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(54) **Title:** SIGNALING PARAMETERS CHANNEL PROCESSING

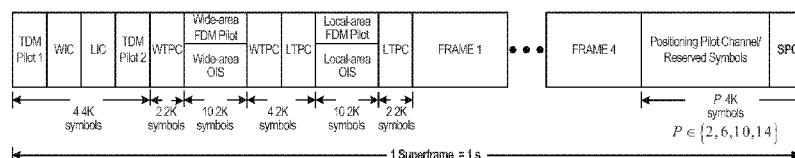


FIG. 2

(57) **Abstract:** Providing for network-based management of dynamic mobile coupons (DMCs) employed in mobile device-related commerce is described herein. Management can include mitigating processing load involved in processing dynamic characteristics of a set of DMCs, facilitating post-transaction evaluation of DMCs, or facilitating a virtual shopping experience in conjunction with redeeming DMCs in a mobile-commerce environment. Communicative association between a mobile device and network components can be implemented to leverage data collected by the mobile device with communication and processing capabilities of the network. Dynamic DMC states are determined from the collected data, which are implemented to facilitate the mobile-commerce. The disclosure provides an integrated mechanism for efficient utilization of DMCs to enhance user experience and satisfaction with mobile commerce.



SIGNALING PARAMETERS CHANNEL PROCESSING

BACKGROUND

[0001] Field

[0002] The present disclosed embodiments relates generally to processing wave forms in a wireless telecommunication system at the Forward Link Only (FLO) receiver, and more specifically to signaling parameters channel (SPC) and its associated processing at the FLO receiver, wherein SPC is a new channel added to the FLO superframe as a revision of the FLO air interface specification to convey physical layer parameters that cannot be transmitted through the Overhead Information Symbol (OIS).

[0003] Background

[0004] The Forward Link Only (FLO) system multicasts several services. A service is an aggregation of one or more independent data components. Each independent data component of a service is called a flow. For example, a flow can be the video component, audio component, text or signaling component of a service.

[0005] The transmitted signal in the Forward Link Only system is organized into superframes, wherein each superframe has the duration of about one second. FIG. 1 shows the general relationship (not to scale) between the various physical layer channels in a superframe, such as the OIS and the data channels.

[0006] Forward Link Only services are carried over one or more logical channels, and these logical channels are called Multicast Logical Channels or MLCs. It is the smallest addressable element in the FLO Network transmission system.

[0007] The definition of the FLO Air interface is that the FLO physical layer consists of the FLO physical layer channels. The OIS and Data are two of them. OIS stands for overhead information symbol channel. OIS channel carries the important system information sent out by the network.

[0008] However, there are physical layer parameters in the FLO superframe that cannot be transmitted through the OIS.

[0009] There is therefore a need in the wireless telecommunications systems devices employing the Forward Link Only (FLO) system multicast services to acquire physical layer parameters that cannot be transmitted through the OIS.

SUMMARY

[0010] Embodiments disclosed herein address the above stated needs to convey physical layer parameters by employing Signaling Parameter Channel in associated processing at the FLO receiver, so that the SPC when added to the FLO superframe enables physical layer parameters that cannot be transmitted through the OIS to now be conveyed.

[0011] In one aspect of the SPC addition to the FLO superframe, the SPC carries information that would be required to decode the OIS itself.

[0012] In another aspect, since one important characteristic of SPC is that the SPC wave form is independent of the physical layer parameters such as slot to interlace map, the Fast Fourier Transform (FFT) and cyclic prefix, this allows the receiver to be able to decode the information carried by the SPC under any network deployment conditions using default factory settings. The information obtained from the SPC can then be used to decode the OIS, which in turn will allow for other parameters to be configured via the network.

[0013] In yet another aspect, the SPC symbols have been designed such that the receiver processing is along the lines of Wide Area Differentiator/Local Area Differentiator (WID/LID) determination in the WIC /LIC symbols allow reuse of hardware in the receiver.

[0014] BRIEF DESCRIPTION OF DRAWINGS

[0015] FIG. 1 depicts the location and relationship of the OIS channel and data channel in the FLO (Forward Link Only) superframe structure.

FIG. 2 shows the superframe structure for FLO with PPC symbols and SPC symbols which are always of duration 4625 chips.

FIG. 3 shows a SPC symbol structure.

FIG. 4 shows a block diagram for SPC processing at the receiver.

FIG. 5 is a diagram of a hardware circuit to implement the descrambling operation.

FIG. 6 is a block diagram for the threshold operation.

[0016] DETAILED DESCRIPTION

[0017] Signalling parameters Channel (SPC) and its associated processing at the FLO receiver is a new channel that is added to FLO superframe in revision of the FLO Air Interface Specification. In particular, SPC is added to the FLO superframe to convey physical layer parameters that cannot be transmitted through the OIS. For example, SPC carries information that would be required to decode the OIS itself. The information that is carried by the SPC includes FFT mode information (1k, 2k, 4k, 8k), the cyclic prefix length used ($1/16$, $1/8$, $1/4$ or $3/8$) and the slot to interlace map used ((2,6) pattern, (0,3,6) pattern).

[0018] Each SPC symbol can convey 8 bits of information. Therefore, 16 bits of information can be conveyed using the two SPC symbols. 16 bits of information allows for additional room to convey any other information that may be required in the future.

[0019] One important characteristic of SPC is that the SPC waveform is independent of the physical layer parameters such as slot to interlace map, FFT mode and cyclic prefix. This allows the receiver to be able to decode the information carried by SPC under any network deployment conditions using default factory settings. The information obtained from the SPC can then be used to decode OIS, which will in turn allow for other parameters to be configured via network. SPC symbols have been designed such that the receiver processing is along the lines of WID/LID determination in WIC/LIC symbols or the (Positioning Pilot Channel) PPC symbol to simplify the receiver architecture. While SPC waveform conveys the FFT mode information also in addition to other physical layer parameters, it may be possible for the device to acquire the FFT mode information by other means. For instance, the device may perform hypothesis testing on the FFT modes by detecting the TDM1 symbols by matching to the waveform transmitted for each of the FFT modes. In this case, the FFT information may already be available and the SPC symbols may be used to acquire cyclic prefix length and the slot to interlace information. On the other hand, another implementation is possible where TDM1 detection does not yield the FFT mode information. For instance, the minimum periodicity across all the FFT modes can be used to perform delayed correlation on the TDM1 symbols and the resulting ambiguity in the FFT size than can then be resolved

using the SPC symbols. In either case, the manner of processing the SPC symbols may not be different.

[0020] With regard to the numerology of the innovation, SPC symbols occur at the end of FLO superframe. SPC symbols are always two in number, and this fixed numerology follows across all modes of transmission. The superframe structure for FLO with PPC symbols and SPC symbols is shown in FIG. 1 SPC symbols are always of duration 4625 chips and have identical structure across FFT modes, cyclic prefix lengths and pilot patterns., It should be noted that SPC symbol structure is described in terms of 4K mode interlaces and does not depend on the FFT mode used for the rest of the superframe.

[0021] See FIG. 1 which shows the location and relationship of the OIS channel and data channel in the forward link only (FLO) air interface by way of the super frame structure. The FLO transmitted signal is organized into super frames, wherein each super frame is comprised of four frames of data, including the TDM pilots, the overhead information symbols (OIS) and frames containing wide-area and local-area data. In general, each super frame consists of 200 OFDM symbols per MHz of allocated bandwidth (1200 symbols of 6MHz), and each symbol contains 7 interlaces of active subcarriers. Each interlace is uniformly distributed in frequency, so that it achieves the full frequency diversity within the available bandwidth. These interlaces are assigned to logical channels that vary in terms of duration and number of actual interlaces used to provide flexibility in the time diversity achieved by any given data source. Lower data rate channels can be assigned fewer interlaces to provide time diversity, while higher data rate channels utilize more interlaces to minimize the signal on-time and reduce power consumption. The acquisition time for both low and high data rate channels is approximately the same. Both frequency and time diversity can be maintained without compromising acquisition time.

[0022] SPC symbols are recovered using the demodulation technique that is based on matching the descrambling sequence with the scrambling sequence. In particular, useful information from the received signal can be obtained only when the scrambling sequence at the receiver is matched to the scrambling sequence used at the transmitter. If the scrambling sequence is mismatched, then the received signal would appear as noise to the receiver. However, if the scrambling sequence used at the receiver matches with the transmitted sequence, then the receiver would be able to extract information from the received signal. In particular, SPC symbol transmits pilots in the frequency domain on interlaces 0 and 4 with the only unknown at the receiver being the four bits

used in the scrambler seed for each of the interlaces. The algorithm used for SPC decoding computes the channel estimate in time domain using the pilots from each of the interlaces and also a particular combination of the four unknown bits in the scrambler seed. When the receiver scrambler seed is not matched to the transmitter, the time domain channel estimate appears noisy with no significant energy taps. However, when the receiver scrambler seed matches with that of the transmitter, the time domain channel estimate will exhibit energy concentrated in few taps. In order to identify the concentration of the energy in few taps, an energy threshold is set and the energy above the threshold is collected for each of the hypotheses. The four bits in the SPC information field of the scrambler seed index corresponding to the maximum energy are declared as the Information bits contained in that particular SPC symbol interlace.

[0023] Reference is now made to FIG.2, which shows the superframe structure for the FLO with the SPC and PPC symbols. As can be seen from FIG.2, the SPC symbols are at the end of the FLO superframe. The SPC symbols are always two in number, and follow fixed numerology across all modes of transmission. The SPC symbols are always of duration 4625 chips. The break up of the SPC symbols is independent on the FFT mode. In this connection, it should be noted that the SPC symbols structure is based on 4K mode interlaces and does not depend on the FFT mode used for the rest of the superframe.

[0024] The superframe structure for the FLO waveform with SPC and PPC symbols is shown in FIG. 2, and the numerology for the two SPC symbols is as follows:

[0025] FFT window = 4096 chips

Cyclic prefix = 512chips

Window = 17 chips

As can be seen from the SPC symbol structure of FIG. 3, there are two 4K mode interlaces active in each SPC symbol. In particular, interlaces 0 and 4 are occupied in the frequency domain. Two active interlaces in the frequency domain lead to a time domain waveform that is periodic with a periodicity of 1024 samples, and four such periods occur within the FFT window. Information in SPC symbols is conveyed through the scrambler seed used for interlaces 0 and 4. Specifically, the SPC information field in the scrambler seed is used to convey 4 bits of information in each interlace. The

scrambler seed referred to here is the 20 bit scrambler seed specified in FLO AIS given by

d3d2d1d0 c3c2c1c0 b0 a10a9a8a7a6a5a4a3a2a1a0

where

a10a9a8a7a6a5a4a3a2a1a0 – correspond to the OFDM symbol index

b0 – reserved bit set equal to 1

c3c2c1c0 – set to 0000

d3d2d1d0 – SPC information field. The receiver should use the following information for descrambling the SPC symbols.

In addition to the scrambler seed, the mask used for scrambling is based on the slot information. The information for each of the interlaces in SPC0 and SPC1 is as follows (see FIG. 3).

Interlace 0:

Symbol index (a10-a0) – hard coded: SPC0 =0, SPC1=1

SPC information field = 4 bits of Information to be conveyed

Slot index = 0 (identity slot to interlace map used)

Interlace 4:

Symbol index (a10-a0) – hard coded: SPC0 =0, SPC1=1

SPC information field = 4 bits of Information to be conveyed

Slot index = 4 (identity slot to interlace map used)

Symbol index (a10-a0) – hard coded: SPC0 =0, SPC1=1

The block diagram for SPC processing is shown in FIG.4, where the software collects the 16 bits of information obtained from SPC0 and SPC1 and determines the system parameters to be used for decoding the FLO waveform. Based on the decoded information, the software programs the slot to interlace map to be used, the cyclic prefix information and the FFT mode information to be used by the hardware to decode the OIS and data channels in the superframe.

The steps involved in determining the scrambler information is described in the following sections. While the processing for interlace 4 is almost identical to that of interlace 0, there are a few minor differences which will be highlighted wherever they occur.

Scrambler Seed Detection.

The receiver operations involved in scrambler seed detection corresponding to all the fields other than the SPC information field are known at the receiver. Also, to distinguish between the four SPC information fields detected during the processing of the two SPC symbols, we refer to the four fields as SPC00, SPC04, SPC10, SPC14, where the first index after SPC refers to SPC symbol index and the second index corresponds to interlace index. SPC processing is typically initiated in HW by an associated software. This enables the processing of one or both the SPC symbols in the superframe.

Time Domain Interlace

SPC symbol processing follows TDM1 detection in the superframe. WIC/LIC detection and TDM2 processing may also be done following TDM1 depending on the methods used to detect TDM1. In any case, the close to 1 second delay between processing TDM1 and SPC symbols could potentially result in timing drifts, thus resulting in possible ambiguity in symbol boundary at SPC. Therefore, we use only two periods (2K samples) out of the total of four possible periods (4K samples) in the SPC symbol. Note that depending on the timing ambiguity expected from the circuitry of the chip, one to four periods of the SPC waveform can be used for processing. The start of the window for collecting the 2K samples may be programmable by software through a register FLO_SPC_OFFSET, for example.

During each SPC symbol, the FFT block collects 2K samples starting at sample number FLO_SPC_OFFSET coming out of the AFC. FFT extends the 2K samples periodically to form 4K samples (2 periods of 2K samples). Let $x(n), n = 0, 1, \dots, 4095$ be the 4096 samples after periodic extension where $x(n) = x(n + 2048)$, for $0 \leq n \leq 2047$. FFT block forms 512 time domain interlace samples corresponding to interlace 0 and interlace 4 using $x(n), n = 0, 1, \dots, 4095$. Let the 512 samples corresponding to interlace m be denoted by $y_m(n), n = 0, 1, 2, \dots, 511$, where $m = 0, 4$.

512 pt FFT

The next step in computing WID is to perform a 512 pt FFT on the sequence $\{y_m(n)\}$ corresponding to interlaces 0 and 4. The 512 pt FFT (with normalization as implemented in the hardware) is given by

$$Y_m(k) = \frac{1}{64} \sum_{l=0}^{511} y_m(l) e^{-j \frac{2\pi k l}{512}}, \text{ for } k=0,1,2,\dots,511.$$

At the output of the FFT block, the samples corresponding to interlaces 0 and 4 given by $\{Y_m(k)\}, k = 0,1,2,\dots,511$ in frequency domain where each frequency domain sample is a complex number.

Descrambling

After obtaining the frequency domain samples, hypothesis testing is performed using the 16 possible scrambler seeds corresponding to the 4 bits for the SPC information field in the scrambler seed for each of the two interlaces. The scrambler seed and mask parameters for the interlace 0 and interlace 4 are as follows:

Interlace 0:

- Symbol index = 0000 for SPC0 and 0001 for SPC1
- SPC information field = all combinations from 0000 through 1111
- Slot index = 0 (since identity slot to interlace map is used)

Interlace 4

- Symbol index = 0000 for SPC0 and 0001 for SPC1
- SPC information field = all combinations from 0000 through 1111
- Slot index = 4 (identity slot to interlace map)

If the scrambler output corresponding to the k th subcarrier in the interlace 0 corresponding to the i th hypothesis (i goes from 0 through 15) is given by $S_i(k)$, then the descrambler output is given by:

$$H_i(k) = Y(k)S_i^*(k)$$

Note that $S_i(k)$ is obtained by mapping the scrambler output $[b_{2k} \ b_{2k+1}]$ to the QPSK constellation. Multiplication by $S_i^*(k)$ is accomplished as a clockwise rotation by a multiple of $\frac{\pi}{2}$ as shown in Table 1 followed by a clockwise rotation by $\frac{\pi}{4}$ (given by $1 - j$ ignoring scaling by $\frac{1}{\sqrt{2}}$).

Table 1

$(b_{2k+1} \ b_{2k})$ (from scrambler)	Angle of rotation (degrees)
00	0
01	90
11	180
10	270

Descrambling Operation Based On The Scrambler Output

The hardware operations for descrambling is the same as that used for descrambling of the pilot symbols in channel estimation, WIC/LIC symbols and PPC acquisition mode operations, and the hardware circuit to implement the descrambling operation is shown in FIG. 5.

Zero Extrapolation

Note that there are only 500 pilots transmitted in each of the active interlaces for the SPC symbols. A least squares channel estimate based on 500 pilots would involve a matrix inversion operation and is computationally expensive. Therefore, it is computationally advantageous to extend the 500 pilot observations to 512 observations so that the least squares channel estimation operation can be reduced to a 512 point IFFT operation. The extension of 500 pilot observations to 512 observations can be done in one of several ways. One way to extend the observations is to use zero extrapolation where the missing pilot observations are replaced with zeros. The zero extrapolation performed on $H_i(k)$ is similar to the zero extrapolation performed during channel estimation. The memory locations are zeroed out are slightly different between interlaces 0 and 4.

For Interlace 0: set the memory locations between 251 and 261 (11 subcarriers) in the buffer corresponding to $H_i(k)$'s equal to zero to account for the presence of guard subcarriers. In addition, the DC subcarrier at memory location 0 should also be set to zero.

For Interlace 4: set the memory locations between 250 and 261 (12 subcarriers) in the buffer corresponding to $H_i(k)$'s equal to zero to account for the presence of guard subcarriers. In this case, DC subcarrier is not part of the interlace and hence does not require special attention.

Another example of extrapolation is a zero order hold where the last pilot observation is extended to fill in the missing pilots. In yet another case, the missing pilot observations may be formed by a filtering process on all the available pilot observations.

512pt IFFT

After extrapolation, we obtain 512 values for $H_i(k)$. We then perform a 512 pt IFFT operation on the extrapolated values for WID hypothesis i to obtain the corresponding time domain samples. The IFFT operation on the extrapolated values $H_i(k)$ is given by (with normalization as in the hardware)

$$h_i(l) = \frac{1}{64} \sum_{k=0}^{511} H_i(k) e^{\frac{j2\pi lk}{512}}, \text{ for } l = 0, 1, 2, \dots, 511.$$

At the output of the IFFT operation, we obtained a 512 length time domain channel estimate given by $\{h_i(l)\}$ corresponding to the transmitter using the scrambling pattern with the WID given by index i . Each time domain sample is a complex number with the real and imaginary parts represented by 9 bits. The next step is to threshold the channel estimate to remove contribution of noise and measure energy against each hypothesis.

Thresholding and energy measurement

After obtaining the time domain channel estimate, the energy in each tap is computed and compared to a threshold value. The thresholding and energy measurement procedure is similar to that in WIC/LIC and PPC processing. The threshold value to be used is programmed by software in FLO_SPC_THRESHOLD, which is referred to as β .

For each hypothesis i , the pseudo code for measuring the corresponding energy E_i is as follows:

```

 $E_i = 0;$ 
for  $l = 0..511$ 
  if  $|h_i(l)|^2 \geq \beta$ 
     $E_i = E_i + |h_i(l)|^2;$ 
  end;
end;
```

The block diagram for implementing the thresholding operation and energy accumulation is given in Figure 6.

The above steps corresponding to descrambling through thresholding and energy measurement are repeated for all of the 16 hypotheses. After collecting energies E_i for $i=0,1,..15$ corresponding to the 16 hypotheses, we find i for which E_i is maximum. The four bits representing the winning hypothesis which is the value of i corresponding to maximum E_i represent the information contained in that particular interlace of the SPC symbol. The same process is repeated independently on each of the two interlaces and then on each of the SPC symbols in the superframe.

[0026] Those of skill in the art would understand that information and signals may be represented using any of a variety of different technologies and techniques. For example, data, instructions, commands, information, signals, bits, symbols, and chips that may be referenced throughout the above description may be represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, or any combination thereof.

[0027] Those of skill would further appreciate that the various illustrative logical blocks, modules, circuits, and algorithm steps described in connection with the embodiments disclosed herein may be implemented as electronic hardware, computer software, or combinations of both. To clearly illustrate this interchangeability of hardware and software, various illustrative components, blocks, modules, circuits, and steps have been described above generally in terms of their functionality. Whether such functionality is implemented as hardware or software depends upon the particular application and design constraints imposed on the overall system. Skilled artisans may implement the described functionality in varying ways for each particular application, but such implementation decisions should not be interpreted as causing a departure from the scope of the present invention.

[0028] The various illustrative logical blocks, modules, and circuits described in connection with the embodiments disclosed herein may be implemented or performed with a general purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general purpose processor may be a microprocessor, but in the alternative, the processor may be any conventional processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing

devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

[0029] The steps of a method or algorithm described in connection with the embodiments disclosed herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium is coupled to the processor such that the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in a user terminal. In the alternative, the processor and the storage medium may reside as discrete components in a user terminal.

The previous description of the disclosed embodiments is provided to enable any person skilled in the art to make or use the present invention. Various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without departing from the spirit or scope of the invention. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

MANAGEMENT OF DYNAMIC MOBILE COUPONS

CLAIM OF PRIORITY UNDER 35 U.S.C. §119

[0001] This Application for Patent claims the benefit of U.S. Provisional Application Serial No. 61/230,693 filed on August 1, 2009 entitled “MANAGEMENT OF DYNAMIC MOBILE COUPONS,” the disclosure of which is hereby incorporated by reference in their entirety.

CLAIM FOR BENEFIT UNDER 35 U.S.C. §120

[0002] The present Application is a continuation in part of U.S. Application No. 12/142,159 entitled DYNAMIC ELECTRONIC COUPON FOR A MOBILE ENVIRONMENT filed June 19, 2008, which claims priority to U.S. Provisional Application No. 60/945,098 entitled DYNAMIC COUPON SYSTEM filed June 20, 2007; and of U.S. Application No. 12/142,597 entitled MANAGEMENT OF DYNAMIC ELECTRONIC COUPONS filed June 19, 2008, which claims priority to U.S. Provisional Application No. 60/945,100 entitled COUPON WALLET SYSTEM, filed June 20, 2007, each of which are assigned to the assignee hereof, and hereby expressly incorporated by reference herein.

BACKGROUND

[0003] The following relates generally to wireless communication, and more specifically to managing dynamic mobile coupons in mobile commerce.

[0004] In recent years, a variety of advancements has occurred in cellular communication technology and cellular communication devices. Some of the advancements, such as integration of camera and video recording technology onto such devices, incorporation of e-mail and short messaging services into mobile communication, and the like, involve software and/or hardware applications. These applications have added increased flexibility, processing power, communication

capabilities, and so forth, to already popular communication devices (*e.g.*, cellular telephones). As a result, such devices have become more popular in a consumer marketplace, motivating larger numbers of consumers to purchase such devices, or to upgrade to devices that include new applications and technologies.

[0005] As larger numbers of consumers own and utilize mobile devices, business mechanisms traditionally limited to personal, radio, television or landline telephone contact are expanding into the mobile environment. For instance, as the Internet becomes increasingly accessible *via* mobile communication devices, e-mail and web browsing applications are utilized with mobile devices. Further, electronic commerce is conducted by way of such devices as well. For instance, secure web applications can provide an interface for conducting online commercial transactions with a web browsing device. Credit card, debit card, bank transfer and like payments can be facilitated utilizing secure web applications by way of such device.

[0006] In addition to the foregoing, other commercial mechanisms have also been incorporated into mobile devices and mobile communication environments. For instance, mobile coupons stored on and configured for mobile devices (mobile coupons) can be utilized to replace paper coupons. A commercial entity can generate coupons and distribute them to mobile devices, which can in turn facilitate redemption of mobile coupons in conjunction with commercial transactions. As electronic files, such coupons have more flexibility than traditional paper coupons. For instance, a paper coupon is more readily misplaced as compared with a mobile coupon stored on a mobile device. Further, a mobile coupon can incorporate various security measures to mitigate duplication and other unauthorized uses. Accordingly, many benefits accrue upon introduction of mobile coupons in a mobile operating environment.

SUMMARY

[0007] The following presents a simplified summary of one or more aspects in order to provide a basic understanding of such aspects. This summary is not an extensive overview of all contemplated aspects, and is intended to neither identify key or critical elements of all aspects nor delineate the scope of any or all aspects. Its sole purpose is to present some concepts of one or more aspects in a simplified form as a prelude to the more detailed description that is presented later.

[0008] The subject disclosure provides for network-based management of dynamic mobile coupons (DMCs) employed in mobile device-related commerce. Data correlated to variable characteristics of DMCs can be analyzed by network components to determine real time, periodic or triggered, *etc.*, states of the variable characteristics. As network processing load associated with analyzing the data becomes prohibitive, one or more DMCs can be set to non-variable, enabling back-end resources to forego data analysis with respect to the non-variable DMCs, potentially reducing resource load.

[0009] According to further aspects of the subject disclosure, provided is post-transaction evaluation of DMC-related activity. Evaluation can be based on a set of post-transaction rules correlating transaction modifiers to post-transaction activity. Data pertaining to post-transaction activity is received and analyzed, and transaction modifiers are implemented as per the post-transaction rules. The transaction modifiers can include adding funds to a user financial account, issuing a rebate check, associating an additional DMC with a user's account, updating user loyalty points or frequent-user points, or the like.

[0010] According to one or more other aspects of the subject disclosure, provided is virtual shopping management coupled with DMC allocation. A user DMC account associated with a mobile device is transmitted to a commercial entity *via* wireless communication, or to a mobile network entity configured to manage DMCs for the commercial entity. The commercial/network entity can cross-reference DMCs associated with the account to products or services of the commercial entity. Modified transactions characteristics specified as part of the DMCs can be applied to one or more products and services and downloaded to the mobile device for display. If a product or service is selected at the mobile device, the selection is sent to the network entity, which generates a virtual invoice for the product or service. The invoice can reflect transaction modifications provided by pertinent DMCs, as well as additional modifications based on a user loyalty or frequent-shopper account, credit card purchase benefits, user points, other coupons, rebates, promotional modifications or instant discounts, or the like. The virtual invoice indicates a final transaction for the selected product/service based on applicable transaction modifications, and can be provided to the mobile device or a point of sale device to facilitate completing the transaction.

[0011] In addition to the foregoing, the subject disclosure provides a method including a data processor to execute instructions for managing a DMC. The

instructions can cause the data processor to assign the DMC to a target mobile device and to establish an initial state of a variable characteristic of the DMC based on a factor pertinent to the target mobile device or a user account related to such device.

Furthermore, the method can comprise employing a communication interface to obtain data pertinent to the DMC. Additionally, the method can comprise employing the data processor to manage a state of a DMC account associated with the target mobile device based on the data pertinent to the DMC.

[0012] According to one or more aspects of the subject disclosure, provided is an apparatus for managing mobile coupons. The apparatus can comprise a data processor that executes a set of modules configured for managing a DMC. The set of modules can include an allocation module that assigns the DMC to a mobile device user account, an evaluation module that establishes an initial state of the DMC based on a factor pertinent to the mobile device user account and a management module that maintains a status of the mobile device user account based on data pertinent to the DMC. Furthermore, the apparatus can comprise a database for storing the data pertinent to the DMC, the initial state of the DMC or the status of the mobile device user account.

[0013] According to one or more aspects, disclosed is an apparatus for wireless communication. The apparatus can comprise means for processing instructions for managing a DMC. The instructions can cause the means for processing to assign the DMC to a target mobile device and to establish an initial state of a variable characteristic of the DMC based on a factor pertinent to the target mobile device or a user account related to such device. In addition, the apparatus can comprise means for employing a communication interface to obtain data pertinent to the DMC. Moreover, the apparatus can comprise means for managing a state of a DMC account associated with the target mobile device based on the data pertinent to the DMC.

[0014] In one or more other aspects, disclosed is at least one processor configured for wireless communication. The processor(s) can comprise a first module for assigning a DMC to a target mobile device. Furthermore, the processor(s) can comprise a second module for establishing an initial state of a variable characteristic of the DMC based on a factor pertinent to the target mobile device or a user account related to such device. Additionally, the processor(s) can comprise a third module for obtaining data pertinent to the DMC and a fourth module for managing a state of a

DMC account associated with the target mobile device based on the data pertinent to the DMC.

[0015] According to at least one additional aspect, the subject disclosure provides a computer program product comprising a computer-readable medium. The computer-readable medium can include at least one instruction for causing a computer to assign a DMC to a target mobile device. Additionally, the computer-readable medium can include at least one instruction for causing the computer to establish an initial state of a variable characteristic of the DMC based on a factor pertinent to the target mobile device or a user account related to such device. Further, the computer-readable medium can comprise at least one instruction for causing the computer to obtain data pertinent to the DMC. Moreover, the computer-readable medium can comprise at least one instruction for causing the computer to manage a state of a DMC account associated with the target mobile device based on the data pertinent to the DMC.

[0016] Further to the above, the subject disclosure provides a method for facilitating management of mobile coupons. The method can comprise employing a data processor to execute rules for maintaining a DMC associated with a mobile device user account. The rules can cause the data processor to obtain an assignment of the DMC to the mobile device user account, obtain a rule for calculating variability of the DMC and to monitor data pertinent to the variability specified by the calculating rule. Furthermore, the method can comprise employing a wireless communication interface to submit the data to a network entity identified by the rule. Moreover, the method can comprise employing the wireless communication interface to obtain a network response to the submission, wherein the response affects the mobile device user account or the DMC.

[0017] In at least one other aspect, disclosed is an apparatus for facilitating management of mobile coupons. The apparatus can comprise a data processor for executing a set of modules configured to support the mobile coupon management. The set of modules can include an assignment module that associates a DMC with a user of the apparatus based on assignment of the DMC to a user account and a tracking module that monitors data pertinent to variability of the DMC. Additionally, the set of modules can include a communication module that submits the pertinent data to a network management apparatus and obtains a response affecting the user account or a status of

the DMC. Furthermore, the apparatus can include memory for storing the monitored data or the response.

[0018] According to other aspects of the subject disclosure, provided is an apparatus for facilitating management of mobile coupons. The apparatus can comprise means for processing rules configured to manage a DMC associated with a mobile device user account. The rules can cause the means for processing to obtain an assignment of the DMC to the mobile device user account and to monitor data pertinent to variability of the DMC. Additionally, the apparatus can comprise means for submitting the data to a network entity and for obtaining a network response to the submission, wherein the response affects the mobile device user account or the DMC.

[0019] According to yet other aspects, disclosed is at least one processor configured to facilitate management of mobile coupons. The processor(s) can comprise a first module for obtaining an assignment of a DMC to a mobile device user account and a second module for monitoring data pertinent to variability of the DMC. Furthermore, the processor(s) can comprise a third module for submitting the data to a network entity and for obtaining a network response to the submission, wherein the response affects the mobile device user account or the DMC.

[0020] In accordance with at least one additional aspect, the subject disclosure provides a computer program product comprising a computer-readable medium. The computer-readable medium can comprise at least one instruction for causing a computer to obtain an assignment of a DMC to a mobile device user account and at least one instruction for causing the computer to monitor data pertinent to variability of the DMC. Moreover, the computer-readable medium can include at least one instruction for causing the computer to submit the data to a network entity and obtain a network response to the submission, wherein the response affects the mobile device user account or the DMC.

[0021] To the accomplishment of the foregoing and related ends, the one or more aspects comprise the features hereinafter fully described and particularly pointed out in the claims. The following description and the annexed drawings set forth in detail certain illustrative aspects of the one or more aspects. These aspects are indicative, however, of but a few of the various ways in which the principles of various aspects can be employed and the described aspects are intended to include all such aspects and their equivalents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] **Fig. 1** illustrates a block diagram of an example apparatus for managing dynamic mobile coupons (DMCs) in a mobile communication environment, according to one aspect.

[0023] **Fig. 2** depicts a block diagram of a sample system for mitigating network loading based on maintaining DMC variability characteristics, according to one aspect.

[0024] **Fig. 3** illustrates a block diagram of an example system for implementing post-transaction activities for DMCs according to one or more disclosed aspects.

[0025] **Fig. 4** depicts a block diagram of a sample system for providing a virtual invoice for mobile shopping according to one or more aspects of the subject disclosure.

[0026] **Fig. 5** illustrates a block diagram of an example electronic display interface to facilitate virtual shopping according to one or more aspects of the subject disclosure.

[0027] **Fig. 6** illustrates a block diagram of a sample system providing security for electronic transactions according to one or more disclosed aspects.

[0028] **Fig. 7** depicts a block diagram of a sample mobile device for facilitating DMC management in mobile-related commerce according to one or more further aspects.

[0029] **Fig. 8** illustrates a flowchart of an example methodology for managing DMCs in a mobile communication environment, according to one aspect.

[0030] **Fig. 9** illustrates a flowchart of a sample methodology for network-facilitated mobile-related commerce employing DMCs, according to one aspect.

[0031] **Fig. 10** depicts a flowchart of a sample methodology for facilitating management of DMCs in a mobile communication environment, according to one aspect.

[0032] **Figs. 11A and 11B** depict a flowchart of a sample methodology for facilitating network-implemented management of DMCs in mobile-related commerce, according to one aspect.

[0033] **Figs. 12 and 13** illustrate respective block diagrams of example systems for implementing and facilitating network management of DMCs for a mobile device, according to one aspect.

[0034] Fig. 14 depicts a block diagram of an example wireless communication environment for implementing one or more aspects of the subject disclosure.

DETAILED DESCRIPTION

[0035] Various aspects are now described with reference to the drawings, wherein like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of one or more aspects. It can be evident, however, that such aspect(s) can be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to facilitate describing one or more aspects.

[0036] In addition, various aspects of the disclosure are described below. It should be apparent that the teaching herein can be embodied in a wide variety of forms and that any specific structure and/or function disclosed herein is merely representative. Based on the teachings herein one skilled in the art should appreciate that an aspect disclosed herein can be implemented independently of any other aspects and that two or more of these aspects can be combined in various ways. For example, an apparatus can be implemented and/or a method practiced using any number of the aspects set forth herein. In addition, an apparatus can be implemented and/or a method practiced using other structure and/or functionality in addition to or other than one or more of the aspects set forth herein. As an example, many of the methods, devices, systems, and apparatuses described herein are described in the context of providing efficient implementation and utilization of dynamic mobile coupons in wireless communication environment. One skilled in the art should appreciate that similar techniques could apply to other communication environments.

[0037] In some aspects of the subject disclosure, a server-side mechanism for managing dynamic mobile coupons in mobile device-related transactions is provided. Historically speaking, a coupon is generally a certificate or note, torn off from a ticket, advertisement, or the like, that entitles a bearer of the coupon to a specified benefit. A sponsor of the coupon agrees to provide the benefit in exchange for an action taken by the bearer of the coupon; typically in conjunction with the bearer engaging in a

commercial transaction with the sponsor, such as purchase of a product or service provided by the sponsor.

[0038] For mobile devices, coupons can take the form of electronic applications, also referred to as mobile coupons or electronic coupons. These mobile coupons can include multimedia files that employ user interface features of a mobile device to convey coupon-related information. As an example, a mobile coupon can play an audio recording that announces coupon-related information, display pictures, text, or other video media descriptive of such information, employ various sensory features of the mobile device to display product or sponsor information (*e.g.*, tactile interface, olfactory spray features), and so forth. Additionally, the mobile coupon can include or be coupled with media files that can play audio/visual advertisements related to the coupon (*e.g.*, product/service advertisement), coupon sponsor (*e.g.*, sponsor advertisement) or to a third party related to the sponsor (*e.g.*, third party advertisement).

[0039] Additionally, because the mobile coupon is an electronic application, attributes of the coupon, benefits provided by the coupon or transactions involving the coupon can be personalized for a particular user or have non-fixed, variable characteristics. These characteristics can be subject to various data or conditions pertinent to a mobile coupon sponsor, a transaction related to the coupon, a user, or user account associated with the mobile coupon, a mobile device employed by the user or coupled with the user account, actions taken by the user involving the mobile device or user account, and so on. A set of rules can correlate states of the dynamic characteristics to predetermined data or conditions. Based on current conditions or data, current characteristics can be determined and applied to the mobile coupon, yielding a current value or state of the mobile coupon. Thus, as an example, a transaction price or discount value can depend on a time of day, for instance, or day of the week. Thus, on various days or at various times the price of a good or service, or discounted price benefit, can change. According to this example, the current value or state of the mobile coupon depends on the day of the week or the time of the day. It should be appreciated that various other value/state dependencies can be established to cause current DMC characteristics to vary as a function of selected conditions or data.

[0040] As another example, an attribute of the mobile coupon can be personalized for a particular user, or for a particular user account. For instance, a media application associated with the mobile coupon could display user receipt, redemption, or

sharing history pertinent to a user account. Alternatively, the media application could display or highlight members of a user's friends list, social network, *etc.* who also have the mobile coupon assigned to their respective accounts. As another alternative, the media application can display or announce the user's name, access user coupon preferences, display coupon-related status activity for members of the user's social network, and so forth. It should be appreciated that other suitable examples of personalized coupon attributes or characteristics are contemplated as part of the subject disclosure; the scope of the disclosure is not limited to the articulated examples. Furthermore, as utilized in this disclosure and appended claims, a mobile coupon having a variable characteristic (*e.g.*, changing based on some criteria, or state of data) or an attribute personalized for a particular user or user account is defined as a dynamic mobile coupon (DMC).

[0041] Further to the above, DMCs can be distributed by a coupon sponsor, or a third party distribution entity to a user account. Distribution can be as described in U.S. Application No. 12/142,159 entitled Dynamic Electronic Coupon for a Mobile Environment, or in U.S. Application No. 12/142,597 entitled Management of Dynamic Electronic Coupons, each of which are incorporated by reference in their entireties herein, or as described herein. As one particular example, a network server can be employed to transmit a DMC to an account server that manages a DMC account associated with a mobile device. As another example, a mobile network component can employ a terrestrial radio network to send the DMC directly to the mobile device over-the-air. As yet another example, a wireless transceiver can be employed (*e.g.*, by a computer, independent server, point of sale device, distribution device, *etc.*) to send the DMC directly to the mobile device. In still other examples, the DMC can be downloaded from the Internet, loaded on a memory card or Flash card or drive, and installed manually on the mobile device, pre-loaded onto a subscriber identity module (SIM) or removable user identity module (RUIM), or the like.

[0042] For direct transmission to the mobile device, a mobile application residing on the device can receive the DMC and display the DMC (*e.g.*, including related media files/applications or advertisement files/applications) to a device user. The mobile application can be substantially as that described in U.S. Application No. 12/142,159, cited above. For network transmission to a network account, the account server can relay the DMC to the mobile device, or the account server can provide

remote access, remote management, remote trading (*e.g.*, with peer mobile devices) or remote redemption of the DMC *via* a network Browser, or other network-based application (*e.g.*, in *lieu* of or in addition to a mobile application on the mobile device). In the latter case, a DMC can be delivered to or accessed (*e.g.*, browsed, printed, shared *etc.*) from various mobile devices associated with a DMC user account, including a cellular phone or smart phone, personal digital assistant, e-book reader, digital photo frame, computer, laptop, and so on.

[0043] Further to the above, DMCs can be distributed individually, or in bundles or packages by a particular coupon sponsor, distributor or re-distributor. For instance, a sponsor can establish a set of DMCs (*e.g.*, a DMC 'booklet') pertaining to products or services of the sponsor, and offer the set of DMCs for sale (*e.g.*, an offer might comprise \$50 for \$200 face value coupons) or as part of another suitable promotion. As another example, a coupon distributor could bundle sets of coupons provided by different sponsors as a single package of coupons. Upon purchase or other payment/service agreement, the package of coupons can be transferred to a user account/user mobile device. In yet another example, a re-distributor could break up DMC sets or packages obtained from a sponsor or distributor, and offer a DMC book comprising an arrangement of DMCs from the sets/packages selected by the re-distributor. Regardless of how DMCs are arranged or by what entity, once a DMC set/package/book is purchased or otherwise obtained, it can be distributed to a user account or mobile device in a similar manner as discussed above.

[0044] According to some aspects of the subject disclosure, data and conditions affecting value or state of a DMC can be uploaded to a network processing module for evaluation. The processing module can manage a current state of the DMC by analyzing the data/conditions and comparing the analysis to rules establishing DMC characteristic states. Based on the comparison, a current state of the DMC is obtained. Data and conditions can be monitored by network entities, retail entities, or mobile devices, depending on the particular condition/data, and uploaded to the network processing module. As numbers of DMCs managed by the network processing module increase, however, processing load can become prohibitive, potentially reducing processing or memory resources for other network applications (*e.g.*, redemption of DMCs, assignment of DMCs to mobile devices, *etc.*). Processing load can be exacerbated where complex relationships between user account status and current DMC

state exist, particularly where significant delay occurs in providing the network processing module with data necessary to analyze the current DMC state.

[0045] Some aspects of the subject disclosure relate to addressing the foregoing problem. For example, DMCs can be associated with a dynamic/fixed flag utilized by the network processing module to terminate data analysis involved in evaluating varying DMC states. When processing load exceeds a threshold level, one or more DMCs managed by the module can be set to fixed, allowing the processing module to forego analysis pertaining to such DMCs. Processor or memory resources freed up in this manner can be allocated to other processing/storage tasks.

[0046] Where a DMC is set to fixed, variable characteristics of the DMC are frozen, or non-dynamic. Accordingly, the current state of the DMC becomes static, rendering the DMC a non-dynamic mobile coupon, (*e.g.*, at least until the dynamic/fixed flag is set to dynamic, and further state processing for dynamic characteristics of the DMC is implemented). The static state of the DMC can be temporary or permanent, depending on programming logic governing the network processor. Further to the above, the DMC characteristics or state can be set to a default state/value when the dynamic/fixed flag is set to fixed. The default state can comprise a predetermined state (*e.g.*, a predetermined monetary discount), or can comprise a most recent state determined by the network processor (*e.g.*, the discount value most recently established for the DMC).

[0047] Where suitable, the network processor can change the dynamic/fixed flag of one or more DMCs from static to dynamic. Such can occur after a threshold time, once processing load drops below a threshold level, based on a request from a mobile device associated with the DMC (*e.g.*, *via* a DMC user account), based on a request from a DMC sponsor, or the like, or a combination thereof. Once the flag is set to dynamic, the network processor again analyzes uploaded data to determine a current state of variable characteristics of the DMC. Such characteristics are downloaded to the mobile device (*e.g.*, *via* a wireless network) for display to a user. Accordingly, the user can be informed of state changes to one or more DMCs, allowing the user to make redemption decisions based on the current DMC state.

[0048] According to further aspects of the subject disclosure, benefits provided by a DMC can be based on activity occurring after redemption of the DMC, in lieu of or in addition to benefits provided at the time of redemption. Thus, for instance, if a copy

of a DMC is shared from one user account to recipient user accounts, or a copy(ies) of the DMC is redeemed by a recipient user account(s), a benefit can be provided to the sharing account. As another example, a benefit involving multiple-items can be applied to non-concurrent transactions for the respective items. As a particular case to illustrate the foregoing, a DMC can provide a mobile device user account with a one-dollar discount if redeemed with purchase of item A, a three dollar discount if redeemed with purchase of item B, and a five dollar discount based on purchase of both items A and B. If the DMC is redeemed in conjunction with a purchase of item A involving the mobile device, the transaction involving item A is reduced by one dollar. However, if a user employs the mobile device in purchasing item B after redemption of the DMC, a four dollar discount benefit can be provided. The benefit can be realized by applying the four dollar discount to the purchase of item B, by depositing four dollars in a financial account associated with the mobile device user account (*e.g.*, a bank savings account, checking account, money market account, investment account, and so forth), by sending a rebate check for four dollars to an address associated with the user account, and so on. According to such aspects of the subject disclosure, DMC benefits can be applied to a richer and more diverse set of transactions, increasing utility of the DMC in mobile-related commerce.

[0049] In at least one additional aspect of the subject disclosure, DMCs can be employed in providing an enhanced mobile-related shopping experience. A mobile device can communicatively couple with a commercial entity (*e.g.*, wireless network of a retail store) and share information with the commercial entity to implement the enhanced shopping experience. In some aspects of the subject disclosure, the mobile device can provide an identifier (ID) of a DMC user account associated with a mobile device user to the commercial entity. The commercial entity can forward the ID to a back-end DMC management apparatus that maintains DMCs associated with the user account. A correlation between products/services of the commercial entity and DMCs of the user account can be identified (*e.g.*, by comparing product name, product ID, product serial number, *etc.*, specified on an associated DMC), and a benefit(s) provided by the DMCs can be applied to suitable products/services. A list of products/services of the commercial entity can be compiled, reflecting the benefits provided by DMCs associated with the user account, and optionally detailing those benefits (*e.g.*,

differences in cost, money saved, additional product availability, extension of service or contract terms, and so forth).

[0050] Also based on the communication between the commercial entity and mobile device, a list of products/services of the entity can be displayed for virtual shopping on the mobile device. Alternatively, or in addition, products/services can be wirelessly scanned by the mobile device to provide data pertaining to the product/service to such device (*e.g.*, *via* near-field wireless communications, optical scanning input, Bluetooth® communications, or the like). Once the mobile device obtains a product/service of the commercial entity, data or media descriptive of the item can be output to a user. In addition, the data/media can specify or highlight modified transaction information involving the item, as a result of applying pertinent DMC benefits to the item. A user can be given the option to select an output item, where the selection is received as input to the mobile device. The user can also specify whether applicable DMCs should be redeemed with the product. The selected item and DMC(s) can then be uploaded to the commercial entity, or to a network entity (*e.g.*, *via* wireless data exchange) configured for managing DMCs or mobile-related commerce. A virtual invoice for the item is generated, which includes the benefits provided by the selected DMCs. Optionally, the invoice can also reflect other benefits from other user accounts associated with a user of the mobile device, such as a user loyalty account, frequent-customer account (*e.g.*, frequent shopper, frequent purchaser, frequent flyer, frequent guest, and so on), credit card reward points, *etc.*

[0051] Once the virtual invoice is generated, a transaction involving the invoiced items can be completed, causing redemption of specified DMCs. The transaction can be completed virtually by entering payment information into the mobile device, and submitting the payment information to the network entity or commercial entity. Reconciliation of DMC or other user account benefits can be implemented between the network entity and commercial entity, based on the invoiced items and payment. A receipt of the invoice and transaction can be provided to the commercial entity and mobile device for physical item checkout (*e.g.*, a user or store employee can scan items in their shopping cart to reconcile the transaction with shopping cart items). As another example of completing the transaction, the virtual invoice can be provided to the point of sale device, which can display verification of payment and a list of items involved in the transaction. The point of sale device or a store employee can reference

items that the user has in their possession or shopping cart with the list of items, by automated scanning or human inspection, respectively.

[0052] In at least one further aspect of the subject disclosure, enhanced mobile-related shopping can further comprise virtual in-store mapping at the mobile device. For instance, data exchange between the mobile device and commercial entity can involve transfer of a virtual mapping application, depicting a layout of the store for display at a mobile device. According to some aspects, a position location of the mobile device can be highlighted on the map, determined from global positioning system (GPS), cellular base-station position determination, satellite-position determination, wireless communication with a set of wireless transceivers of the commercial entity, and so on.

[0053] Further to the above, position location of select items can also be displayed on the mapping application. Selection of items can be based on explicit selection at the mobile device, or inferred selection. The latter, for instance, can include items associated with a DMC in a mobile device user account, items the user has purchased in the past, items the user has indicated an interest in, *etc.* Once position location of select items is displayed on the map, a route between the user's position location (*e.g.*, inferred from position location of the mobile device) can be displayed on the mapping application, helping the user navigate through the store *via* the mobile device display. In some aspects of the subject disclosure, routes can be displayed between the user and each selected item, between the user and items explicitly selected by the user, and so on. Routes to different items can be visually distinct, highlighted upon selection, hidden upon selection of a different item, *etc.*, to increase utility and user friendliness of the mapping application. When the mobile device comes within a threshold distance of a selected item, user interface feedback can be implemented to announce the proximity to a selected item. Such feedback can include a particular graphical highlighting on the mapping application, execution of an audio-video application pertaining to the item, auditory or verbal announcement of the item, vibration of the mobile device, or the like, or a combination thereof. Once in proximity to the item, the user can select the item as described above (*e.g.*, optical scanning, selection on mobile device UI display), causing the mobile device to submit the item for virtual invoicing. Accordingly, a rich and robust integration between virtual commerce

and physical shopping can be implemented by the subject disclosure, based on properties of DMCs and associated mobile device user accounts and mobile devices.

[0054] In at least one aspect of the subject disclosure, electronic video or graphical recognition systems can be employed to filter DMCs associated with a particular DMC sponsor. For instance, a picture of a trademark, logo, building, *etc.*, of a sponsor, that contains graphics or imagery distinctive of the sponsor can be recognized and utilized to automatically search or retrieve DMCs associated with the sponsor. In other aspect, sounds, audio files, music, jingles, *etc.*, distinctive of the sponsor can be recognized with electronic audio recognition and utilized to search for DMCs associated with the sponsor. It should be appreciated that recognition can be implemented at a mobile device, or at a network entity based on information (*e.g.*, photographs, media files, audio recordings, video recordings, *etc.*) uploaded to the network entity.

[0055] In other aspects of the subject disclosure, if a DMC is retrieved, activated, or searched on an electronic user device, a system can also search for and retrieve retail outlet locations or virtual website locations that honor a benefit provided by the DMC. The outlet/website locations can be associated with a sponsor of the DMC, a related partner of the sponsor, or DMC distributor, re-distributor, or the like. Furthermore, for physical retail locations, a navigation application can be initiated to provide travel/driving directions to nearby locations, estimate distance from user location, time of arrival, and so on. For online retail locations, a list of such locations can be displayed with links to pertinent websites, *etc.*, for retail entities that honor the DMC in electronic transactions. It should be appreciated that the subject disclosure is not limited in scope to the specific examples articulated herein, however. Rather, other examples and embodiments of the subject disclosure, known to one of skill in the art or reasonably made known to one of skill in the art by way of the context provided herein, are considered part of the subject disclosure.

[0056] Referring now to the figures, **Fig. 1** illustrates a block diagram of an example apparatus (100) providing DMC management according to one or more aspects of the subject disclosure. Specifically, depicted is a coupon management apparatus 100 providing network-assisted implementation of DMCs for mobile device-related commerce. Apparatus 100 can facilitate assignment of DMCs to user DMC accounts, tracking status of such DMCs, establishment of current states of variable characteristics of the DMCs, and redemption of the DMCs in conjunction with specified transactions.

As one example, apparatus 100 comprises a component of a network (*e.g.*, a cellular network, data network) communicatively coupled, either directly or indirectly (*e.g.*, by way of another network or series of networks) with a mobile device associated with a DMC user account. However, the subject description and claims are not so limited.

[0057] Coupon management apparatus 100 can comprise a set of data processors 102 for executing one or more modules stored in memory (not depicted) pertinent to functions provided by apparatus 100. Data processor(s) 102 can comprise any suitable set of hardware or hardware and software processing components. The modules can include an allocation module 104 for assigning a DMC to a DMC user account coupled with a mobile device (mobile device user account). The assignment can be based on criteria specified by a sponsor of the DMC, stored in a database 110. Once a mobile device user account is identified, the DMC or a suitable indication thereof (*e.g.*, a distinct ID) is conveyed to the DMC user account *via* a communication interface 114.

[0058] It should be appreciated that in some aspects of the subject disclosure communication interface 114 can comprise a wireless transmitter that sends the DMC or indication thereof over-the-air to the mobile device. In other aspects of the subject disclosure, communication interface 114 can comprise a wired transmitter that forwards the DMC/indication to a suitable wireless network for transmission to the mobile device. In at least one aspect of the subject disclosure, communication interface 114 can send the DMC/indication to a non-mobile account of a user of the mobile device (*e.g.*, an e-mail account) *via* one or more network servers sponsoring the non-mobile account. In such aspects, the user can load or access the DMC *via* a direct communication link (*e.g.*, an Ethernet cable) or through a web browser, for instance.

[0059] Criteria for identifying a suitable mobile device user account can include identity of a user associated with the mobile device user account, previous account activity associated with such user account (*e.g.*, redemption of DMCs, account-related transactions, online shopping, inter-user DMC sharing, executing or reviewing an advertisement of the sponsor or a related third party, or the like), status of a receive/deny DMC distribution flag of the user account, a determinable circumstance pertaining to a mobile device associated with the user account (*e.g.*, position location of the mobile device, proximity of such device with apparatus 100 or a wireless transmitter 114 of apparatus 100, proximity to a retail location pertinent to the DMC or DMC sponsor, *etc.*), or the like, or a suitable combination thereof. Other criteria for assigning

a DMC to a mobile device user account can be employed by allocation module 104, such as those criteria described in U.S. Patent Application No. 12/142,159 entitled Dynamic Electronic Coupon for a Mobile Environment, or in U.S. Patent Application No. 12/142,597 entitled Management of Dynamic Electronic Coupons, each of which are expressly incorporated by reference herein.

[0060] Further to the above, coupon management apparatus 100 can comprise an evaluation module 106. The evaluation module 106 can establish an initial state for one or more variable characteristics of a DMC. The initial state can be a function of various determinable data or conditions. Example conditions can include activity pertaining to the mobile device user account, promotional offers provided by a sponsor of the DMC, product inventory status, time of day, day of the week, season, position location of a target mobile device, or the like, or a suitable combination thereof. Data characterizing the determinable conditions can be uploaded to apparatus 100 *via* communication interface 114, and stored in database 110. A set of characterization rules 112 stored in the database 110 can be employed by evaluation module 106 for analyzing the uploaded data and determining the initial state, as well as subsequent states of the variable characteristics. Based on the analysis, evaluation module 106 can output a current state for the DMC, which can define benefits provided by the DMC in conjunction with a commercial transaction (*e.g.*, purchase, rent, lease, *etc.* of a product or service).

[0061] Evaluation module 106 can trigger determination of the current state of the DMC in at least one predetermined manner. For instance, the determination can be made periodically, based on a time-based function saved in database 110. Alternatively, the determination can be non-periodic, based on a non-time based function. As another example, evaluation module 106 can trigger the current state determination in response to input from a mobile device user account or DMC sponsor, or the like. Evaluation module 106 can further employ suitable combinations of the foregoing trigger mechanisms, or like trigger mechanisms in determining the current state of the DMC.

[0062] In addition to the foregoing, coupon management apparatus 100 can comprise a management module 108 for managing respective states of a set of DMCs issued by apparatus 100, or otherwise maintained by apparatus 100. Specifically, the management module 108 can maintain a status of respective DMCs in database 110. The status can comprise a current state of a DMC and associated benefits determined by evaluation module 108. Additionally, the status can comprise a fixed/dynamic state of

the DMC, which specifies whether characteristics of the DMC are variable or constant. In at least one aspect of the subject disclosure, the status can comprise a redemption state, establishing whether the DMC has been selected for redemption in conjunction with a specified product or service pertinent to the DMC. The redemption state can further specify whether the DMC has already been redeemed or is outstanding. Further to the above, the status can include a post-transaction flag indicating whether activity occurring after redemption of the DMC is pertinent to a benefit provided by the DMC. Thus, based on the status of the DMC, apparatus 100 can determine whether the DMC is outstanding or redeemed, dynamic or fixed, what benefits are currently associated with the DMC, whether the DMC is selected for redemption in conjunction with an identified transaction, or whether outstanding benefits can accrue to a user's account based on post-transaction activity related to the DMC. It should be appreciated, however, that the foregoing status and determinations are exemplary only, and apparatus 100 is not so limited to the specifically recited examples.

[0063] Fig. 2 depicts a block diagram of an example system 200 for mitigating processing load involved in maintaining status of DMCs according to additional aspects of the subject disclosure. System 200 comprises a coupon management apparatus 202 that can be employed to manage DMCs utilized in mobile device-related commerce. Management can include assigning a DMC to a mobile device user account, or receiving and monitoring data pertinent to variable characteristics of the DMC (variable characteristics can include, *e.g.*, commercial benefits, transactions related to such benefits, products/services involved in such transactions, logistics related to completing the transactions, or the like). Furthermore, management can include establishing an initial state of such variable characteristics, monitoring changes in the pertinent data and updating current states of the variable characteristics, applying DMC benefits to commercial transactions, updating a user account (*e.g.*, DMC account, bank account, credit account, investment account, *etc.*) to reflect a DMC benefit, and so on.

[0064] Additionally, system 200 can comprise a control module 204 that evaluates processing load of the coupon management apparatus 202. Specifically, control module 204 can track processor, memory or other related resources relative to one or more resource consumption thresholds. Control module 204 can further determine if consumption of a resource exceeds or falls below a threshold resource consumption threshold. If control module 204 determines that resource consumption

exceeds a threshold, control module 204 can suspend consumption of the resource (*e.g.*, a processing resource). In some aspects of the subject disclosure, processing can be suspended by setting a dynamic/fixed flag associated with one or more DMCs to a fixed state, rendering the DMC non-variable. Accordingly, coupon management apparatus 202 can forego evaluating data pertinent to the fixed DMCs, and conserve or re-allocate resources otherwise allocated to the evaluation.

[0065] Furthermore, control module 204 can determine whether resource consumption falls below the resource consumption threshold, or a second resource consumption threshold associated with re-starting data and state evaluation for fixed DMCs. In such case, control module 204 can set a dynamic/fixed flag of one or more fixed DMCs to dynamic. Accordingly, coupon management apparatus 202 can re-initiate variable characteristic evaluation of the DMCs, and establish current DMC states based on current data, and vary such state based on changes in the data.

[0066] DMC states and DMC dynamic/fixed flags can be stored in a DMC account file 210, associated with a DMC user account, maintained by a database 208. Additionally, data pertinent to variable characteristics of the DMC can be stored in the DMC account file 210, and updated as changes to the data occur. Moreover, changes to the DMC state based on the changes to the data can also be saved in the DMC account file 210. Coupon management apparatus 202 can employ a communication interface 206 to convey DMC state information to a mobile device associated with the DMC user account. Alternatively, or in addition, coupon management apparatus 202 can convey DMC state information, as well as other pertinent information (*e.g.*, DMC transaction information, fixed/dynamic information, redemption information, DMC benefits, applicable transactions and products/services, a default state and associated default benefit(s) for the DMC while fixed, and so forth) to a point of sale device 216 *via* a router module 218 coupled with the point of sale device 216.

[0067] Data pertinent to determining a current state of a DMC can be uploaded to the coupon management apparatus 202 from a mobile device 212, 214, a point of sale device 216 wirelessly coupled with a mobile device 204 (*e.g.*, by a wireless transceiver 220), or other suitable communication node or network entity (*e.g.*, a computer associated with a retail store or other commercial entity). To this end, communication interface 206 can be configured to communicate wirelessly, or *via* wired data exchange.

Thus, communication interface 206 could comprise a wireless transceiver and antenna, a wired router, switch or hub, or a suitable combination thereof.

[0068] In at least some aspects of the subject disclosure, data exchange directly between mobile device 212 and mobile device 214 (*e.g.*, *via* peer-to-peer communication) can be used as a basis for determining variable characteristics of a DMC. As one example, peer-to-peer communication between the mobile devices 212, 214 can involve sharing a copy of the DMC from a user account associated with a first mobile device (212) to a user account associated with a second mobile device (214). The sharing can, according to particular aspects, be conditioned on a setting of a DMC sharing flag associated with the DMC (*e.g.*, establishing whether a copy of the DMC can be generated or shared with other user accounts, or establishing conditions for such sharing). In another example, data exchange between the mobile devices 212, 214 can involve a peer-to-peer transaction (*e.g.*, sale, lease, rent, *etc.*, of a product or service) between the devices 212, 214. In the latter example, details pertaining to the peer-to-peer transaction (*e.g.*, product ID, price, DMC benefits, payment method, *etc.*) can be uploaded to the coupon management apparatus 202 for approval. Based on a set of rules for conducting peer-to-peer transactions (*e.g.*, redemption rules for the DMC, product/service availability, suitable identification of the product/service, verification of payment, proof of transfer – which can include scanning an ID of a product first by a selling device 214 and second by a buying device 212 – or the like), coupon management apparatus 202 can approve or deny the peer-to-peer transaction. Accordingly, coupon management apparatus 202 can act as an arbiter for peer-to-peer as well as retail or commercial transactions.

[0069] **Fig. 3** illustrates a block diagram of an example system 300 for providing post-transaction or post-redemption aspects for mobile-related commerce, according to one aspect. The system 300 can comprise a coupon management apparatus 302 for managing DMCs and DMC state as described herein. Additionally, system 300 can comprise a post-transaction module 304 coupled with coupon management apparatus 302. The post-transaction module 304 can be employed to communicate with a third party server 320 (*e.g.*, banking server, *etc.*) and update an account (322) associated with a user of a client mobile device 308. Updating the account (322) can involve granting a post-redemption benefit based on activity occurring after redemption of a DMC.

[0070] Account (322) can comprise a DMC user account, a banking account (*e.g.*, savings, checking, certificate of deposit, and so on), a credit account, a debit account, an investment account, or the like, stored in a user account database 322 and associated with a user of client device 308. Updating the account is facilitated by the third party server 320 that manages the account (322). In some aspects, the account (322) can be updated with money or credit (*e.g.*, transferred from an account associated with coupon management apparatus 302, or a sponsor of a DMC – not depicted) based on the activity occurring after redemption of the DMC. According to other aspects, updating the account can comprise assigning an additional DMC(s) based on such activity. The additional DMC(s) can comprise a copy of the redeemed DMC, a variation of the redeemed DMC(s) (*e.g.*, having at least one different characteristic with respect to the redeemed DMC, such as a different benefit or product/service), or a disparate DMC or set of DMCs.

[0071] Whether and when to update the account (322), and in what manner to update the account (322), can be specified by a set of post-transaction rules employed by a tracking module 306 and stored in a data store 318. Based on such rules, tracking module 306 can identify suitable post-transaction activity pertinent to a DMC that confers a post-transaction benefit on a user of client device 308. The rules can contain a set of criteria identifying what condition(s) are required to be met to update the account (322) with a specific benefit (*e.g.*, money, credit, DMC) based on post-redemption activity. An example of a post-redemption condition can include completing or advancing a multiple-product transaction specified by a DMC. For instance, the DMC may be redeemed in conjunction with a transaction involving a first of the multiple specified products. When subsequent products are transacted, progressive benefits can be conferred to the user account (322). As another example, a final benefit can be conferred to the user account (322) upon completing transactions involving all of the multiple specified products.

[0072] As another example, the post-redemption activity can involve sharing a copy of the DMC 316, or other related DMCs, among other mobile device user accounts 314. In this case, user sharing can be a feature of DMC 316. Client device 308 can employ a peer-to-peer communication module 312 to wirelessly couple with a peer-to-peer partner 314. If the sharing feature is enabled, a copy of a DMC (316) can be generated and sent to peer-to-peer partner 314. A DMC user account associated with a

peer-to-peer partner 314 can acknowledge receipt of the shared DMC 316. The acknowledgement can be stored by a post-redemption module 310, and transmitted to coupon management apparatus 302 for tracking of qualified post-redemption activity conferring a post-redemption coupon benefit.

[0073] Optionally, exchange of the shared DMC 316 can be limited to authorized user accounts (*e.g.*, accounts associated with family members, social network members, co-workers, organization members, *etc.*). As a further option, updating the account (322) with a post-redemption benefit based on DMC sharing can be conditioned on redemption of the shared DMC 316 by a recipient user account (*e.g.*, peer-to-peer partner 314). In such case, evidence of the redemption (*e.g.*, a transaction ID, DMC ID, redemption acknowledgement provided by coupon management apparatus 302) can be conveyed to client device 308 and stored at post-redemption module 310. Alternatively, peer-to-peer partner 314 can upload an ID of the client device user account (308) to coupon management apparatus 302. Coupon management apparatus 302 can then employ post-transaction module 304 to credit the recipient account redemption to client device 308.

[0074] In yet another example of post-redemption conditions, a suitable condition conferring a post-redemption benefit can comprise playing an advertisement of a DMC sponsor on the client device 308. Alternatively, the condition can comprise playing an advertisement of a related third party promoted by the DMC sponsor. In another alternative, the condition can comprise sharing the advertisement with another mobile device 314, which plays the advertisement. In the latter case, an advertisement acknowledgement obtained by playing the advertisement can be conveyed by the recipient mobile device 314 to the client device 308. Post-redemption module 308 can upload the acknowledgement to coupon management apparatus 302 to obtain credit for the shared advertisement, as described above.

[0075] **Fig. 4** illustrates a block diagram of an example system 400 that provides enhanced shopping for mobile-related commerce according to particular aspects of the subject disclosure. System 400 can comprise a coupon management apparatus 402 for managing DMCs issued to one or more mobile device user accounts (*e.g.*, associated with a client device 406B). Coupon management apparatus 402 can be substantially similar to coupon management apparatus 102, described at **Fig. 1, supra**.

[0076] In addition to the foregoing, system 400 can comprise a client device 406A associated with a commercial entity (*e.g.*, a retail store, online store, investment bank, and so on) that submits information to the coupon management apparatus 402 *via* an input module 404. The information can include data pertinent to variable characteristic(s) of a DMC(s) assigned to a mobile client device 406B. Such pertinent data can include position location of the client device 406B, whether an advertisement of a DMC sponsor or related third party is viewed at the client device 406B, peer-to-peer sharing or shared redemption of DMCs, or the like, as described herein.

[0077] Further to the above, information provided by client device 406A can comprise mobile shopping-related information. In such case, client device 406A can comprise a point of sale device, or other processing device (computer) of a commercial entity (*e.g.*, retail store). Communication between the coupon apparatus 402 and commercial client device 406A can be *via* a wired network connection (*e.g.*, employing the Internet as a common network medium), or a wireless connection. Communication between the mobile client device 406B and coupon management apparatus 402 can be *via* wireless cellular communication, wireless fidelity (WiFi) communication, or other suitable wireless standard.

[0078] Information provided by a commercial entity client device 406A can comprise an ID of a DMC user account (406B) communicatively coupled with the client device 406A. Such communication can be initiated when the commercial client device 406A detects a suitable mobile device (406B) within wireless communication range. The client device 406A can request DMC user account information from the mobile device 406B. If received, the information is forwarded to coupon management apparatus 402 to initiate a DMC shopping session. Such session can exist while communication is maintained between the mobile client 406B, commercial client device 406A, and coupon management apparatus 402.

[0079] Coupon management apparatus 402 can be coupled with a reference module 408. Reference module 408 employs the DMC user account ID to look up active DMCs (optionally including redeemed DMCs providing post-redemption benefits) associated with the user account, and products/services specified by the active DMCs. A list of products associated with the commercial entity can be obtained from the client device 406A. Reference module 408 can then cross-reference products/services of the commercial entity with DMCs of the DMC user account.

Benefits provided by applicable DMCs of the user account can be applied to associated products by a discount module 410. For instance, a discount benefit obtained by redeeming a DMC when purchasing a specified product can be applied to a purchase price of the specified product.

[0080] Reference module 408 then generates a list of products/services of the commercial entity affected by DMCs associated with the user account. The list comprises data identifying modified transaction characteristics (*e.g.*, modified purchase price) resulting from application of DMC benefits to the products/services. The list is communicated to the commercial client device 406A, or directly to the mobile client 406B.

[0081] Further to the above, commercial client device 406A can obtain a product/service selection(s) from the mobile device 406B. The selection(s) can comprise an ID(s) of the selected product(s)/service(s), in conjunction with a 'buy' command, or 'place in virtual shopping cart' command, *etc.* The selected product/service ID(s) is forwarded to coupon management apparatus 402. The coupon apparatus 402 can generate a virtual invoice 414 for the selected product(s)/service(s), reflecting benefits provided by an applicable DMC associated with a selecting mobile device.

[0082] In some aspects of the subject disclosure, the virtual invoice 414 can also reflect benefits associated with additional commercial accounts of a user of the mobile client 406B. For instance, an integration module 512 can query the mobile client 406B for communication information (*e.g.*, server ID and routing information) and access information (*e.g.*, user login information) for a server 416 that manages a user account for the user. The server 416 and account can be a loyalty account of the commercial entity (*e.g.*, providing frequent-shopper benefits), a credit or debit account of a bank or lending facility (*e.g.*, providing frequent purchase rewards that can be applied to mobile-related transactions) or the like. Benefits associated with such account (*e.g.*, price discounts) can also be applied to selected items included in the virtual invoice 414. Once generated, the virtual invoice 414 can be conveyed to the commercial client device 406A to facilitate payment for the product(s)/service(s), and completion of the transaction (including DMC benefits and optionally third party account benefits). Alternatively, or in addition, the virtual invoice 414 can be conveyed directly to the

mobile client 406B *via* wireless communication, to facilitate completion of the transaction.

[0083] Mobile client device 406B can be associated with a DMC user account of a user of the mobile client 406B. Additionally, mobile client device 406B can submit an ID of the DMC user account directly to coupon management apparatus 402. Submission of the ID can be in response to an instruction from commercial client 406A (*e.g.*, a wireless shopping assistant). Optionally, mobile device 406 can further submit an ID and routing information of the commercial client 406A to the coupon management apparatus 402, to facilitate a connection between the coupon management apparatus 402 and both the mobile client 406B and commercial client 406A.

[0084] Upon obtaining the ID from the mobile device 406, coupon management apparatus 402 can initiate a virtual shopping session for the mobile device 406. Product/service selections made by mobile client 406B can be conveyed to coupon apparatus 402 for virtual invoicing (414). As described above, the invoicing can update transaction information involving the selected product/service with benefits provided by a DMC associated with the DMC user account ID. A virtual invoice 414 comprising updated transaction information is sent to the commercial client 406A or mobile client 406B to facilitate the transaction, as described above. Based on the virtual invoice 414, mobile client 406B and commercial client 406A can exchange payment for invoiced items to complete the transaction.

[0085] In conjunction with the virtual shopping session, the commercial client 406A can provide the mobile client 406B with a mapping application depicting a layout of a retail store associated with the commercial client 406A (*e.g.*, see **Fig. 5, *infra***). Location of selected items can be identified by commercial client 406A and provided to mobile client 406B for display on the mapping application. Additionally, mobile client 406B can display location of the mobile device on the mapping application, and depict convenient routes through the retail store layout to get to the selected items. To facilitate item selection, commercial client 406A can convey a list of products/services offered by an associated commercial store/entity, along with product/service descriptions and product/service IDs. As described above, the product/service descriptions can comprise benefits provided by applicable DMCs associated with a DMC user account of the mobile client 406B. In addition, the product/service

description can include mapping position data for locating respective products/services on the layout of the retail store, where suitable.

[0086] **Fig. 5** depicts a block diagram of an example mobile device 500 that can facilitate virtual shopping according to aspects of the subject disclosure. Mobile device 500 can comprise a user interface display 502, for outputting data or media to a user of the mobile device 500, or receiving input from the user. Input can also be facilitated by a set of human machine interface (HMI) features 506. HMI features 506 can include one or more buttons, knobs, controls, trackballs, or sliders facilitating data entry to mobile device 500, a touch-screen interface, a short range wireless receiver interface (*e.g.*, for infrared or other suitable short range wireless data transmission), or other suitable user interface input features (506), of a mobile device 500, or combinations thereof.

[0087] In at least one aspect of the subject disclosure, mobile device 500 can obtain and execute a mapping application provided by a commercial entity. The mapping application can be employed to generate a shopping area layout 504 of a retail store associated with the commercial entity, and display the shopping area layout 504 at the user interface display 502 of the mobile device 500. The shopping area layout 504 can be annotated with descriptive information pertaining to store layout. Annotations can describe types or characteristics (*e.g.*, type of product, such as food, beverage, cleaning, automotive, gardening, and so forth) of items in particular sections, aisles, *etc.*, of the retail store. According to some aspects of the subject disclosure, the annotations can be customized by a user of the mobile device 500, based on user input at the display screen 502 or user interface input features 506.

[0088] According to some aspects of the subject disclosure, the mapping application can display a position location 508 of the mobile device 500 with respect to the store layout 504 on the display. The position location 508 can be determined from a GPS module (not depicted) located at the mobile device 500, cellular network positioning determination conveyed to the mobile device 500, satellite positioning determination conveyed to the mobile device 500, positioning determination conveyed by a set of wireless transceivers installed at the retail store, or the like. The position location 508 of the mobile device 500 can be updated on the layout 504 as position 508 of the mobile device 508 changes within the retail store.

[0089] In addition to the foregoing, mobile device 500 can obtain a list of items offered by the retail entity, *e.g.*, via wireless communication with a communication device of such entity. The list of items can be displayed at the user interface display 502, optionally specifying coupon benefits that can be achieved by redeeming one or more DMCs associated with a user account of mobile device 500. A user can select one or more items in the list with the input features 506 or display 502. Position 510 within the retail store of selected items can be highlighted by the mapping application. Furthermore, a route between the mobile device location 508 and the selected item position 510 can be displayed on the layout 504 (dashed line between mobile location 508 and target 510) to facilitate user navigation of the retail store.

[0090] In at least some aspects of the subject disclosure, the mapping application can initiate a checkout module (not depicted) upon a checkout command input by a user of the mobile device 500. The checkout module can submit selected items to a wireless entity associated with the retail store for invoicing. Alternatively, or in addition, the checkout module can submit the selected items to a network coupon apparatus (*e.g.*, coupon management apparatus 102 of **Fig. 1**) for virtual invoicing. Additionally, the checkout module can request checkout information for one or more point of sale locations (*e.g.*, checkout register) of the retail store. Checkout registers having relatively few or no customers can be highlighted on the store layout 504, to facilitate efficient mobile-related shopping.

[0091] **Fig. 6** illustrates a block diagram of an example system 600 that provides security for electronic transactions involving DMCs according to one or more aspects of the subject disclosure. System 600 comprises a coupon management apparatus 602 that is configured to provide management services for mobile coupons, mobile coupon accounts, or mobile coupon-related transactions. The coupon management system 602 can be configured to provide security in electronic commerce. Furthermore, the management system 602 can be configured to securely access DMC user accounts, and user commercial accounts to redeem DMCs in conjunction with an electronic transaction, and secure payment for such transactions.

[0092] Coupon management system 602 comprises a security module 604 that facilitates secure electronic communication for the management apparatus 602. Security module 604 can comprise one or more of various mechanisms (606A, 606B, 606C, 606D) for secure communication. As an example, security module 604 can

comprise a digital certificate 606A with public or private keys 606B for digital certificate-based secure communications. As another example, the security module 604 can comprise a set of usernames and passwords for user DMC accounts, and employ an encryption algorithm 606D in conjunction with the usernames/passwords 606C to provide secure communications. Secure communications pertinent to DMC transactions can involve accessing DMC user accounts to obtain a state of active DMCs associated with a user's account. Additionally, such communications can involve interaction with a user's financial account (*e.g.*, savings account, checking account, credit account, debit account, investment account, and so on) to access payment for electronic transactions. Communications between the management apparatus 602 and commercial account database 620 can be secured as described above.

[0093] Further to the above, coupon management apparatus 602 can establish a secure communication link with a commercial client 608, employing a client security module 610, involved in electronic commerce. The client security module 610 can employ similar mechanisms as provided by security module 604 (*e.g.*, digital certificate and public/private keys, username and password combination, encryption algorithm, *etc.*). Accordingly, commercial client 608 can secure information passed to coupon management apparatus 602 pertaining to the commercial client (*e.g.*, including product/service lists, prices, issued DMCs pertinent to the product/service lists, or the like). Coupon management system 602 can furthermore send a secure invoice 612 for products and services, as described herein, employing the secure communication link.

[0094] According to other aspects of the subject disclosure, a mobile client 614 can employ a mobile security module 616. As described above, mobile security module 616 can employ digital certificates, password/username combinations, encryption algorithms, and so on. Based on such mechanisms, mobile client 614 can establish a secure wireless communication link with commercial client 608. Product/service selections, DMCs, application of a DMC to a product/service, or like activities involved in DMC-related mobile commerce can be secured *via* such a link. Additionally, mobile client can establish a secure link with coupon management apparatus 602, for instance utilizing a mobile network base station as a wireless interface, employing mobile security module 616 and security module 604. Accordingly, system 600 can provide reduced likelihood of spoofing attacks, or data interception from the mobile client 614,

commercial client 608, coupon management apparatus 602, or commercial account 620, or a suitable combination thereof.

[0095] Fig. 7 depicts a block diagram of an example system 700 comprising a mobile device 702 configured for wireless communication according to aspects of the subject disclosure. Mobile device 702 can be configured to wirelessly couple with one or more remote transceivers (*e.g.*, access point – not depicted) of a wireless network. For instance, mobile device 702 can receive wireless signals from a base station on a forward link channel and respond with wireless signals on a reverse link channel. Through the wireless network, mobile device 702 can exchange data with a coupon system 704 for managing DMCs, as described herein. In addition, mobile device 702 can comprise instructions stored in memory 714 for receiving a DMC assignment, tracking activity pertinent to the DMC or redemption of the DMC, communicating with a peer device, or implementing virtual shopping, as described herein.

[0096] Mobile device 702 includes at least one antenna 706 (*e.g.*, a wireless transmission/reception interface or group of such interfaces comprising an input/output interface) that receives a signal and receiver(s) 708, which performs typical actions (*e.g.*, filters, amplifies, down-converts, *etc.*) on the received signal. In general, antenna 706, and a transmitter 736 (collectively referred to as a transceiver) can be configured to facilitate wireless data exchange with remote transceiver(s) 704.

[0097] Antenna 706 and receiver(s) 708 can also be coupled with a demodulator 710 that can demodulate received symbols and provide such signals to a data processor 712 for evaluation. It should be appreciated that data processor 712 can control and/or reference one or more components (706, 708, 710, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732) of the mobile device 702. Further, data processor 712 can execute one or more modules, applications, engines, or the like (716, 718, 720, 722, 724, 726, 728, 730, 732) that comprise information or controls pertinent to executing functions of the mobile device 702. For instance, such functions can include tracking information pertinent to dynamic characteristics of DMC associated with mobile device 702. In addition, functions can include uploading the pertinent information to coupon system 704, obtaining a state of associated DMCs in response, displaying the state to a user of mobile device 702, assisting in redemption of the DMC in mobile-related commerce, or like operations, as described herein.

[0098] Additionally, the memory 714 of mobile device 702 is operatively coupled to data processor 712. Memory 714 can store data to be transmitted, received, and the like, and instructions suitable to conduct wireless communication with a remote device (704). Specifically, the instructions can be utilized to implement the various functions described above, or elsewhere herein. Further, memory 714 can store the modules, applications, engines, *etc.* (716, 718, 720, 722, 724, 726, 728, 730, 732) executed by data processor 712, above.

[0099] Further to the above, mobile device 702 can comprise an assignment module 716 that associates a DMC with a user of mobile device 702 based on assignment of the DMC to a particular DMC user account by coupon system 704. Additionally, a tracking module 718 can monitor data pertinent to variable characteristics of such DMC. The pertinent data can include a time of day, day of the week, previous mobile-related transactions conducted by mobile device 702, position location of mobile device 702, special offers conveyed by a remote transceiver (704) to mobile device 702 (*e.g.*, a transmitter of a retail store might broadcast double coupon points for a limited time, or like special offer), and so on. A communication module 720 can submit the pertinent data to coupon system 704, and obtain a response to the submission that affects a state of the DMC user account, or a status of the DMC. For instance, the response can specify a current status of the DMC (*e.g.*, including current state of dynamic benefits provided by the DMC). As another example, the response can enable or disable sharing of DMCs among other mobile device user accounts, establish the DMC as fixed/dynamic, engage post-redemption activity tracking for one or more DMCs, trigger virtual shopping, and so forth, as described herein.

[00100] Further to the above, mobile device 702 can comprise a termination module 722 that can terminate monitoring of data by tracking module 718. Such termination can be based on the response received from coupon system 704, described above (*e.g.*, if a DMC is set to fixed). Termination module 722 can enforce a default state (*e.g.*, a predetermined state, previously determined state, most-recently determined state, *etc.*) on the fixed DMC, including default benefits, default transaction conditions, default product/service applicable for the transaction, or the like. In addition to the foregoing, the termination module can re-initiate monitoring of the data by tracking module 718 based on the response (*e.g.*, if the response changes the fixed setting to dynamic).

[00101] According to some aspects of the subject disclosure, mobile device 702 can comprise a post-redemption module 724 that monitors activity pertinent to a DMC user account associated with mobile device 702 after redemption of a DMC. Such activity monitoring can be based on the response received by the communication module 520 from coupon system 704 (*e.g.*, where the response activates a post-redemption flag of the DMC). The post-redemption module 724 can track activity specified in the response, or default activity stored in memory 714. Tracked activities can be uploaded to coupon system 704 for application of post-redemption benefits as described herein.

[00102] In some aspects of the subject disclosure, post-redemption activities can be based on DMC sharing between mobile device 702 and another mobile device (not depicted). Such sharing can be facilitated with a peer-to-peer communication module 726, which enables direct wireless communication between peer mobile devices. The communication can involve transmitting or receiving a copy of a DMC to/from a peer device, or transmitting/receiving a redemption acknowledgement pertaining to a shared DMC. The exchanged information can be tracked by post-redemption module 724, where suitable, in conjunction with applying DMC benefits to a user account (not depicted).

[00103] According to one or more other aspects of the subject disclosure, mobile device 702 can comprise a virtual shopping module 728. Virtual shopping module 728 can communicatively couple with a commercial entity (not depicted, but see 406A for **Fig. 4**) to facilitate mobile-related transactions with the commercial entity. As one example, the virtual shopping module 728 can provide payment information (*e.g.*, bank account, credit account, debit account, money wire, *etc.*) to the commercial entity for payment of goods or services provided by the commercial entity. The virtual shopping module 728 can also convey a DMC account ID to the commercial entity, along with DMC IDs pertinent to the goods or services. Payment can be updated, where suitable, based on benefits provided by the pertinent DMCs.

[00104] Additionally, virtual shopping module 728 can query the commercial entity for a list of products/services available for mobile-related commerce. The list can be displayed on a user interface display of the mobile device 702. Additionally, the virtual shopping module 728 can submit an ID of a DMC user account or DMC and obtain a list of products/services affected by the DMC or DMCs of the user account.

Affected products/services can be highlighted at the user interface display, along with benefits applicable to those associated products/services in conjunction with redeeming one or more DMCs. In at least some aspects of the subject disclosure, the virtual shopping module 728 can submit suitable information to coupon system 704 identifying other accounts associated with a user of mobile device 702. Such accounts can include loyalty accounts of the commercial entity, frequent-shopper accounts, a frequent DMC user account, and so forth. Benefits provided by those accounts to one or more products/services of the received list can be obtained in response to the submission and highlighted at the user interface display.

[00105] In at least one aspect of the subject disclosure, virtual shopping module 728 can comprise a mapping module 730. The mapping module can obtain a digital map of a retail store associated with a commercial entity (*e.g.*, see **Fig. 5, supra**) and display the digital map on the user interface display. The map can be populated with locations of products or services selected by the user of mobile device 702. Additionally, a location module 732 can determine a position location of the mobile device 702, and update the digital map with the position location. The mapping module 730 can generate navigation routes within the retail store between the position location and product/services locations, updating the position location as the mobile device 702 moves throughout the store. Thus, mobile device 702 can provide a fully integrated virtual shopping experience, integrating benefits provided by DMCs associated with the mobile device 702, as well as other user benefit accounts associated with users of the mobile device 702.

[00106] The aforementioned systems have been described with respect to interaction between several components, modules, and/or communication interfaces. It should be appreciated that such systems and components/modules/interfaces can include those components or sub-components specified therein, some of the specified components or sub-components, and/or additional components. For example, a system could include mobile device 500, point of sale device 216 and wireless router 220, coupon management apparatus 402, and third party server 320 coupled with user account database 322, or a different combination of these or other components. Sub-components could also be implemented as components communicatively coupled to other components rather than included within parent components. Additionally, it should be noted that one or more components could be combined into a single

component providing aggregate functionality. For instance, post-transaction module 304 can include tracking module 306, or *vice versa*, to facilitate identifying and tracking post-redemption activity pertaining to a DMC, and updating a user account based on such activity, by way of a single component. The components can also interact with one or more other components not specifically described herein but known by those of skill in the art.

[00107] Furthermore, as will be appreciated, various portions of the disclosed systems above and methods below may include or consist of artificial intelligence or knowledge or rule based components, sub-components, processes, means, methodologies, or mechanisms (*e.g.*, support vector machines, neural networks, expert systems, Bayesian belief networks, fuzzy logic, data fusion engines, classifiers...). Such components, *inter alia*, and in addition to that already described herein, can automate certain mechanisms or processes performed thereby to make portions of the systems and methods more adaptive as well as efficient and intelligent.

[00108] In view of the exemplary systems described *supra*, methodologies that may be implemented in accordance with the disclosed subject matter will be better appreciated with reference to the flow charts of FIGs. 8-11B. While for purposes of simplicity of explanation, the methodologies are shown and described as a series of blocks, it is to be understood and appreciated that the claimed subject matter is not limited by the order of the blocks, as some blocks may occur in different orders and/or concurrently with other blocks from what is depicted and described herein. Moreover, not all illustrated blocks may be required to implement the methodologies described hereinafter. Additionally, it should be further appreciated that the methodologies disclosed hereinafter and throughout this specification are capable of being stored on an article of manufacture to facilitate transporting and transferring such methodologies to computers. The term article of manufacture, as used, is intended to encompass a computer program accessible from any computer-readable device, device in conjunction with a carrier, or storage medium.

[00109] **Fig. 8** depicts a flowchart of an example methodology 800 for providing network management of DMCs in mobile commerce according to aspects of the subject disclosure. At 802, method 800 can employ a data processor to assign a DMC to a target mobile device. Selection of the target mobile device can be based on suitable criteria analyzed by the data processor. Examples of such criteria can include location

of the mobile device, time of day, day of the week, proximity of the mobile device to a DMC distribution entity, proximity of the mobile device to a DMC redemption entity or retail entity, previous DMC user account activity, previous mobile-commerce activity, previous peer to peer DMC sharing activity, or the like, or a suitable combination thereof.

[00110] At 804, method 800 can establish an initial state of a variable characteristic of the assigned DMC. The variable characteristic can comprise a variable benefit provided by the DMC, transactions applicable to the DMC, product/service involved in such transaction, logistics pertaining to redemption of the DMC (*e.g.*, time of redemption, place of redemption), and so forth. At 806, method 800 can obtain data pertinent to the variable characteristic of the DMC. Such data can be employed in determining a current state of the variable characteristic, based on changes in the data and rules for characterizing the current state. At 808, method 800 can employ the data in managing a state of a DMC account associated with the device, or a status of the DMC. The status of the DMC can comprise a dynamic/fixed status, as described herein, for instance. Alternatively the status of the DMC can comprise a sharable/non-sharable status, post-redemption/non post-redemptions status, or the like. Status of the DMC account can comprise initiation of a virtual shopping session, integrating third party commercial benefit accounts with the DMC account, or activation/deactivation of DMC sharing with the DMC account, identification of authorized sharing partners associated with the DMC account, or the like.

[00111] **Fig. 9** illustrates a flowchart of an example methodology for providing network-based management of DMCs in mobile-related commerce according to aspects of the subject disclosure. At 902, method 900 can initialize a DMC for a target mobile device. At 904, method 900 can manage data pertaining to variability of the DMC. At 906, a determination can be made as to selection of a management function in conjunction with the mobile-related commerce. If loading management is selected, method 900 can proceed to 908. If post-transaction accounting is selected, method 900 can proceed to 930. Otherwise, if virtual shopping is selected, method 900 can proceed to 914.

[00112] At 908, method 900 can monitor processor load based on management of data pertaining to DMC variability conducted at reference number 904. At 910, method 900 can suspend or engage the monitoring based on comparison of the processor load

with one or more load thresholds. At 912, method 900 can optionally provide a mobile device user account with a default state for suspended DMCs. The default state can comprise default benefit settings, default transactions, default products/services applicable to redemption of a DMC, default logistics pertaining to the transactions/redemption, or the like. Method 900 can end after reference number 912, or can optionally return to decision 906 for further management selection.

[00113] At 914, method 900 can obtain a notification of a DMC user account in conjunction with a virtual shopping command. At 916, method 900 can initialize an account invoice for the DMC user account in response to the virtual shopping command. At 918, method 900 can obtain and access DMC records for the DMC user account. The DMC records can identify DMCs associated with the DMC user account, whether the DMCs are active, what products/services the DMCs provide benefits for, and so on. At 920, method 900 can obtain an item selection. At 922, method 900 can reference the DMC records to identify a DMC(s) applicable to the selected item. At 924, method 900 can optionally reference non-DMC accounts (*e.g.*, loyalty account, frequent-shopper account, frequent-purchaser/flyer/guest account, *etc.*) associated with a user of the DMC user account, to determine applicability to the selected item. At 926, method 900 can prepare and send a virtual invoice for the item, reflecting benefits provided by applicable DMCs, and optionally benefits provided by applicable non-DMC accounts. The virtual invoice can then be forwarded to a mobile device associated with the DMC user account, or a point of sale device coupled with the mobile device. At 928, method 900 can optionally submit mapping updates to the mobile device for the selected item, to facilitate virtual mapping as described herein. From 928, method 900 can end, or optionally can return to reference number 906 for selection of another DMC management function.

[00114] At 930, method 900 can facilitate redemption of a DMC in conjunction with a transaction (*e.g.*, as described by reference numbers 914 through 928). At 932, method 900 can obtain data pertaining to post-redemption activity pertinent to the redeemed DMC. At 934, method 900 can reference a set of rules for post-redemption activity. At 936, method 900 can identify an action or result to be implemented from the post-redemption activity rules, based on the post-redemption activity data. At 938, method 900 can update a DMC user account with a post-redemption benefit specified by the rules. At 940, method 900 can update related accounts (*e.g.*, DMC account, banking

account, credit account, *etc.*) as suitable, for instance to provide a rebate, assign an additional DMC, provide a cash-back reward, and so on. From 940, method 900 can end, or optionally can return to reference number 906 for selection of another DMC management function.

[00115] **Fig. 10** illustrates a flowchart of an example methodology for facilitating network-based DMC management according to additional aspects of the subject disclosure. At 1002, method 1000 can employ a data processor to obtain a DMC assignment for a DMC user account. At 1004, method 1000 can employ the data processor to obtain a rule for calculating DMC variability. At 1006, method 1000 can employ the data processor to monitor data pertinent to the DMC variability, as described herein. At 1008, method 1000 can employ a wireless communication interface to submit the data to a network entity that manages variability of the DMC. At 1010, method 1000 can obtain a response to the submission affecting the DMC user account or the DMC. Specifically, the response can set a status of the DMC or the DMC user account, as related to mobile commerce.

[00116] **Figs. 11A and 11B** illustrate a flowchart of an example methodology 1100 for facilitating network-managed mobile-commerce according to aspects of the subject disclosure. At 1102, method 1100 can obtain a DMC assigned to a DMC user account. At 1104, method 1100 can manage data pertinent to state variability of the DMC. At 1106, method 1100 can receive a network command pertinent to the state variability, and pause or re-initiate the state variability management based on the network command. At 1108, method 1100 can associate a default state with the DMC if the network command involves pausing state variability management.

[00117] At 1110, method 1100 can obtain and identify a retail entity by wireless signals broadcast by a transmitter employed by the retail entity. At 1112, method 1100 can submit an ID of the DMC user account to the retail entity. Submitting the ID can be accomplished by transmitting suitable wireless signals to a receiver of the retail entity. At 1114, method 1100 can obtain mapping application data for a retail store of the retail entity, and initiate a mapping application that displays a layout of the retail store. At 1116, method 1100 can obtain an item list from the retail entity, and a user selection of at least one item from the list. At 1118, method 1100 can submit the selected item for virtual invoicing and obtain an invoice in response. Specifically, the invoice can include transaction information (*e.g.*, purchase price) associated with the selected item.

Additionally, the transaction information can reflect applicable benefits provided by DMCs related to the selected item, or other benefit accounts associated with a user of the DMC user account, and pertinent to the selected item.

[00118] At 1120, method 1100 can obtain virtual position location of the selected item with respect to the retail entity mapping layout, and populate the mapping application display with item location. Additionally, a location of user of the DMC user account can be populated to the application display. At 1122, method 1100 can calculate an efficient route through the store layout between the user location and item position location.

[00119] Turning to **Fig. 11B**, at 1124, method 1100 update the mapping application with the route calculated at reference number 1122. At 1126, a determination can be made as to whether the selected item is placed in a shopping cart by a user of the DMC user account. The shopping cart can be a physical shopping cart within the retail store, or can be a virtual shopping cart managed by a mobile device shopping application. Verification that the item is physically placed in the shopping cart can be obtained from receiving an ID of the selected item from a mobile device (*e.g.*, where the mobile device scans in the ID, or a user manually types in the ID). Verification that the item is placed in the virtual shopping cart can be obtained from the mapping application. An assumption can be made that a user takes possession of the item if the virtual shopping cart verification is obtained.

[00120] If it is determined at reference number 1126 that the selected item is not placed in the shopping cart (*e.g.*, failure to receive shopping cart verification, or receiving a cancellation of the selected item), method 1100 can proceed to 1128 where the item is cancelled from the mapping application display. Furthermore, at 1130, the item can be deleted from the virtual invoice. From 1130, method 1100 can return to reference number 1116 of **Fig. 11A**.

[00121] If at reference number 1126, method 1100 determines that an item is placed in a physical or virtual shopping cart, method 1100 proceeds to 1132 where the virtual invoice can be updated to reflect the addition of the selected item to the shopping cart. At 1134, method 1100 can reconcile the updated virtual invoice with a point of sale device of the commercial entity. Specifically, shopping cart items can be conveyed to the point of sale device (*e.g.*, *via* wireless communication between a mobile device maintaining the virtual invoice, or by displaying the items on a screen of the mobile

device for optical scanning, or manual entry by a point of sale device or store employee) to facilitate the reconciliation. At 1136, method 1100 can facilitate redemption of one or more DMCs applicable to the selected item in conjunction with a transaction involving the selected item.

[00122] At 1138, method 1100 can identify whether any post-transaction activity or benefits are pertinent to the DMC or transaction. At 1140, method 1100 can monitor specified post-transaction activity. At 1142, method 1100 can submit a record of the post-transaction activity to a network entity managing the DMC. At 1144, method 1100 can obtain a response to the submission. In some aspects, the response can comprise a notice that post-redemption benefits are applied to a user account based on the post-transaction activity. At 1146, the notice or updated user account information can be displayed to a user.

[00123] **Figs. 12 and 13** depict block diagrams of example systems 1200, 1300 for implementing and facilitating, respectively, management of DMCs in mobile-related commerce, according to one or more aspects of the subject disclosure. For example, systems 1200 and 1300 can reside at least partially within a wireless communication network and/or within a transmitter such as a node, base station, access point, user terminal, personal computer coupled with a mobile interface card, or the like. It is to be appreciated that systems 1200 and 1300 are represented as including functional blocks, which can be functional blocks that represent functions implemented by a processor, software, or combination thereof (*e.g.*, firmware).

[00124] System 1200 can comprise a module 1202 for processing a DMC. Processing can involve assigning a DMC to a user account associated with system 1200. Furthermore, system 1200 can comprise a module 1204 for processing data pertaining to variable characteristics of the DMC. The module 1204 can output a status of the DMC based on the processed data. The status can comprise a current state of benefits provided by the DMC, transactions applicable to the DMC, post-redemption status of the DMC, and so on. The module 1204 can identify data affecting the status from a set of variability rules maintained by module 1204. Furthermore, module 1204 can reference a fixed/dynamic flag associated with the DMC, and condition processing the pertinent data on a status of the fixed/dynamic flag, as described herein. The pertinent data can be received from a remote transceiver device (*e.g.*, point of sale device, mobile device) by a module 1206 for obtaining and processing wireless data. The module 1206

can comprise a wireless transceiver, receiver and transmitter, as well as suitable processing components for processing received wireless signals. Additionally, system 1200 can comprise a module 1208 for managing a state of a DMC user account, or status of a DMC based on the pertinent data, as described herein.

[00125] System 1300 can comprise a module 1302 for processing a DMC assignment. Processing can involve identifying a DMC user account assigned to the DMC, and identifying a user of system 1300 associated with the DMC user account. Additionally, the module 1302 can display the DMC or an indication thereof to identified user of system 1300, upon such user logging in to the system 1300, for instance. Furthermore, system 1300 can comprise a module 1304 for processing data pertaining to variable characteristics of the DMC. The module 1304 can identify pertinent data from a set of variability rules maintained by the module 1304. Furthermore, the module 1304 can reference a fixed/dynamic flag associated with the DMC, and condition processing the pertinent data on a status of the fixed/dynamic flag, as described herein. Processed data can be transmitted by the module 1304 to a network based DMC management apparatus, for determining a state of the DMC based on the processed data. Further to the above, system 1300 can comprise a module 1306 for obtaining data wirelessly. The module 1306 can receive a response to the transmission of processed data, specifying a state of the DMC user account, or a status of the DMC, as specified herein. The state or status can be output to a user of system 1300, optionally upon request of the user.

[00126] **Fig. 14** depicts a block diagram of an example system 1400 that can facilitate wireless communication according to some aspects disclosed herein. On a downlink, at access point 1405, a transmit (TX) data processor 1410 receives, formats, codes, interleaves, and modulates (or symbol maps) traffic data and provides modulation symbols (“data symbols”). A symbol modulator 1415 receives and processes the data symbols and pilot symbols and provides a stream of symbols. A symbol modulator 1420 multiplexes data and pilot symbols and provides them to a transmitter unit (TMTR) 1420. Each transmit symbol can be a data symbol, a pilot symbol, or a signal value of zero. The pilot symbols can be sent continuously in each symbol period. The pilot symbols can be frequency division multiplexed (FDM), orthogonal frequency division multiplexed (OFDM), time division multiplexed (TDM),

code division multiplexed (CDM), or a suitable combination thereof or of like modulation and/or transmission techniques.

[00127] TMTR 1420 receives and converts the stream of symbols into one or more analog signals and further conditions (*e.g.*, amplifies, filters, and frequency upconverts) the analog signals to generate a downlink signal suitable for transmission over the wireless channel. The downlink signal is then transmitted through an antenna 1425 to the terminals. At terminal 1430, an antenna 1435 receives the downlink signal and provides a received signal to a receiver unit (RCVR) 1440. Receiver unit 1440 conditions (*e.g.*, filters, amplifies, and frequency downconverts) the received signal and digitizes the conditioned signal to obtain samples. A symbol demodulator 1445 demodulates and provides received pilot symbols to a processor 1450 for channel estimation. Symbol demodulator 1445 further receives a frequency response estimate for the downlink from processor 1450, performs data demodulation on the received data symbols to obtain data symbol estimates (which are estimates of the transmitted data symbols), and provides the data symbol estimates to an RX data processor 1455, which demodulates (*i.e.*, symbol demaps), deinterleaves, and decodes the data symbol estimates to recover the transmitted traffic data. The processing by symbol demodulator 1445 and RX data processor 1455 is complementary to the processing by symbol modulator 1415 and TX data processor 1410, respectively, at access point 1405.

[00128] On the uplink, a TX data processor 1460 processes traffic data and provides data symbols. A symbol modulator 1465 receives and multiplexes the data symbols with pilot symbols, performs modulation, and provides a stream of symbols. A transmitter unit 1470 then receives and processes the stream of symbols to generate an uplink signal, which is transmitted by the antenna 1435 to the access point 1405. Specifically, the uplink signal can be in accordance with SC-FDMA requirements and can include frequency hopping mechanisms as described herein.

[00129] At access point 1405, the uplink signal from terminal 1430 is received by the antenna 1425 and processed by a receiver unit 1475 to obtain samples. A symbol demodulator 1480 then processes the samples and provides received pilot symbols and data symbol estimates for the uplink. An RX data processor 1485 processes the data symbol estimates to recover the traffic data transmitted by terminal 1430. A processor 1490 performs channel estimation for each active terminal transmitting on the uplink.

Multiple terminals can transmit pilot concurrently on the uplink on their respective assigned sets of pilot subbands, where the pilot subband sets can be interlaced.

[00130] Processors 1490 and 1450 direct (*e.g.*, control, coordinate, manage, *etc.*) operation at access point 1405 and terminal 1430, respectively. Respective processors 1490 and 1450 can be associated with memory units (not shown) that store program codes and data. Processors 1490 and 1450 can also perform computations to derive frequency and impulse response estimates for the uplink and downlink, respectively.

[00131] For a multiple-access system (*e.g.*, SC-FDMA, FDMA, OFDMA, CDMA, TDMA, *etc.*), multiple terminals can transmit concurrently on the uplink. For such a system, the pilot subbands can be shared among different terminals. The channel estimation techniques can be used in cases where the pilot subbands for each terminal span the entire operating band (possibly except for the band edges). Such a pilot subband structure would be desirable to obtain frequency diversity for each terminal. The techniques described herein can be implemented by various means. For example, these techniques can be implemented in hardware, software, or a combination thereof. For a hardware implementation, which can be digital, analog, or both digital and analog, the processing units used for channel estimation can be implemented within one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, micro-controllers, microprocessors, other electronic units designed to perform the functions described herein, or a combination thereof. With software, implementation can be through modules (*e.g.*, procedures, functions, and so on) that perform the functions described herein. The software codes can be stored in memory unit and executed by the processors 1490 and 1450.

[00132] As used in the subject disclosure, the terms “component,” “system,” “module” and the like are intended to refer to a computer-related entity, either hardware, software, software in execution, firmware, middle ware, microcode, and/or any combination thereof. For example, a module can be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, a device, and/or a computer. One or more modules can reside within a process, or thread of execution; and a module can be localized on one electronic device, or distributed between two or more electronic devices. Further, these

modules can execute from various computer-readable media having various data structures stored thereon. The modules can communicate by way of local or remote processes such as in accordance with a signal having one or more data packets (*e.g.*, data from one component interacting with another component in a local system, distributed system, or across a network such as the Internet with other systems by way of the signal). Additionally, components or modules of systems described herein can be rearranged, or complemented by additional components/modules/systems in order to facilitate achieving the various aspects, goals, advantages, *etc.*, described with regard thereto, and are not limited to the precise configurations set forth in a given figure, as will be appreciated by one skilled in the art.

[00133] Furthermore, various aspects are described herein in connection with a UT. A UT can also be called a system, a subscriber unit, a subscriber station, mobile station, mobile, mobile communication device, mobile device, remote station, remote terminal, access terminal (AT), user agent (UA), a user device, or user equipment (UE). A subscriber station can be a cellular telephone, a cordless telephone, a Session Initiation Protocol (SIP) phone, a wireless local loop (WLL) station, a personal digital assistant (PDA), a handheld device having wireless connection capability, or other processing device connected to a wireless modem or similar mechanism facilitating wireless communication with a processing device.

[00134] In one or more exemplary aspects, the functions described can be implemented in hardware, software, firmware, middleware, microcode, or any suitable combination thereof. If implemented in software, the functions can be stored on or transmitted over as one or more instructions or code on a computer-readable medium. Computer-readable media includes both computer storage media and communication media including any medium that facilitates transfer of a computer program from one place to another. A storage media may be any physical media that can be accessed by a computer. By way of example, and not limitation, such computer storage media can comprise RAM, ROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, smart cards, and flash memory devices (*e.g.*, card, stick, key drive...), or any other medium that can be used to carry or store desired program code in the form of instructions or data structures and that can be accessed by a computer. For example, if the software is transmitted from a website, server, or other remote source using a coaxial cable, fiber optic cable, twisted pair,

digital subscriber line (DSL), or wireless technologies such as infrared, radio, and microwave, then the coaxial cable, fiber optic cable, twisted pair, DSL, or wireless technologies such as infrared, radio, and microwave are included in the definition of medium. Disk and disc, as used herein, includes compact disc (CD), laser disc, optical disc, digital versatile disc (DVD), floppy disk, and blu-ray disc where disks usually reproduce data magnetically, while discs reproduce data optically with lasers. Combinations of the above should also be included within the scope of computer-readable media.

[00135] For a hardware implementation, the processing units' various illustrative logics, logical blocks, modules, and circuits described in connection with the aspects disclosed herein can be implemented or performed within one or more ASICs, DSPs, DSPDs, PLDs, FPGAs, discrete gate or transistor logic, discrete hardware components, general purpose processors, controllers, micro-controllers, microprocessors, other electronic units designed to perform the functions described herein, or a combination thereof. A general-purpose processor can be a microprocessor, but, in the alternative, the processor can be any conventional processor, controller, microcontroller, or state machine. A processor can also be implemented as a combination of computing devices, *e.g.*, a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other suitable configuration. Additionally, at least one processor can comprise one or more modules operable to perform one or more of the steps and/or actions described herein.

[00136] Moreover, various aspects or features described herein can be implemented as a method, apparatus, or article of manufacture using standard programming and/or engineering techniques. Further, the steps and/or actions of a method or algorithm described in connection with the aspects disclosed herein can be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. Additionally, in some aspects, the steps or actions of a method or algorithm can reside as at least one or any combination or set of codes or instructions on a machine-readable medium, or computer-readable medium, which can be incorporated into a computer program product. The term "article of manufacture" as used herein is intended to encompass a computer program accessible from any suitable computer-readable device or media.

[00137] Additionally, the word “exemplary” is used herein to mean serving as an example, instance, or illustration. Any aspect or design described herein as “exemplary” is not necessarily to be construed as preferred or advantageous over other aspects or designs. Rather, use of the word exemplary is intended to present concepts in a concrete fashion. As used in this application, the term “or” is intended to mean an inclusive “or” rather than an exclusive “or.” That is, unless specified otherwise, or clear from context, “X employs A or B” is intended to mean any of the natural inclusive permutations. That is, if X employs A; X employs B; or X employs both A and B, then “X employs A or B” is satisfied under any of the foregoing instances. In addition, the articles “a” and “an” as used in this application and the appended claims should generally be construed to mean “one or more” unless specified otherwise or clear from context to be directed to a singular form.

[00138] Furthermore, as used herein, the terms to “infer” or “inference” refer generally to the process of reasoning about or inferring states of the system, environment, or user from a set of observations as captured *via* events, or data. Inference can be employed to identify a specific context or action, or can generate a probability distribution over states, for example. The inference can be probabilistic—that is, the computation of a probability distribution over states of interest based on a consideration of data and events. Inference can also refer to techniques employed for composing higher-level events from a set of events, or data. Such inference results in the construction of new events or actions from a set of observed events and/or stored event data, whether or not the events are correlated in close temporal proximity, and whether the events and data come from one or several event and data sources.

[00139] What has been described above includes examples of aspects of the claimed subject matter. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the claimed subject matter, but one of ordinary skill in the art may recognize that many further combinations and permutations of the disclosed subject matter are possible. Accordingly, the disclosed subject matter is intended to embrace all such alterations, modifications, and variations that fall within the spirit and scope of the appended claims. Furthermore, to the extent that the terms “includes,” “has” or “having” are used in either the detailed description or the claims, such terms are intended to be inclusive in

a manner similar to the term “comprising” as “comprising” is interpreted when employed as a transitional word in a claim.

We Claim

1. A method to process TDM symbols carrying information about signaling parameters used for generating the waveform in a wireless broadcast network.
2. The method of claim 1 where the wireless broadcast network is Forward Link Only (FLO) network.
3. The method of claim 1 where the signaling parameters are specific to an OFDM system such as FFT size, cyclic prefix length and pilot stagger pattern.
4. The method of claim 1 where the TDM symbols refer to the symbols comprising the Signaling Parameter Channel (SPC) in a Forward Link Only (FLO) network.
5. The method of claim 1 where processing the TDM symbols involves deriving signal parameter information from Signaling Parameter Channel (SPC) symbols transmitted in a Forward Link only (FLO) network by deriving a time domain channel estimate by assuming each of the combinations for the signal parameter field in the scrambler seed and picking the signal parameter combination that yields the most energy in the time domain above a threshold value.
6. The process of claim 5, wherein the time domain channel estimate is obtained by:
 - a. collecting one or more periods of the SPC samples in the domain;
 - b. performing an FFT on the collected time domain samples in a) to obtain the corresponding frequency domain pilot samples;
 - c. selecting one of several possibilities for the signal parameter information in the scrambler seed and descrambling the frequency domain pilot samples obtained in b) ;
 - d. performing extrapolation in the frequency domain to extend the pilot observations so that the total number of observations is a power of 512;
 - e. performing a 512 point IFFT operation on the extrapolated frequency domain samples obtained in d) to get a time domain channel estimate corresponding to the selected scrambler seed;
 - f. selecting an energy threshold and computing the sum of the energy of all the time domain channel taps that exceed the threshold;
 - g. repeating steps c) through f) with all possible combinations of the signal parameter field in the scrambler seed; and

CLAIMS

WHAT IS CLAIMED IS:

1. A method, comprising:
employing a data processor to execute instructions for managing a dynamic mobile coupon (DMC), the instructions causing the processor to:
assign the DMC to a target mobile device; and
establish an initial state of a variable characteristic of the DMC based on a factor pertinent to the target mobile device or a user account related to such device;
employing a communication interface to obtain data pertinent to the DMC; and
employing the data processor to manage a state of a DMC account associated with the target mobile device based on the data pertinent to the DMC.
2. The method of claim 1, wherein managing the state of the DMC account further comprises evaluating a subsequent state of the variable characteristic based on changes to the factor.
3. The method of claim 2, further comprising evaluating processing load on the data processor resulting from evaluating the subsequent state.
4. The method of claim 1, further comprising at least one of:
suspend variability of the characteristic if the data processor exceeds a processing load threshold associated with processing DMC characteristics; or
restore variability of a suspended DMC characteristic if the data processor falls below the processing load threshold.
5. The method of claim 1, wherein managing the state of the DMC account further comprises updating a user account after redemption of the DMC.
6. The method of claim 5, further comprising tracking post-redemption activity pertinent to the DMC.

7. The method of claim 6, further comprising modifying a value of the user account based on the post-redemption activity.

8. The method of claim 5, wherein updating the user account further comprises:

tracking user-to-user sharing of DMCs involving the user account;
identifying redemption of a shared DMC for a disparate user account;
establish a value to the user account based on redemption of the shared DMC;

and

updating the user account by the established value.

9. The method of claim 5, wherein managing the state of the user account further comprises:

identifying multiple products associated with the DMC;

obtaining data pertinent to redemption of the DMC with respect to a first of the multiple products;

obtaining data pertinent to a transaction involving a second of the multiple products;

establishing a value for a transaction involving the second product subsequent redemption of the DMC for the first product; and

updating the user account by the established value.

10. The method of claim 1, wherein managing the state of the DMC account further comprises automatically generating a virtual invoice for the user account based on data submitted by the target mobile device.

11. The method of claim 10, further comprising extracting from the submitted data a DMC identifier (ID) and an ID of a product or service associated with the DMC.

12. The method of claim 10, further comprising:

modifying price of a product or service based on a characteristic of the DMC;
and
submitting the modified price of the product or service to the target mobile device.

13. The method of claim 10, further comprising receiving an ID of a retail entity from a network server and cross-referencing products of the retail entity with DMCs associated with the target mobile device.

14. The method of claim 13, further comprising modifying a transaction characteristic of a product or service based on a current state of at least one of the DMCs to generate the virtual invoice, and submitting the virtual invoice to the target mobile device.

15. The method of claim 13, further comprising:
referencing a customer loyalty database associated with the retail entity and
modifying a transaction characteristic of a product or service based on a state of a user loyalty account associated with the target mobile device; and
including the modified transaction characteristic in the virtual invoice.

16. The method of claim 1, wherein the DMC is bundled with a set of related or similar DMCs, and the DMC is assigned to the target mobile device as a part of the set.

17. The method of claim 1, further comprising employing the data processor to execute a network browser application that provides a mobile device with a network interface to access a DMC user account, view media associated with the assigned DMC, share DMCs with other mobile device users, redeem the DMC in conjunction with a transaction, or a combination thereof.

18. An apparatus for managing mobile coupons, comprising:
a data processor that executes a set of modules configured for managing a DMC, the set of modules comprising:

an allocation module that assigns the DMC to a mobile device user account;

an evaluation module that establishes an initial state of the DMC based on a factor pertinent to the mobile device user account; and

a management module that maintains a status of the mobile device user account based on data pertinent to the DMC; and

a database for storing the data pertinent to the DMC, the initial state of the DMC or the status of the mobile device user account.

19. The apparatus of claim 18, wherein the data processor analyzes changes to the factor pertinent to the mobile device user account to vary the initial state of the DMC.

20. The apparatus of claim 19, further comprising a control module that evaluates processing load of the data processor and at least one of:

suspends the analysis and variation of the state of the DMC if the processing load exceeds a threshold; or

restores variability of a suspended DMC state if the processing load drops below the threshold.

21. The apparatus of claim 20, wherein the data processor sets a DMC state to a default state or a most recently established state while suspended by the control module.

22. The apparatus of claim 18, further comprising a post-transaction account module that updates the mobile device user account after redemption of the DMC.

23. The apparatus of claim 22, further comprising a tracking module that identifies post-transaction activity pertinent to the DMC and involving the mobile device user account.

24. The apparatus of claim 23, wherein the post-transaction account module updates a value of the mobile device user account based on post-transaction activity identified by the tracking module.

25. The apparatus of claim 22, wherein the post-transaction account module updates the mobile device user account if a copy of the DMC, shared with a second user account, is redeemed by the second user account.

26. The apparatus of claim 22, wherein the post-transaction account module updates the mobile device user account if a second product associated with the DMC is purchased after the DMC is redeemed for a first product associated with the DMC.

27. The apparatus of claim 18, further comprising a reference module that obtains data identifying the mobile device user account from a retail entity, and identifies products or services of the retail entity pertinent to the DMC.

28. The apparatus of claim 27, further comprising an input module that obtains a product or service selection, wherein the reference module determines whether the selected product/service is pertinent to the DMC.

29. The apparatus of claim 28, further comprising a discount module that applies the DMC to the product or service to obtain a modified offer involving the product or service based on a current state of the DMC.

30. The apparatus of claim 29, wherein the reference module generates a virtual invoice including the modified offer, and submits the virtual invoice to the mobile device user account or the retail entity.

31. The apparatus of claim 27, further comprising an integration module that couples the transaction module with a customer loyalty database of the retail entity.

32. The apparatus of claim 31, wherein:

the integration module obtains a rule for modifying a product or service offer based on a user loyalty status associated with the mobile device user account; and

the transaction module applies the modification rule, or the DMC, to arrive at a modified product or service offer, and submits the modified offer to the mobile device user account or the retail entity.

33. An apparatus for wireless communication, comprising:

means for processing instructions for managing a DMC, the instructions causing the means for processing to:

assign the DMC to a target mobile device; and

establish an initial state of a variable characteristic of the DMC based on a factor pertinent to the target mobile device or a user account related to such device;

means for employing a communication interface to obtain data pertinent to the DMC; and

means for managing a state of a DMC account associated with the target mobile device based on the data pertinent to the DMC.

34. At least one processor configured for wireless communication, comprising:

a first module for assigning a DMC to a target mobile device;

a second module for establishing an initial state of a variable characteristic of the DMC based on a factor pertinent to the target mobile device or a user account related to such device;

a third module for obtaining data pertinent to the DMC; and

a fourth module for managing a state of a DMC account associated with the target mobile device based on the data pertinent to the DMC.

35. A computer program product, comprising:

a computer-readable medium, comprising:

at least one instruction for causing a computer to assign a DMC to a target mobile device;

at least on instruction for causing the computer to establish an initial state of a variable characteristic of the DMC based on a factor pertinent to the target mobile device or a user account related to such device;

at least on instruction for causing the computer to obtain data pertinent to the DMC; and

at least on instruction for causing the computer to manage a state of a DMC account associated with the target mobile device based on the data pertinent to the DMC.

36. A method for facilitating management of mobile coupons, comprising: employing a data processor to execute rules for maintaining a DMC associated with a mobile device user account, the rules causing the data processor to:

- obtain an assignment of the DMC to the mobile device user account;
- obtain a rule for calculating variability of the DMC; and
- monitor data pertinent to the variability specified by the calculating rule;

employing a wireless communication interface to submit the data to a network entity identified by the rule; and

employing the wireless communication interface to obtain a network response to the submission, wherein the response affects the mobile device user account or the DMC.

37. The method of claim 36, further comprising stopping the monitoring of data pertinent to the variability of the DMC as a result of the network response.

38. The method of claim 37, further comprising re-initiating stopped monitoring of the data based on a second network response and obtaining a current state of the DMC.

39. The method of claim 36, further comprising obtaining a default or previous state of the DMC from the network response and applying the default or previous state to the DMC in conjunction with stopping the monitoring of the data.

40. The method of claim 36, further comprising obtaining a rule from the network entity establishing post-redemption activity associated with the mobile device user account affecting commercial value of the DMC.

41. The method of claim 40, further comprising monitoring the post-redemption activity and submitting data pertaining to such activity to the network entity.

42. The method of claim 40, further comprising obtaining and displaying a report of an update to the mobile device user account based on the post-redemption activity.

43. The method of claim 40, wherein the post-redemption activity comprises at least one of:

sharing and subsequent redemption of a copy of the DMC with a second user account; or

progression of a multi-product transaction associated with the DMC.

44. The method of claim 36, further comprising wirelessly coupling with a commercial entity pertaining to an ID of the mobile device user account.

45. The method of claim 44, further comprising submitting the ID to such entity and obtaining a product or service of the commercial entity affected by the DMC.

46. The method of claim 44, further comprising receiving an updated offer of the commercial entity based on a current status of the DMC or of a loyalty account associating the mobile device user account with the commercial entity.

47. The method of claim 36, further comprising:
wirelessly obtaining data descriptive of a product or service of the commercial entity; and

displaying the descriptive data at a display of a mobile device associated with the mobile device user account.

48. The method of claim 47, further comprising referencing the DMC for relevance to the product or service and displaying a modified offer with the descriptive data based on a current state of the DMC.

49. The method of claim 47, further comprising:
obtaining a user-selection of the product or service;
wirelessly conveying the selection to the commercial entity or the network entity; and
obtaining a virtual invoice of the product or service reflecting a modified offer based on a current state of the DMC or a current status of a user loyalty account associating the mobile device user account with the commercial entity.

50. The method of claim 36, further comprising employing electronic media recognition to identify a sponsor of the DMC from media data pertinent to the DMC, and searching for or retrieving additional DMCs provided by the sponsor.

51. The method of claim 36, further comprising at least one of:
identifying retail or network locations that facilitate redemption of the DMC; or
initiating a navigation application that provides navigation instructions or mapping to at least one identified retail location.

52. An apparatus for facilitating management of mobile coupons, comprising:
a data processor for executing a set of modules configured to support the mobile coupon management, the modules comprising:
an assignment module that associates a DMC with a user of the apparatus based on assignment of the DMC to a user account;
a tracking module that monitors data pertinent to variability of the DMC;
and
a communication module that submits the pertinent data to a network management apparatus and obtains a response affecting the user account or a status of the DMC; and
memory for storing the monitored data or the response.

53. The apparatus of claim 52, further comprising a termination module that stops monitoring of the pertinent data based on a command in the response.

54. The apparatus of claim 53, wherein the termination module re-initiates monitoring of the data based on a message from the network management apparatus.

55. The apparatus of claim 53, wherein the termination module applies a default state or previously determined state of the DMC in conjunction with stopping the monitoring.

56. The apparatus of claim 52, further comprising a post-redemption module that monitors activity pertinent to the user account after redemption of the DMC, the pertinent data comprises the pertinent activity.

57. The apparatus of claim 56, further comprising a peer-to-peer communication interface that monitors the pertinent activity *via* wireless communication with a peer wireless apparatus.

58. The apparatus of claim 56, wherein the response comprises an update to the user account based on the monitored activity.

59. The apparatus of claim 56, wherein the monitored activity comprises at least one of:

a multi-item transaction specified by the DMC that involves the user account; or
sharing and redemption of a copy of the DMC by a second user account associated with a wireless peer apparatus.

60. The apparatus of claim 52, further comprising a virtual shopping module that employs a wireless interface of the apparatus to couple with a commercial entity in conjunction with association of the DMC with products or services of such entity.

61. The apparatus of claim 60, wherein the virtual shopping module accesses a product or service list of the commercial entity and displays products or services relevant to the DMC.

62. The apparatus of claim 60, wherein the virtual shopping module submits an ID of the user account or of the DMC to the commercial entity and obtains a set of products or services relevant to the DMC in response to the submission.

63. The apparatus of claim 60, wherein the virtual shopping module submits an ID of a frequent shopper account to the commercial entity to integrate benefits provided by the frequent shopper account with benefits provided by the DMC.

64. The apparatus of claim 60, further comprising a mapping module that obtains a digital map of a retail store associated with the commercial entity, and populates locations of the products or services on the digital map.

65. The apparatus of claim 64, further comprising a location module that determines a position location of the apparatus and updates the digital map with the position location.

66. The apparatus of claim 60, wherein:
the commercial entity comprises a checkout device of a retail store;
the virtual shopping module submits an ID of the user account to the virtual shopping module; and
the virtual shopping module employs the ID to obtain an invoice of products or services selected by the apparatus, wherein the selection is conveyed wirelessly to a network server associated with the retail store.

67. An apparatus for facilitating management of mobile coupons, comprising:

means for processing rules configured to manage a DMC associated with a mobile device user account, the rules causing the means for processing to:

obtain an assignment of the DMC to the mobile device user account; and

monitor data pertinent to variability of the DMC; and
means for submitting the data to a network entity and for obtaining a network response to the submission, wherein the response affects the mobile device user account or the DMC.

68. At least one processor configured to facilitate management of mobile coupons, comprising:

a first module for obtaining an assignment of a DMC to a mobile device user account;

a second module for monitoring data pertinent to variability of the DMC; and

a third module for submitting the data to a network entity and for obtaining a network response to the submission, wherein the response affects the mobile device user account or the DMC.

69. A computer program product, comprising:

a computer-readable medium, comprising:

at least one instruction for causing a computer to obtain an assignment of a DMC to a mobile device user account;

at least one instruction for causing the computer to monitor data pertinent to variability of the DMC; and

at least one instruction for causing the computer to submit the data to a network entity and obtain a network response to the submission, wherein the response affects the mobile device user account or the DMC.

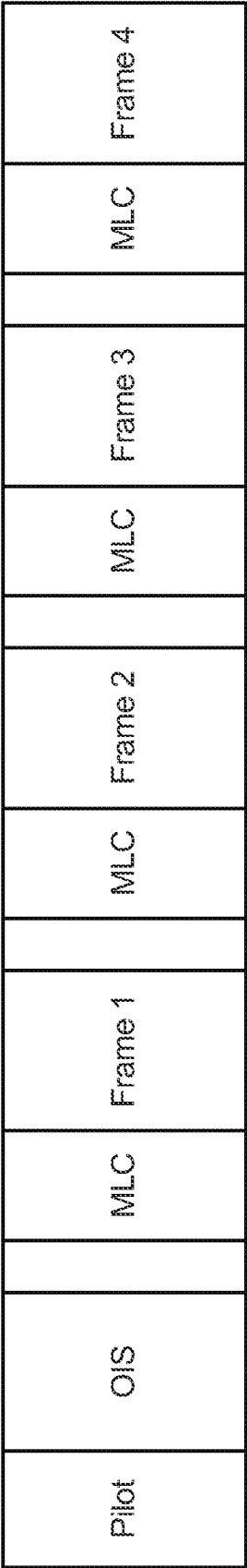


FIG. 1



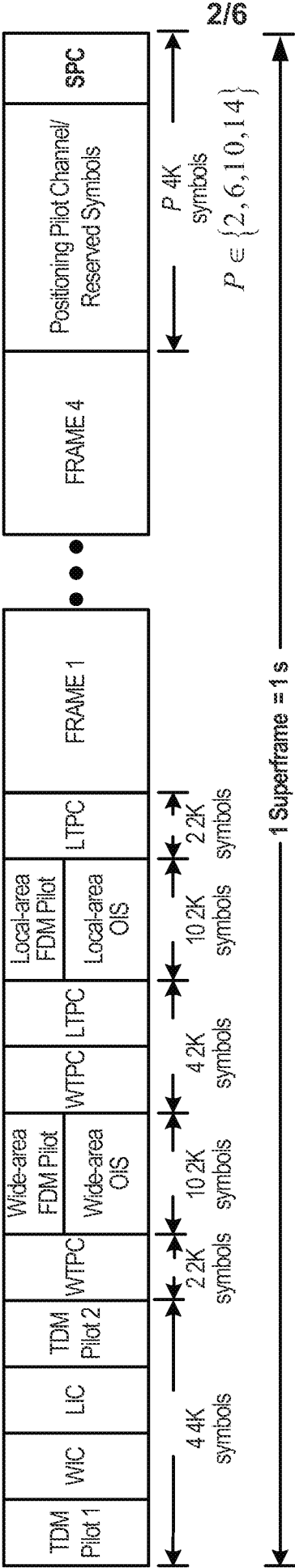


FIG. 2

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SPC symbol structure



WID=Information bits,LID=0000



Empty interlace

FIG. 3

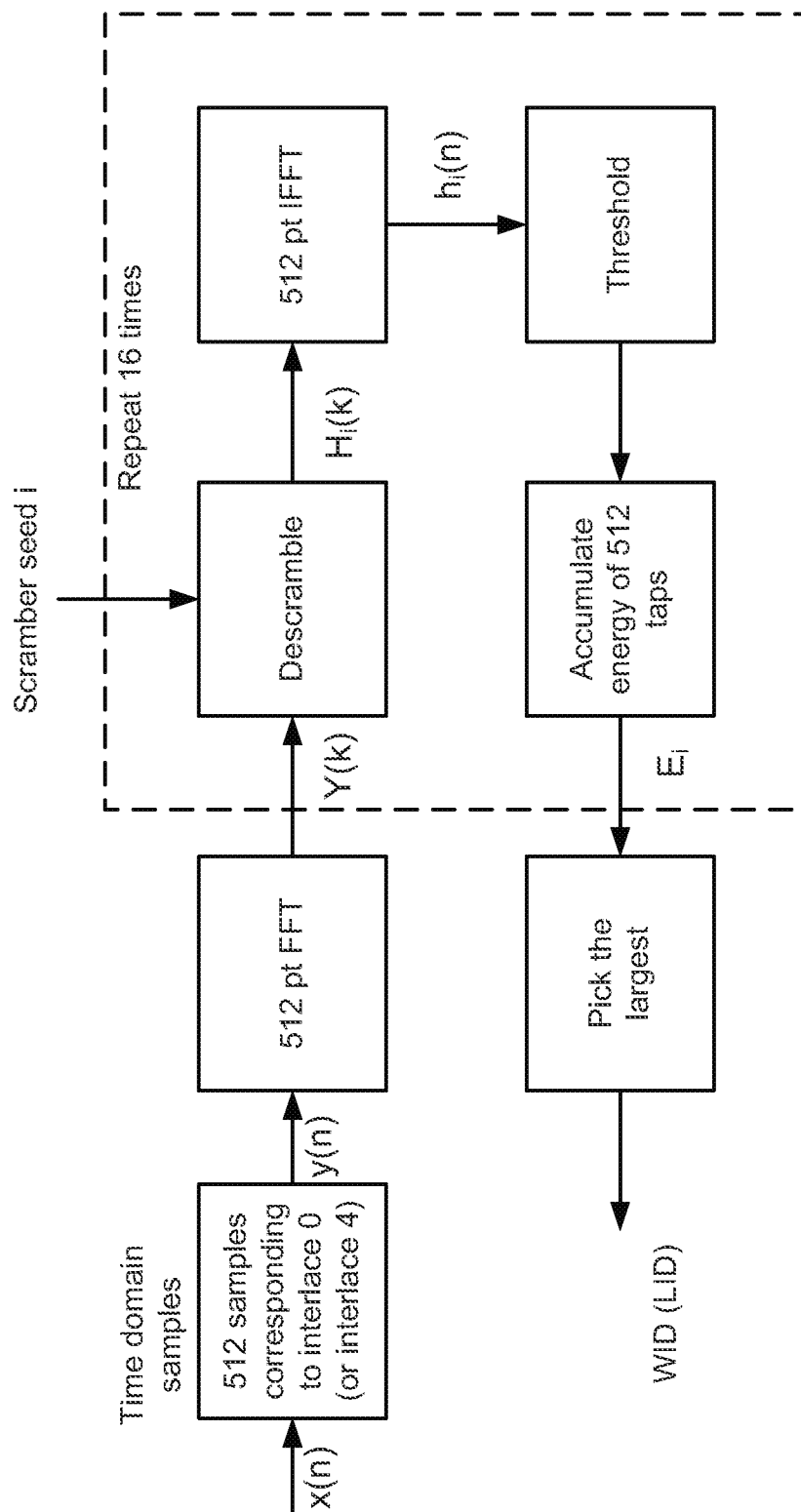
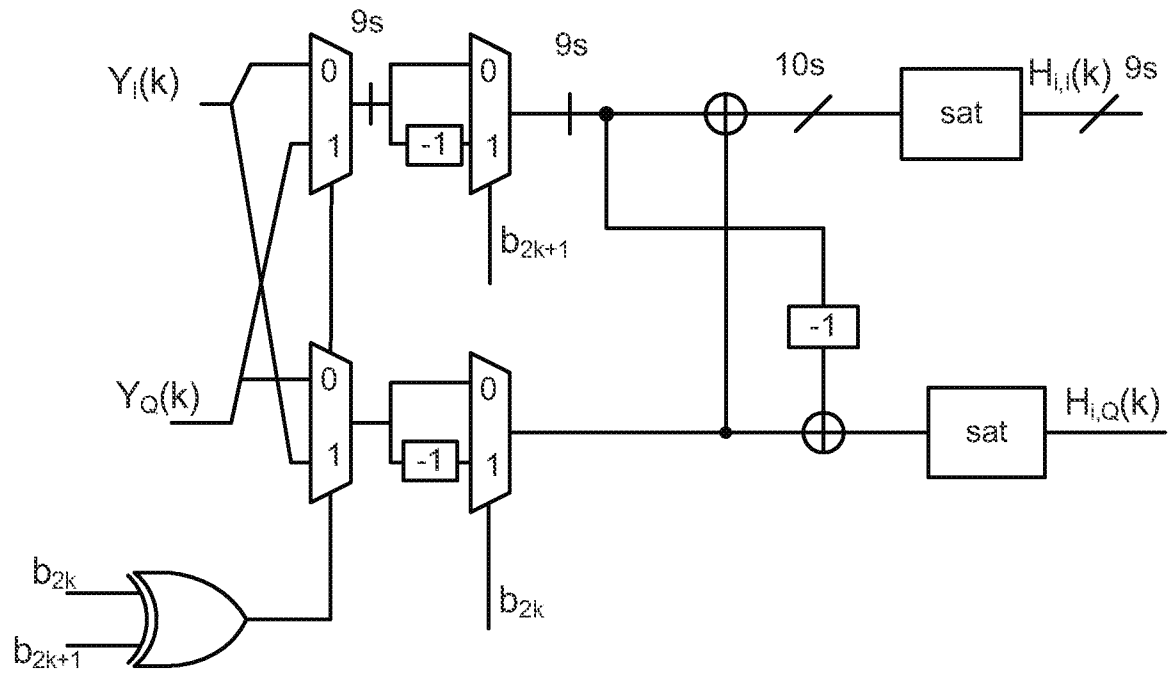


FIG. 4

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b_{2k}, b_{2k+1} obtained from scrambler output

FIG. 5

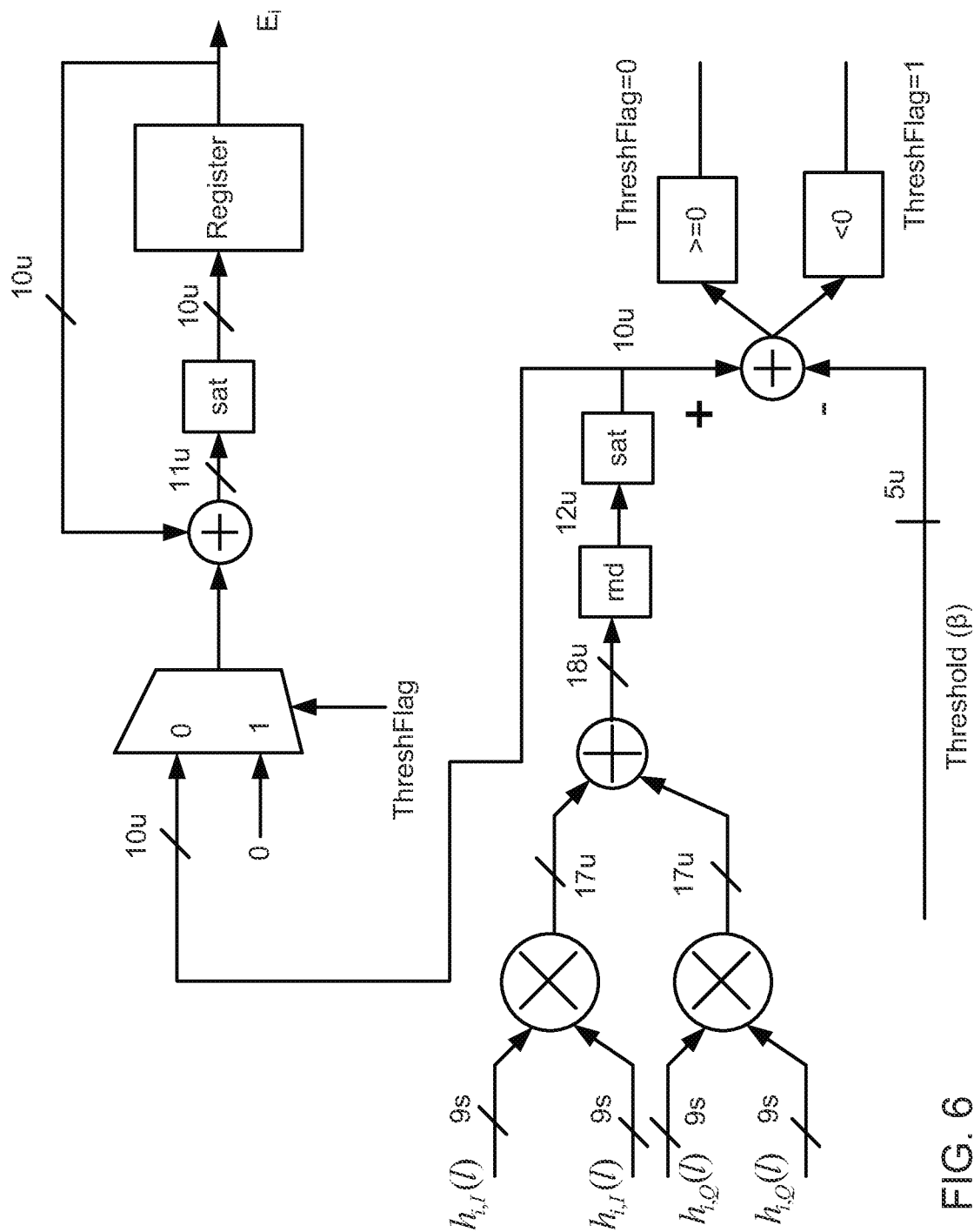


FIG. 6