the vehicle 595 stored in the in-vehicle transponder unit 596.

In both systems 580, 590, the vehicle identifier information may include a vehicle license plate number, the in-vehicle transponder unit number, a vehicle serial number assigned by the vehicle manufacturer, or a bonnet chassis number. The inspection apparatus 585, 597 may include one of: a high-speed camera capable of capturing the vehicle identifier code, a "pinging" device capable of "pinging" the in-vehicle transponder unit ("IU") to obtain the vehicle identifier code. For example, the inspection apparatus 585, 597 may be modified to incorporate a "pinging" device which may be a miniaturized version of the "pinging" device used by the Cash Card parking and Electronic Road Pricing gantries. The "pinging" device may be attached or installed on the inspection apparatus 585, 597 and configured to transmit the IU identifier code obtained during inspection to the inspection apparatus 585, 597 through a wired or wireless connection. The inspection apparatus 585, 597 may then be configured, under control of the processor, to communicate with the content server or a third party server regulated by an government authority such as for example in Singapore, the Land Transport Authority (LTA), to convert or translate the IU identifier code to a vehicle plate number that corresponds with that particular IU identifier code.

Alternatively, the inspection apparatus 585, 597 may include a RFID reader for receiving the vehicle identifier information stored in an RFID or NFC tag attached to a decal issued by the transport authority to the vehicle. Therefore depending on the configuration of the inspection apparatus 585, it will be appreciated by a skilled person in the art that the vehicle identifier code may be input to the inspection apparatus 585 in several ways such as, through:

1. Data Entry in which the parking warden manually keys in the vehicle identifier code into the inspection apparatus 585;
2. RFID/NFC tag scanning in which the parking warden uses the inspection apparatus 585 to scan the unique RFID/NFC tag; each tag is linked to a vehicle identifier code;

3. IU scanning ("Pinging") in which the parking warden uses a function on the inspection apparatus 585 to detect the unique vehicle identifier code by "pinging" the IU device within the vehicle

4. Image-capturing in which the warden uses a camera (including a camera or a high-speed infrared camera, or a camera incorporated in the inspection apparatus 585) to capture the vehicle identifier code;

5. Voice Recognition Entry in which the warden uses a voice recognition function on the inspection apparatus 585 to input the vehicle identifier code

Alternatively, the vehicle identifier code may be input to the inspection apparatus manually by the parking warden via an graphical user interface (not shown) and the parking warden may acquire content related to an electronic parking coupon from the content server 588 configured to process content related to an electronic parking coupon according to a method 510 as shown in the flow chart of FIG. 20.

The server 588 may be configured, under control of the processor, to receive vehicle identifier information of a vehicle in step 541 from the inspection apparatus 585. The server 502 performs a determination check in step 542 to determine whether the vehicle identifier code is related to an electronic parking coupon, i.e. if a valid request is received for an electronic parking coupon for the vehicle having the vehicle identifier code. If it is determined in step 542 that the vehicle identifier code is related to a valid request received for an electronic parking coupon, content related to an electronic parking coupon is transmitted to the inspection apparatus 585 at step 544. The server 588 may be configured, under control of the processor, to generate for display on a display of the apparatus 585, content related to the electronic parking coupon. If it is determined in step 542 that there is no valid request for an electronic parking coupon associated with the vehicle identifier code, i.e. no electronic parking coupon purchased, the parking warden may then proceed to issue a parking notification for a parking fine in step 543.

Based on the content related to the electronic parking coupon displayed on the inspection apparatus 585, the parking warden may determine the validity of the electronic parking coupon in step 545 by checking the following content of the electronic parking coupon:

- 1) Parking Rate Selected; AND
- 2) Stipulated Parking Duration.

If it is determined in step 546 that the electronic parking coupon does not register the vehicle as having valid vehicle parking rights, such as for example, the content related to the

electronic parking coupon includes an incorrect parking rate or the stipulated parking duration have expired, the parking warden may proceed to issue a notification for a parking fine in step 543. It will be appreciated that the notification for the parking fine may be communicated in various mediums including a paper-based parking fine ticket or an official letter from the relevant authority or as digital content including notifications sent through a message facility (SMS), an email, an in-application. For example, if in future in Singapore, a "citizen inbox" is set up for sending correspondence from all government authorities to Singapore citizens, the parking notification for a parking fine may be sent as an email to the motorist through the citizen inbox. Alternatively, the parking notification for a parking fine may be sent through a combination of the abovementioned mediums or through a central server configured for issuing parking fine notifications wherein the central server is connected to the content server 588 over the network. Except for where paper based parking notification fines are issued by the parking warden, the central server may be configured to receive a request for issuing an electronic parking fine notification for a parking fine to a device. The central server may be configured to set a time period for storing the electronic parking notification in an "OutBox" before transmitting the electronic parking fine notification to the device. The time period may be determined by the central server and the advantage is that this allows a motorist who may have been making a request for an electronic parking coupon or an extension on a parking duration of an electronic parking coupon at the same time a request for an electronic parking fine notification is received by the central server. Hence if the central server receives content from the content server that a request has been made for an electronic parking coupon associated with the vehicle identifier code, the central server does not transmit the electronic parking fine notification and sends a further notification to the parking warden to inspect the vehicle.

In addition to transmitting a parking fine notification, the server 588 may be configured to transmit generate for display on the apparatus 585, an application link request for accessing a payment mechanism located on the content server 588 for payment of the fine. Alternatively, the payment for the parking fine may be made through conventional payment mechanisms including:

- 1) Authorised Self-Service Kiosk (i.e. AXS machines / ATM machines)
- 2) Online payment of fines using a authorised website
- 3) Mailing of cheques to the authority

FIG. 21A is a flow chart illustrating a method 550 of acquiring vehicle parking content such as content related to an electronic parking coupon over a network from a content server for inspecting vehicle parking rights. The inspection apparatus 585 may be configured, under

control of the processor, to send vehicle identifier information of a vehicle in step 551 to the content server 588. The server 588 performs a determination check in step 552 to determine whether the vehicle identifier code is related to an electronic parking coupon, i.e. if a valid request is received for an electronic parking coupon for the vehicle having the vehicle identifier code. If it is determined in step 552 that there is no valid request for an electronic parking coupon associated with the vehicle identifier code, i.e. no electronic parking coupon purchased, the parking warden may then proceed to issue a parking notification for a parking fine in step 553 if there is no one waiting in the vehicle. If it is determined in step 552 that the vehicle identifier code is related to a valid request received for an electronic parking coupon, the inspection apparatus 585 acquires content related to an electronic parking coupon at step 554. The inspection apparatus 585 may be configured, under control of a processor, to generate for display on a display of the apparatus 585, content related to the electronic parking coupon.

Based on the content related to the electronic parking coupon, the parking warden determines the validity of the electronic parking coupon in step 555 based on similar checks as described for step 545. If it is determined by the parking warden in step 556 that the electronic parking coupon does not register the vehicle associated with the vehicle identifier code as having valid vehicle parking rights, the parking warden may proceed to issue a parking notification for a parking fine in step 553.

FIG. 21B is a flow chart illustrating a method 560 of transmitting a notification for a parking fine from a content server to a device. The inspection apparatus 585 may be configured, under control of the processor, to send vehicle identifier information of a vehicle in step 561 to the content server 588. The server 588 performs a determination check in step 562 to determine whether the vehicle identifier code is related to an electronic parking coupon, i.e. if a valid request is received for an electronic parking coupon for the vehicle having the vehicle identifier code. If it is determined in step 562 that there is no valid request for an electronic parking coupon associated with the vehicle identifier code, i.e. no electronic parking coupon purchased, the content server 588 may be configured to prompt the parking warden whether to proceed to issue a parking notification for a parking fine in step 563. This is because a person may be waiting in the vehicle. Therefore, a parking warden will need to assess the physical situation and send a decision to issue the parking notification through the inspection apparatus in step 563. For example, if there is no one in the vehicle, the parking warden may proceed to issue the parking notification in step 567.

If it is determined in step 562 that the vehicle identifier code is related to a valid request received for an electronic parking coupon, the inspection apparatus 585 acquires content related to an electronic parking coupon at step 564. The inspection apparatus 585 may be configured, under control of a processor, to generate for display on a display of the apparatus 585, content related to the electronic parking coupon.

Based on the content related to the electronic parking coupon, the parking warden determines the validity of the electronic parking coupon in step 565 based on similar checks as described for step 545. If it is determined by the parking warden in step 566 that the electronic parking coupon does not register the vehicle associated with the vehicle identifier code as having valid vehicle parking rights, the parking warden may proceed to issue a parking notification for a parking fine in step 567.

In an embodiment, inspection of vehicle parking rights and content related to an electronic parking coupon may be performed by a parking warden through a centralized inspection or booking system. For example, the parking warden may communicate with an operator having access to a central content server for processing electronic parking coupon content to provide the operator with the vehicle identifier code of the vehicle being inspected. The vehicle identifier code may be transmitted from the parking warden to the operator accessing the central content server over a network through: a mobile browser web site; a web site such as a parking enforcement website connected to a private network; a non-browser application program operating on the inspection apparatus; a message exchanging facility; a direct connection from the inspection apparatus. For example, the server may be configured to generate HTML functions on the parking enforcement website to prompt a user to select or enter input to go through a series of steps for inspecting vehicle parking rights of a vehicle or to complete a vehicle parking rights inspection.

FIG. 21C is a flow chart illustrating a method 570 of transmitting a notification for a parking fine from a central content server to a device over a network. A device such as an input terminal operated by the operator may be configured to, under control of a processor, to send vehicle identification information of a vehicle such as a vehicle identifier code, to the central content server in step 571. The central content server will determine based on the vehicle identifier code sent from the input terminal whether the vehicle identifier code is related to a valid request for an electronic parking coupon in step 572. If it is determined in step 572 that there is no valid request for an electronic parking coupon, the central content server may be configured to prompt the operator whether to proceed to issue a parking

notification for a parking fine in step 573. This is because a person may be waiting in the vehicle. Therefore, the operator may verify with the parking warden who will assess the physical situation at the location of the vehicle. According to the feedback of the parking warden, the operator may send a request to the central content server to issue the parking notification in step 579. If it is determined in step 572 that the vehicle identifier code is related to a valid request received for an electronic parking coupon, the input terminal acquires content related to an electronic parking coupon at step 574. The input terminal may be configured, under control of a processor, to generate for display on a display of the input terminal, content related to the electronic parking coupon.

Based on the content related to the electronic parking coupon, the operator determines the validity of the electronic parking coupon in step 575 based on similar checks as described for step 545. If it is determined by the operator in step 576 that the electronic parking coupon does not register the vehicle associated with the vehicle identifier code as having valid vehicle parking rights, the operator may send a request to the central content server to issue the parking notification in step 579 after verifying with the parking warden that there is no one in the vehicle.

In an embodiment, a system may be configured for transmitting content related to an electronic parking coupon including an electronic parking notification for a parking fine from a content server to a second device over a network based on location information of a first device wherein the first and second devices are different. In particular, with reference to FIG. 22, an assisted electronic parking coupon tracking system 500 may be configured for transmitting content related to an electronic parking coupon over a network 503 from a content server such as a coupon tracking server 505 to a second device such as a computing device 502 based on location information transmitted by a first device 501 within a specified area of geographical coverage 504. An advantage of the system 500 is to facilitate parking wardens in vehicle parking inspection and enforcement.

When a motorist device sends a vehicle identifier code of a vehicle 506 in a request for an electronic parking coupon to the content server 507, the content server 507 determines the location information of the vehicle through a global positioning system coupled to the system 500 which is configured to receive location information from a first device 501 such as an in-vehicle transponder unit 501 of the vehicle 506. The global positioning system may include a satellite or other positioning equipment (a network of "transmission towers") configured to

be used in the system 500 to triangulate and constantly monitor the vehicle's location via the first device 501.

The content server 507 then stores the location information of the vehicle. After the motorist device acquires an electronic parking coupon for use in the area 504, the electronic parking coupon content related to the vehicle identifier code is also stored in the content server 507. The vehicle's parking location information and the electronic parking coupon content related to the vehicle identifier code may be stored in the content server 507 in a table as shown in Table 3 below.

Table 3

Area	Car Park Number	Vehicle Identifier Code	Electronic Parking Coupon Identifier Code
Ang Mo Kio	A66, A67	XXXXXXX	23920387A
Ang Mo Kio	A66, A67	YYYYYYY	12475555B
Ang Mo Kio	A66, A67	.	.
		.	.
		.	.

The content server 507 may be configured to transmit content related to an electronic parking coupon such as the content shown in Table 3 to the coupon tracking server 505 concurrently. The content server 507 and the coupon tracking server 505 may be connected to a network 508 through a wired or wireless connection, and configured to operate such that every time the content server 507 receives or processes real-time electronic parking coupon content such as real-time content related to electronic parking coupons purchased or extended through a motorist device (not shown), the real-time content related to such electronic parking coupons will be transmitted to the coupon tracking server 505.

The second device 502 may be an inspection device 502 located in the area 504. It will be appreciated that the inspection device 502 may be configured to include a receiver or a transceiver for transmitting location information of the parking inspector or warden to the content server 505 so as to receive real-time status content related to electronic parking coupon from the content server 505.

FIG. 23 is a flow chart illustrating a method 600 of transmitting real-time status content related to electronic parking coupons in a designated parking area such as the area 504

from the coupon tracking server 505 to the second device 502 over the network 503. When a parking warden having the inspection device 502 is conducting vehicle parking inspections, the inspection device 502 transmits location information of the parking warden to the server 505 in step 601. If the server 505 determines in step 602 that the inspection device location information corresponds to location information of a designated parking area such as for example, area 504, the server 505 may be configured to determine the status of electronic parking coupons in the designated parking area of the parking warden in step 603 and transmit content related to the status of the electronic parking coupon to the second device 502 held by a parking warden located in the area 504 in step 604. Based on the status of the electronic parking coupons, the server 505 may be further configured to determine whether the electronic parking coupon related to a vehicle identifier code of a vehicle registers the vehicle as having valid vehicle parking rights in step 605. Alternatively, the parking warden may determine whether the electronic parking coupon related to a vehicle identifier code of a vehicle registers the vehicle as having valid vehicle parking rights in step 605. If it is determined in step 605 that the electronic parking coupon does not register the vehicle as having valid vehicle parking rights, the parking warden determines whether there is any one in the vehicle in step 606. If it is determined in step 606 that no one is in the vehicle, the parking warden may send a request to the server 505 to issue a notification for a parking fine to the vehicle and the server 505 issues the notification for the parking fine in step 607. Alternatively, if the server 505 is configured to receive information on the occupancy in the vehicle through other positioning occupancy detection systems in the vehicle in communication with the satellite, the server 505 may also be configured to automatically issue a notification for a parking fine in step 607 without checking by the parking warden.

FIG. 24 is a flow chart illustrating a detailed method 610 of the step 603 of determining status of electronic parking coupons in a designated parking area. In step 611, the server 505 may be configured to obtain the number of parking spaces in the designated parking area from the coupon content server 507 or a content server which stores data related to parking areas administered by a parking authority. The server 505 may be configured to obtain content related to electronic parking coupons in the designated parking area such as a number of electronic parking coupons in each category (active, expiring and recently expired) from the coupon content server 507 in step 612.

By "active electronic parking coupon", it is meant to include an electronic parking coupon which have been activated by an authorised server such as the coupon content server 507 and are pending at the time the content is obtained from the server 507 in step 612.

By “expiring electronic parking coupon”, it is meant to include an electronic parking coupon that is expiring in less than or equivalent to a time predetermined by the coupon tracking server 505 such as “α” (minutes). For example, the server 505 may be configured to determine the predetermined time to expiry “α” by considering the optimal amount of time a parking warden needs to “reach and respond” (i.e. identify and travel to an area within his jurisdiction). For example, if a parking warden needs on average 10 minutes to identify and travel to an area with a high number of expiring electronic parking coupons within his jurisdiction, the server 505 may set the predetermined time to expiry “α” as 10 minutes. Based on a calculation of a time to expiry for each electronic parking coupon received from the coupon content server 507, the server 505 accordingly sorts the electronic parking coupons according to the respective following categories: and filter content received from the coupon content server 507 according to the time to expiry accordingly.

By “recently expired electronic parking coupons”, it is meant to include an electronic parking coupon that has expired for less than or equal to a time predetermined by the coupon tracking server 505 such as “β” (minutes). The server 505 may be configured to remove electronic parking coupons wherein the time of expiry > “β” minutes and content related to such electronic parking coupons are no longer be displayed. The server 505 may be configured to derive “β” which will be described in detail with reference to FIG. 25.

Based on the number of electronic parking coupons (active, expiring and recently expired), the server 505 may be configured to determine a probability of illegal parking (“PIP”) in the designated parking area in step 613. Specifically, the server 505 may be configured to calculate the PIP by cross-referencing the total number of active electronic parking coupons in the designated parking area with the total number of parking spaces in the designated parking area. The following Formula (3) may be used by the server 505 to calculate PIP of a designated parking area:

$$PIP \text{ of a designated parking area} = \frac{\text{Number of Active Coupons in a Designated Parking Area}}{\text{Total Number of Parking Lots in a Designated Parking Area}}$$

----- Formula (3)

It will be appreciated that a designated parking area may include a few car parks that are close to one another. By considering all car parks that are close to one another, the calculation of PIP will be more accurate as shown in the following Example 4.

Example 4

A designated parking area, *Area R*, has 3 car parks that are close to one another (*Car Park A*, *B* and *C*). Should *Car Park A* be full whilst *Car Park B* and *C* are relatively empty, motorists that are unable to find parking lots in *Car Park A* will be able to find parking lots in *Car Park B* and *C*. Therefore, the PIP of *Area R* is relatively low based on the following calculation using Formulae (3), i.e.:

$$PIP \text{ of Area } R = \frac{\text{Number of Active Coupons in Car Park A}}{\text{Total Number of Parking Lots in Area R (Car Park A+Car Park B+Car Park C)}}$$

However, should all 3 car parks in *Area R* be full, the PIP of *Area R* will be high as motorists will be unable to find parking lots in any of the 3 car parks in *Area R* and as such the tendency for illegal parking is high.

As the number of active electronic parking coupons in a designated parking area increases, the number of available parking lots in the designated parking area decreases and the PIP of the designated parking area will increase. By calculating the PIP in each designated parking area, the server 505 may be configured to identify areas where the PIP is significantly higher and send notifications to the inspection device 502 to inform a parking warden of a designated parking area having a high PIP. The warden can then increase the stringency of his checks in that particular area as well as heighten his alertness in seeking out and apprehending vehicles parked illegally.

FIG. 25 is a graph of a probability of illegal parking (PIP) against a time period β (minutes). Based on the graph 650, a function 651 can be established to show that the PIP is inversely proportional to the time period β , i.e. $PIP = 1/\beta$.

Based on the function 651, it can be seen that the PIP is higher within a shorter period of time β in view of the following scenarios:

- (i) The shorter the period of time the motorist overstays, the lesser the probability that he will be apprehended and issued a hefty summon by a parking warden.
- (ii) The shorter the period of time the motorist needs in addition to the parking duration granted by his electronic parking coupon, the less likely it is for the motorist to request for a parking duration extension if for example, a motorist only needs an additional 5 minutes compared to if the motorist needs an additional 20 minutes, the minimum parking extension being 30 minutes).

Therefore, a value of β , used in defining “recently expired electronic parking coupons”, may be derived based on a time period whereby the probability (a vehicle illegally parked without valid parking rights after expiry of an electronic parking coupon) is $\frac{1}{2}$.

After obtaining the number of electronic parking coupons (active, expiring and recently expired) in step 612 and determining the probability of illegal parking in step 613, the server 505 transmits content related to status of electronic parking coupons in the designated area to the inspection device 502 in step 614. The content related to status of electronic parking coupons is based on the designated parking area and includes:

- a) active electronic parking coupons
- b) expiring electronic parking coupons
- c) recently expired electronic parking coupons
- d) probability of illegal parking (“PIP”)

The server 505 may be configured, under control of a processor, to generate for display on a display, the status of the electronic parking coupon or the status of a plurality of electronic parking coupons in the area 504. For example, the second device 502 may comprise a display unit wherein the second device 502 is configured, under control of a processor, to generate, for display on the display unit, the status of the electronic parking coupon. Alternative, the server may be configured to generate for display on the display unit, a graphical user interface configured for selecting one of the plurality of parking areas for inspection. Still further, the server 505 may be configured to tabulate a number of electronic parking coupons in each category (active, expiring and recently expired) in the designated parking area, generate for display, content related to the status of electronic parking coupons in the designated parking area in the graphical user interface. An embodiment of an exemplary graphical user interface will be described in detail with reference to FIG. 26.

FIG. 26 is a screen shot illustrating a graphical user interface 620 for displaying content related to status of electronic parking coupon in a designated parking area. The graphical user interface 620 may be configured to include a graphic map of a geographical region having a car park A (621), a car park B (622), and a car park C (623) wherein the car park C is a parking lane. The server may be configured to generate for display the status of electronic parking coupons in the geographical region including, displaying:

- electronic parking coupon status in the car park A (621) through a status display screen object 624;

- electronic parking coupon status in the car park B (622) through a status display screen object 625; and
- electronic parking coupon status in the car park C (623) through a status display screen object 626.

5 Alternatively, the graphical user interface 620 may be configured to include, a user selectable screen object 629 for selecting a specific parking area for generating, for display, the status of electronic parking coupon content. The graphical user interface 620 may be configured to include a user selectable screen object 631 corresponding to location information of the second device 502 of the parking warden. Similarly, different user
 10 selectable screen objects may be generated for display on the graphical user interface 620 to represent other parking wardens in the area. For example, the server may be configured to generate different user selectable screen objects 632, 631 having different colours or shapes to allow the differentiation of the wardens. It will be appreciated that other methods of differentiating the wardens may include and are not limited to, use of text, image or photo
 15 of parking warden, or a combination of the aforementioned.

An advantage of the server 505 transmitting status of electronic parking coupon content related to a designated parking area from a content server to a device is that real-time information on the status of electronic parking coupons or content related to electronic
 20 parking coupons can be provided to the parking wardens to assist them in prioritizing the designated parking areas within their assigned locations for inspection.

For example, a parking warden may be assigned to inspect an inspection area consisting of Car Park A (621), Car Park B (622) and Car Park C (623). The content related to the
 25 electronic parking coupons in the designated parking area displayed in the status display screen objects 624, 625, 626 on the graphical user interface 620 may be used to help the parking warden to determine which of the Car Parks A, B or C is of a higher priority for inspection. FIG. 27 is a block diagram illustrating a detailed view of the status display screen object 626 displaying content 640 related to status of electronic parking coupons in
 30 Car Park C.

The content 640 includes a number 642 of active electronic parking coupons, a number 643 of the number of parking spaces in a designated parking area such as Car Park C, a number 644 of expiring electronic parking coupons and a number 645 of recently expired coupons. A capacity 641 of Car Park C being used may be determined by dividing the number 642 of
 35 active electronic parking coupons by the number 643 of parking spaces in Car Park C. The number 642 of active electronic parking coupons may correspond to the number of vehicles

for inspection as to whether the correct parking rate has been selected for each of the active electronic parking coupons. A parking warden, upon viewing the content 640 will note that Car Park C has the highest number of active electronic parking coupons. If Car Park A, B and C are around the same size and require a similar duration of time for completing vehicle parking inspections, he may prioritize the inspection of Car Park C first because he can inspect a greater number of vehicles in a specified amount of time for inspection and determine whether the correct parking rate has been selected for the active electronic parking coupons in Car Park C.

Alternatively, should an area be shown to have a high number of expiring electronic parking coupons, a warden will be able to identify and travel to that area in time to inspect vehicles having the electronic parking coupons are recently expired. The number of expiring electronic parking coupons will also give the warden a good gauge about the number of recently expired electronic parking coupons there will be in the area because the number of expiring electronic parking coupons is directly correlated to the number of recently expired electronic parking coupons. For example, if Car Park A has the highest number of expiring electronic parking coupons (17) compared to Car Park B (2) and Car Park C (2), the warden closest to Car Park A should take notice and anticipate that Car Park A will become a high priority area soon (it may already be a high priority area). The warden closest to Car Park A may then select Car Park A for inspection and make preparations to proceed to Car Park A if no other wardens have indicated that they are proceeding to inspect Car Park A. Similarly, if the graphical user interface 620 indicates an area having a high number of recently expired electronic parking coupons, the parking warden may prioritize that area for inspection.

Further, the server 505 may be configured to use Formula 1.2 to determine a probability of a motorist making an extension on expiring electronic parking coupons and use the probability to determine the number of recently expired electronic parking coupons.

Referring to FIG. 27, Car Park C has 50 parking spaces. The server 505 determines that there are 47 active electronic parking coupons, 9 expiring electronic parking coupons and 20 recently expired electronic parking coupons related to Car Park C. The 9 expiring electronic parking coupons derive from the 47 active electronic parking coupons and are expiring in less than “ α ” minutes. When the expiring electronic parking coupons expire, it will be appreciated that subject to the probability of a motorist making an extension, the number of active and expiring electronic parking coupons will be reduced and the number of recently expired electronic parking coupons will increase. For example, if the number of recently expired electronic parking coupons is 20, and 2 electronic parking coupons have expired, the

number of recently expired electronic parking coupons will be increased to 22. However, if an extension be made, the number of expiring electronic parking coupons will be reduced, but the number of active electronic parking coupons remains unchanged. For example, if an extension is made for one of the 9 expiring electronic parking coupons, the number of electronic parking coupons will be reduced to 8, but the number of active electronic parking coupons remains unchanged at 47. Finally, when server 505 determines that the time period in which the expired electronic parking coupons have expired is $> \beta$ minutes, the server 505 will remove content related to such expired electronic parking coupons from the server and the graphical user interface 620 will be regenerated accordingly.

In some instances, there may be more than one warden in charge of a particular area. The wardens can use information displayed in the graphical user interface 620 to coordinate their inspections. For example, if a warden is near a high priority area, he can inform the other wardens that he is proceeding to inspect the high priority area by selecting that particular area for inspection. An indicator screen object 634 may then appear on the status display screen object 626 for the car park C (623) in the graphical map interface 620 to indicate that the particular area has been selected by a warden for inspection. The indicator screen object 634 may be differentiated by a few ways including but not limited to colour, text, images or a combination of the aforementioned. The other wardens will then be able to divert their attention to other high priority areas and there will not be a situation whereby there is miscommunication and poor coordination and a few wardens end up inspecting the same high priority area.

The server may be configured to receive a request for assistance in a parking area from an inspection device if the parking warden requires parking inspection assistance in view of a wide coverage of a parking area. For example, referring to FIG. 26, if the server determines that a PIP or a number of recently expired electronic parking coupons in Car Park C has exceeded a certain predetermined level, and generates, for display on the graphical map interface 620, an increase in the number of recently expired electronic parking coupons, the inspection device 502 may be configured to send a notification to the server to request for assistance in Car Park C. The notification may include and is not limited to text, images, audio or a combination of any of the aforementioned. In an embodiment, the server may be configured to generate for display, a request for assistance screen object 630 on the graphical map interface 620 indicating that a warden has requested for assistance. The request for assistance screen object 630 may be differentiated by a few ways including but not limited to colour, text, images or a combination of the aforementioned. Other parking wardens within the vicinity of Car Park C will similarly see the graphical map interface 620

having the request for assistance screen object 630 and can therefore promptly respond to the request for assistance by selecting Car Park C for inspection.

Hence, with increased coordination amongst parking wardens, efficiency and productivity of vehicle inspection operations and processes may be improved. An advantage is parking inspection checks can be targeted to specific areas according to the location of parking wardens. As a result, less time is wasted on travelling for parking inspection trips with no idea of the status of the vehicle parking rights in an area. Still further in an example, where Area A has 50 active electronic parking coupons while Area B has 20 active electronic parking coupons. If Area A is of the same size or geographical area as Area B, and the travelling time within each area to complete inspections is similar, the parking warden may be assigned to inspect Area A before Area B because there are more active electronic parking coupons detected in Area A than in Area B. Alternatively, alerts can also be sent to parking wardens in a periphery of Area A to conduct vehicle inspections as a team so that the inspections can be completed in a faster manner.

It will be appreciated that although the server may be configured to generate for display, the status of electronic parking coupons in a designated area in a graphical map interface 620 as shown in FIG. 24, the server may be configured to display, in other modes of implementation, the status of electronic parking coupons in a myriad of other mediums, including but not limited to text, images, sound or a combination of any of the aforementioned.

It will be appreciated that the system 500 may be configured to include a separate operations content server (not shown) for managing parking warden operations and deployment. For example, should a warden need assistance in inspecting an area due to the area of inspection being too large for him to effectively handle, he can request for assistance through a centralized operations department having access to the information provided by the server. The centralized operations department can harness this information and coordinate the placement and movement of wardens within a particular area. Should the PIP or the number of recently expired e-coupons rise above a certain predetermined level for a particular area, the centralized operations department can prioritize the area and mobilize wardens to inspect the area in the shortest time possible.

Moreover, upon receiving a request for assistance notification 630 generated for display on the graphical user interface 620, the centralized operations department may mobilize more parking wardens to the area Car Park C to ensure the continued efficiency of inspections.

5 It will be appreciated that transmission of the content related to status of electronic parking coupons and location information of the parking wardens may be used to facilitate vehicle parking inspection resources management where each parking warden is assigned to inspect a designated inspection area. Based on location information of the parking wardens, the server may be configured to determine each parking warden's travelling time to a high
10 priority parking area (i.e. an area with high PIP) to minimize a wasted trip in view of change in the status in the high priority parking area (i.e. the PIP in the area is reduced because the vehicles have left). Wasted trips may be minimized by configuring the server to assign inspection areas to parking wardens based on real-time content related to electronic parking coupons in designated parking areas and location information of the parking wardens. Still
15 further, if an inspection area is relatively large resulting in it being less accessible (i.e. travelling is less convenient and time consuming), the inspection area should be segmented (whereby each segment is much more accessible) and different parking wardens may be assigned to each segmented area.

20 For example, if the server 505 determines a location of a first parking warden (through location information received from the inspection device of the first parking warden) to be near to a high priority designated parking area not within his designated inspection area and a second parking warden in charge of high priority designated parking area is not available, the server may be configured to notify the parking warden to inspect that high priority area
25 whilst sending a notification to inform the second parking warden that the high priority area is being inspected.

An advantage of having a common platform for transmitting status of electronic parking coupon to a plurality of devices from a server is that there may be increased coordination
30 amongst parking wardens and this will lead to a significant increase in efficiency and productivity.

It will be appreciated by persons skilled in the art that the above described apparatus for acquiring vehicle parking content may be configured according to the user requirements
35 depending on whether the user is a motorist or a parking warden. Hence the apparatus may include any network enabled computing device including but not limited to:

- a) Mobile Terminals including Cellphones, Smartphones, Tablets, Laptops, Portable Handheld devices;
- b) Fixed Terminals including desktop Computers, Self-service kiosk (eg. AXS machines), in-vehicle computers configured for operation in vehicles through which users may purchase electronic parking coupons directly.

In an embodiment, there may be a computer program product, tangibly embodied in a machine-readable storage medium, including instructions for executing in a machine, the abovementioned methods for acquiring and processing vehicle parking content. For example, the storage medium may be a memory of a parking inspection apparatus or a computing device, or a memory of the content server for storing a mobile application that can be used on a smart phone or smart device such as a tablet specifically designed for parking enforcement or a secure website through which the parking warden may access content related to electronic parking coupons using a parking warden account.

While embodiments of the invention have been particularly shown and described with reference to specific embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention as defined by the appended claims. The scope of the invention is thus indicated by the appended claims and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced.

CLAIMS

1. A method for acquiring vehicle parking content over a network from a content server, the method comprising:
 - 5 sending information to the content server from a device;
 - acquiring content related to an electronic parking coupon based on the information sent to the content server, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.
- 10 2. The method as claimed in Claim 1, wherein the content is incorporated in a parking content object.
3. The method as claimed in Claim 1 or Claim 2, further comprising:
 - 15 generating, for output on an input/output device, the content related to the electronic parking coupon.
4. The method as claimed in Claim 3, wherein the input/output device is a display and the content is generated as one of: an image, an image with text, text.
- 20 5. The method as claimed in any one of Claims 1 to 4, wherein sending the information to the content server includes sending vehicle identifier information of a vehicle.
6. The method as claimed in Claim 5, wherein acquiring the content comprises:
 - 25 acquiring an electronic parking coupon identifier code of the electronic parking coupon if the vehicle identifier information is related to a valid request received for the electronic parking coupon.
7. The method as claimed in Claim 5 or Claim 6, further comprising sending a modification request for modifying a parking duration of the electronic parking coupon.
- 30 8. The method as claimed in Claim 6 or Claim 7, further comprising receiving advertisement content from the content server.
9. The method as claimed in any preceding claim, further comprising, prior to acquiring the content, selecting one of a plurality of electronic parking coupons located on the content server through the device.
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10. The method as claimed in Claim 9, wherein the selecting one of a plurality of electronic parking coupons comprises:

accessing the content server from the device through the network.

11. The method as claimed in Claim 10, wherein the accessing the content server includes accessing through: a mobile browser web site; a web site; an non-browser application program operating on the device; a message exchanging facility; a direct connection from the device.

12. The method as claimed in Claim 5, wherein acquiring the content comprises acquiring a notification that there is no valid request received for the electronic parking coupon, the method further comprising: sending a notification for a parking fine to a content server account.

13. The method as claimed in Claim 6, further comprising sending a notification for a parking fine to a content server account if the electronic parking coupon does not register the vehicle as having valid vehicle parking rights.

14. The method as claimed in any one of Claims 1 to 4, wherein sending the information to the content server includes sending location information of the device.

15. The method as claimed in Claim 14, wherein acquiring the content comprises:

acquiring an application request link for an application program for accessing the content server if the location information of the device corresponds with geographical location data of a parking space in one of a plurality of parking areas administered by the authorized server.

16. The method as claimed in Claim 15, wherein the application program is a non-browser application program.

17. The method as claimed in Claim 15 or Claim 16, wherein the application program is configured for acquiring one of a plurality of electronic parking coupons located on the content server.

18. The method as claimed in Claim 15 or Claim 16, wherein the application program is configured for determining availability of an electronic parking coupon for a vehicle.

19. The method as claimed in Claim 15 or Claim 16, wherein the application program is configured for determining status of a plurality of electronic parking coupons in one of a plurality of parking areas

20. The method as claimed in Claim 14, wherein acquiring the content comprises:
acquiring electronic parking coupon content related to one of a plurality of parking areas administered by the authorized server if the location information of the device corresponds with geographical location data of a parking space in the one of the plurality of parking areas.

21. The method as claimed in Claim 20, wherein the electronic parking coupon content includes information related to one of: availability of parking spaces in the one of the plurality of parking areas, a parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas, status of a plurality of electronic parking coupons in the one of the plurality of parking areas.

22. The method as claimed in Claim 21, wherein the electronic parking coupon content relates to the availability of parking spaces in the one of the plurality of parking areas and generating, for display on the display, the content related to the electronic parking coupon includes:

generating a first graphical user interface configured for displaying the availability of parking spaces in the one of the plurality of parking areas.

23. The method as claimed in Claim 22, wherein the first graphical user interface is further configured for displaying an approximate waiting time for a parking space in the one of the plurality of parking areas.

24. The method as claimed in Claim 21, wherein the electronic parking coupon content relates to the parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas and generating, for display on the display, the content related to the electronic parking coupon includes:

generating a second graphical user interface configured for displaying the parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas.

25. The method as claimed in Claim 24, wherein the second graphical user interface is further configured for displaying an approximate waiting time for a parking space in the one of the plurality of parking areas.

26. The method as claimed in Claim 21, wherein the electronic parking coupon content relates to the status of a plurality of electronic parking coupons in the one of the plurality of parking areas and generating, for display on the display, the content related to the electronic parking coupon includes:

generating a third graphical user interface configured for displaying the status of the plurality of the electronic parking coupons, the graphical user interface is configured for selecting one of the plurality of parking areas for inspection.

27. The method as claimed in Claim 26, wherein the third graphical user interface further includes a user selectable screen object corresponding to the location information of the device.

28. An apparatus for acquiring vehicle parking content over a network from a content server, the apparatus comprising:

a processor; and

a memory for storing one or more routines which, when executed under control of the processor, control the apparatus to:

send information to the content server;

acquire content related to an electronic parking coupon based on the information sent to the content server, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

29. The apparatus as claimed in Claim 28, wherein the content is incorporated in a parking content object.

30. The apparatus as claimed in Claim 28 or Claim 29 configured, under control of the processor to:

generate, for output on an input/output device, the content related to the electronic parking coupon.

31. The apparatus as claimed in Claim 30 wherein the input/output device is a display and the content is generated as one of: an image, an image with text, text.

32. The apparatus as claimed in any one of Claims 28 to 31, wherein the information includes vehicle identifier information of a vehicle.

33. The apparatus as claimed in Claim 32 configured to acquire the content including an electronic parking coupon identifier code of the electronic parking coupon if the vehicle identifier information is related to a valid request received for the electronic parking coupon.

34. The apparatus as claimed in Claim 32 or Claim 33, further comprising sending a modification request for modifying a parking duration of the electronic parking coupon.

35. The apparatus as claimed in Claim 33 or Claim 34, further comprising receiving advertisement content from the content server.

36. The apparatus as claimed in any preceding claim configured under control of the processor to, prior to acquiring the content, select one of a plurality of electronic parking coupons located on the content server.

37. The apparatus as claimed in Claim 36, wherein the selecting one of a plurality of electronic parking coupons comprises:

accessing the content server through the network.

38. The apparatus as claimed in Claim 37, wherein the accessing the content server includes accessing through: a mobile browser web site; a web site; an non-browser application program operating on the apparatus; a message exchanging facility; a direct connection from the apparatus.

39. The apparatus as claimed in Claim 32 configured under control of the processor to: acquire the content including a notification for no valid request received for the electronic parking coupon; and

send a notification for a parking fine to a content server account.

40. The apparatus as claimed in Claim 33 configured under control of the processor to send a notification for a parking fine to a content server account if the electronic parking coupon does not register the vehicle as having valid vehicle parking rights.

41. The apparatus as claimed in any one of Claims 28 to 31 wherein the information includes location information of the apparatus.

42. The apparatus as claimed in Claim 41 configured to, under control of the processor to acquire the content comprising an application request link for an application program for accessing the content server if the location information of the apparatus corresponds with geographical location data of a parking space in one of a plurality of parking areas administered by the authorized server.

43. The apparatus as claimed in Claim 42, wherein the application program is a non-browser application program.

44. The apparatus as claimed in Claim 42 or Claim 43, wherein the application program is configured for acquiring one of a plurality of electronic parking coupons located on the content server.

45. The apparatus as claimed in Claim 42 or Claim 43, wherein the application program is configured for determining availability of an electronic parking coupon for a vehicle.

46. The apparatus as claimed in Claim 42 or Claim 43, wherein the application program is configured for determining status of a plurality of electronic parking coupons in one of a plurality of parking areas

47. The apparatus as claimed in Claim 41 wherein acquiring the content comprises:
acquiring electronic parking coupon content related to one of a plurality of parking areas administered by the authorized server if the location information of the apparatus corresponds with geographical location data of a parking space in the one of the plurality of parking areas.

48. The apparatus as claimed in Claim 47, wherein the electronic parking coupon content includes information related to one of: availability of parking spaces in the one of the plurality of parking areas, a parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas, status of a plurality of electronic parking coupons in the one of the plurality of parking areas.

49. The apparatus as claimed in Claim 48, wherein the electronic parking coupon content relates to the availability of parking spaces in the one of the plurality of parking areas and generating, for display on the display, the content related to the electronic parking coupon includes:

generating a first graphical user interface configured for displaying the availability of parking spaces in the one of the plurality of parking areas.

50. The apparatus as claimed in Claim 49, wherein the first graphical user interface is further configured for displaying an approximate waiting time for a parking space in the one of the plurality of parking areas.

51. The apparatus as claimed in Claim 48, wherein the electronic parking coupon content relates to the parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas and generating, for display on the display, the content related to the electronic parking coupon includes:

generating a second graphical user interface configured for displaying the parking rate of one of a plurality of electronic parking coupons applicable in the one of the plurality of parking areas.

52. The apparatus as claimed in Claim 51, wherein the second graphical user interface is further configured for displaying an approximate waiting time for a parking space in the one of the plurality of parking areas.

53. The apparatus as claimed in Claim 48, wherein the electronic parking coupon content relates to the status of a plurality of electronic parking coupons in the one of the plurality of parking areas and generating, for display on the display, the content related to the electronic parking coupon includes:

generating a third graphical user interface configured for displaying the status of the plurality of the electronic parking coupons, the graphical user interface is configured for selecting one of the plurality of parking areas for inspection.

54. The apparatus as claimed in Claim 53, wherein the third graphical user interface further includes a user selectable screen object corresponding to the location information of the device.

55. A graphical user interface for acquiring vehicle parking rights over a network from a server, the graphical user interface produced by an application program operating on a computing device, comprising:

an application program screen layout generated by the application program, the application program screen layout including:

a first user selectable screen object for selecting an electronic parking coupon; and

a second user selectable screen object for selecting a parking duration of the selected electronic parking coupon, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register a vehicle as having vehicle parking rights.

5 56. A computer program product, tangibly embodied in a machine-readable storage medium, including instructions for executing in a machine, a method for acquiring vehicle parking content over a network from a content server, the method comprising:

sending information to the content server from a device;

10 acquiring content related to an electronic parking coupon based on the information sent to the content server, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

57. A content server for processing vehicle parking content over a network, the content server comprising:

15 a processor;

a memory for storing one or more routines which, when executed under control of the processor, control the content server to:

receive information from a first device; and

20 process content related to an electronic parking coupon based on the information from the device, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

58. The content server as claimed in Claim 57 configured, under control of the processor to, incorporate the content related to the electronic parking coupon in a parking content
25 object.

59. The content server as claimed in Claim 57 or Claim 58 configured, to generate, for output on an input/output device, the content related to the electronic parking coupon.

30 60. The content server as claimed in Claim 59, wherein the input/output device is a display and the content is generated as one of: an image, an image with text, text.

61. The content server as claimed in any one of Claims 57 to 60 configured, under control of the processor, to transmit the content to a second device different from the first
35 device.

62. The content server as claimed in any one of Claims 57 to 60 configured, under control of the processor, to transmit the content to the first device.

63. The content server as claimed in any one of Claims 57 to 62 configured to receive information including vehicle identifier information of a vehicle.

64. The content server as claimed in Claim 63 configured, under control of the processor, to transmit the content comprising an electronic parking coupon identifier code of the electronic parking coupon if the vehicle identifier information is related to a valid request received for the electronic parking coupon.

65. The content server as claimed in Claim 64 configured, under control of the processor, to transmit advertisement content from the content server.

66. The content server as claimed in Claim 64 or Claim 65 configured, under control of the processor, to activate the electronic parking coupon based on a parameter related to the content server account.

67. The content server as claimed in Claim 66 wherein the parameter includes one of: a stored monetary value in a user account registered with a parking authority, and an individual parking fee purchase based on a parking duration and a parking rate of the electronic parking coupon.

68. The content server as claimed in any one of Claims 64 to 67 configured, under control of the processor, to receive a modification request for modifying a parking duration of the electronic parking coupon.

69. The content server as claimed in Claim 68 wherein the modification request includes one of: a request to convert the parking duration based on a remaining value of the electronic parking coupon, a request to extend the parking duration.

70. The content server as claimed in Claim 63 configured, under control of the processor, to process the content by:

determining availability of an electronic parking coupon for the vehicle; and

send a notification for a parking fine to the content server account based on one of:

the electronic parking coupon is not available, the electronic parking coupon is available but not valid.

71. The content server as claimed in any one of Claims 57 to 62, wherein the information from the first device includes location information of the first device.

72. The content server as claimed in Claim 71 configured, under control of the processor to transmit the content comprising:

an application request link for an application program for accessing the content server if the location information of the first device corresponds with geographical location data of a parking space in one of a plurality of parking areas administered by the authorized server.

73. The content server as claimed in Claim 72, wherein the application program is a non-browser application program.

74. The content server as claimed in Claim 57 configured, under control of the processor, to process the content by determining status of a plurality of electronic parking coupons in one of a plurality of designated parking areas.

75. The content server as claimed in Claim 74 wherein determining the status includes generating a probability of illegal parking of the one of a plurality of parking areas by dividing a number of active electronic parking coupons in the one of a plurality of parking areas by a total number of parking spaces in the one of the plurality of designated parking areas.

76. The content server as claimed in Claim 74 or Claim 75 configured to, under control of the processor, to send a notification for inspecting the one of a plurality of parking areas to the first device based on the status of the plurality of electronic parking coupons.

77. The content server as claimed in any one of Claims 74 to 76, configured, under control of the processor, to generate, for display on a display, a first graphical user interface configured for displaying the status of the plurality of the electronic parking coupons.

78. The content server as claimed in Claim 77, wherein the first graphical user interface is configured for selecting one of the plurality of parking areas for inspection by a user.

79. The content server as claimed in Claim 78, wherein the first graphical user interface includes a user selectable screen object corresponding to location information of the computing device.

80. The content server as claimed in Claim 71 configured, under control of the processor to process the content by determining if the location information of the device corresponds with geographical location data of a parking space in the one of the plurality of parking areas.

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81. The content server as claimed in Claim 57 configured, under control of the processor to process the content by determining availability of parking spaces in one of a plurality of designated parking areas.

10 82. The content server as claimed in Claim 81 configured, under control of the processor, to determine availability of parking spaces by determining an approximate waiting time for a parking space in the one of the plurality of parking areas.

15 83. The content server as claimed in Claim 82 configured, under control of the processor, to determine availability of parking spaces by calculating a probability of a motorist leaving a parking space in the one of the plurality of parking areas by the end of the parking duration related to the electronic parking coupon.

20 84. The content server as claimed in any one of claims 81 to 83 configured, under control of the processor to:

generate, for display on the display, a second graphical user interface configured for displaying the electronic parking coupon content related to the availability of parking spaces in the one of the plurality of parking areas.

25 85. The content server as claimed in any preceding claim, wherein the content includes the parking rate of one of a plurality of electronic parking coupons applicable in one of a plurality of designated parking areas.

30 86. A method for processing vehicle parking content over a network, the method comprising:

receiving information from a device; and

processing content related to an electronic parking coupon based on the information from the device, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.

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87. A computer program product, tangibly embodied in a machine-readable storage medium, including instructions for executing in a machine, a method for processing vehicle parking content over a network, the method comprising:

receiving information from a device; and

- 5 processing content related to an electronic parking coupon based on the information from the device, wherein the electronic parking coupon is configured to, upon activation by an authorised server, register the vehicle as having vehicle parking rights.