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(54) **METHOD FOR OPERATING A CELLULAR TELECOMMUNICATIONS NETWORK, AND METHOD FOR OPERATING A PERSONAL CELLULAR TELECOMMUNICATIONS DEVICE**

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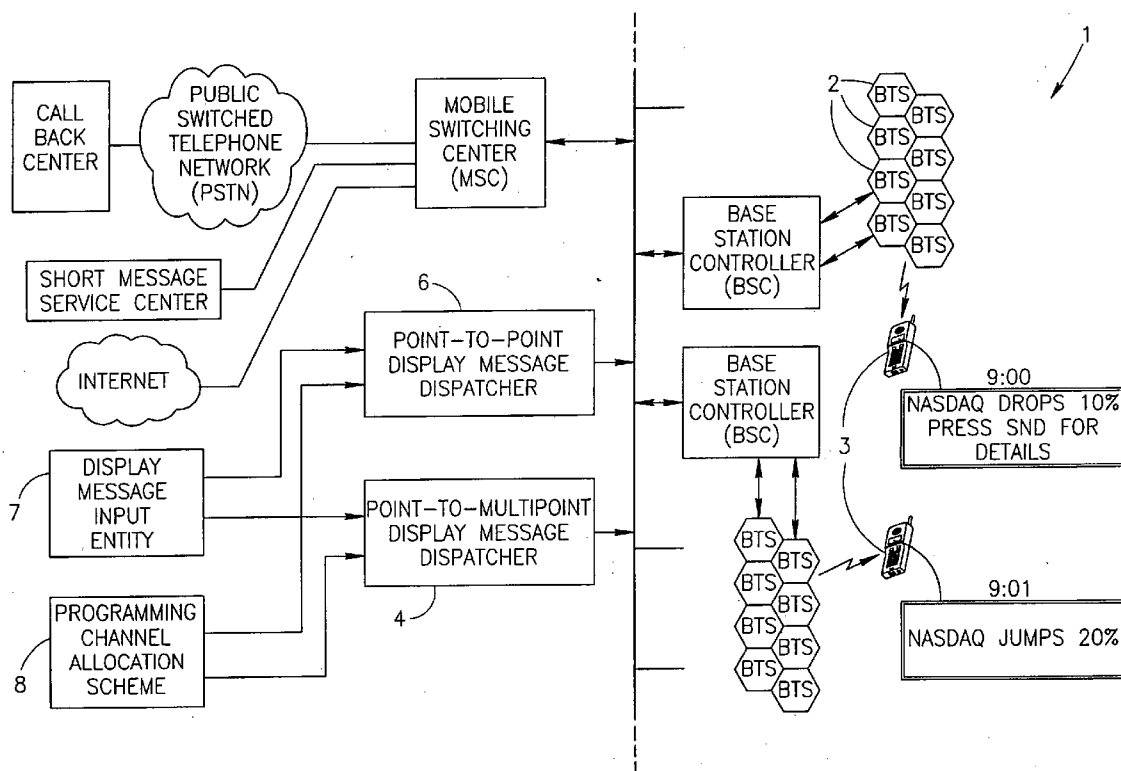
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(57) ABSTRACT

For use in a cellular telecommunications network including a plurality of individually addressable Base Transceiver Stations (BTSs) providing bidirectional signal coverage over a predefined geographical area, capable of transmitting Point-To-MultiPoint (PTMP) messages over a Point-To-MultiPoint Service (TMPS) functionality, and capable of transmitting Point-To-Point (PTP) messages, streaming of a substantially continuous stream of mostly different content, at least some interactive display messages on at least one personal cellular telecommunications device prior to their automatic discarding irrespective of their having been displayed or not.



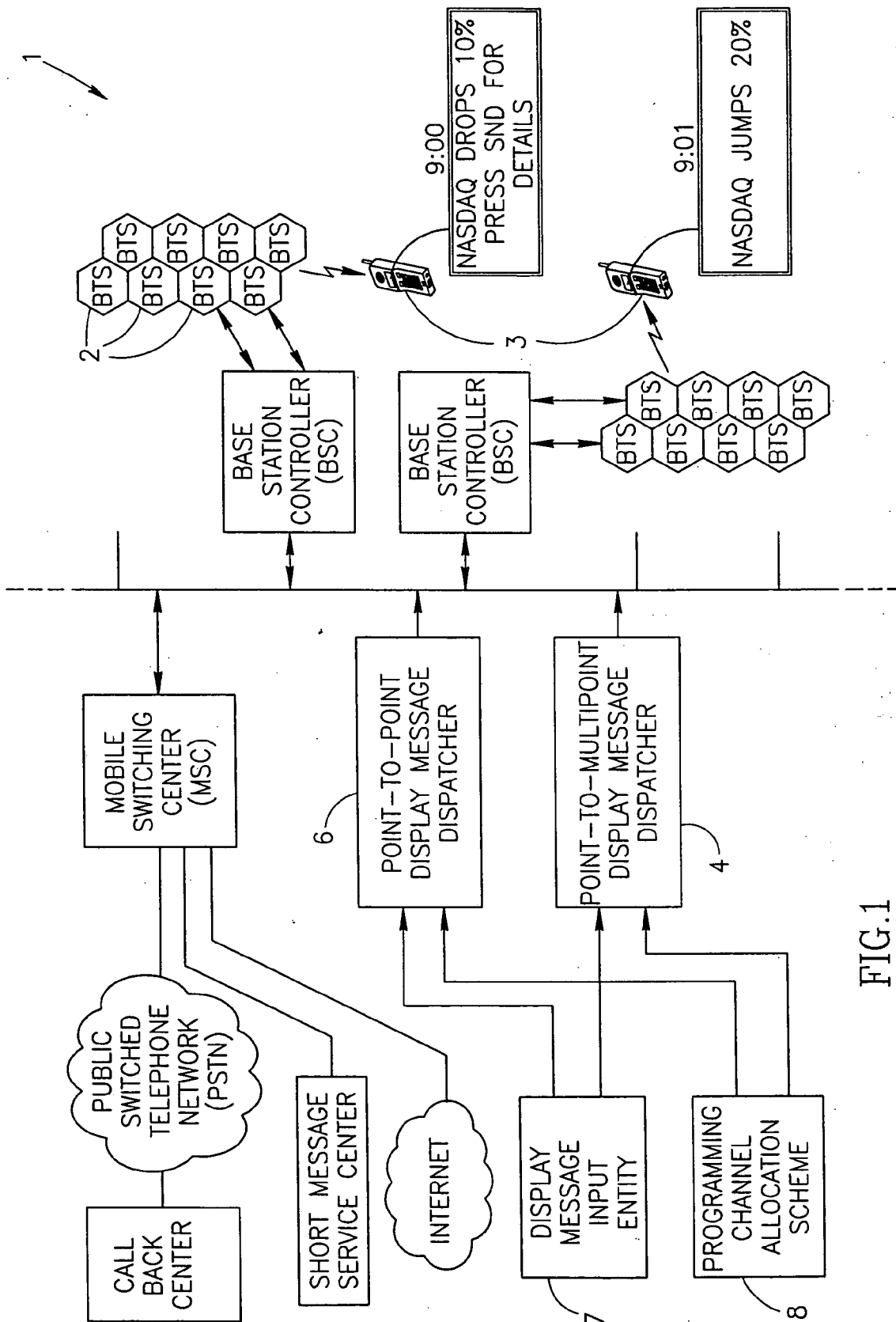


FIG.1

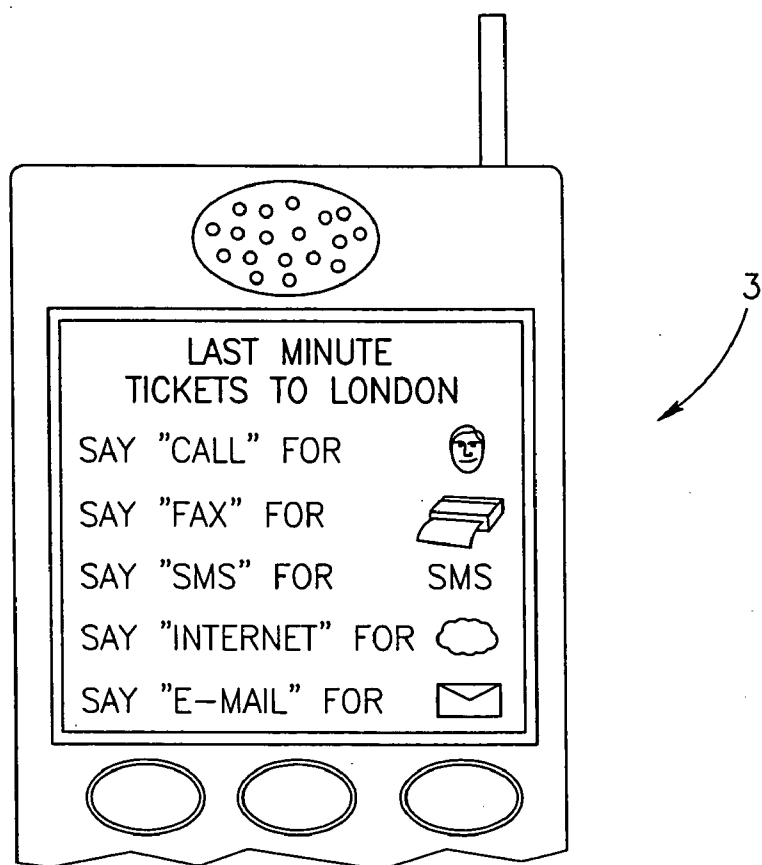


FIG.2

	NATIONAL	SCHOOLS	HIGHWAYS
08:00-08:15	NEWS	NEWS	NEWS
08:15-08:30	HOROSCOPE	ANTI-DRUG	TRAFFIC UPDATE
08:30-08:45	FINANCE	TOP 10	FINANCE
08:45-09:00	LOCAL	LOCAL	TRAFFIC UPDATE
09:00-09:15	NEWS	NEWS	NEWS

FIG.3

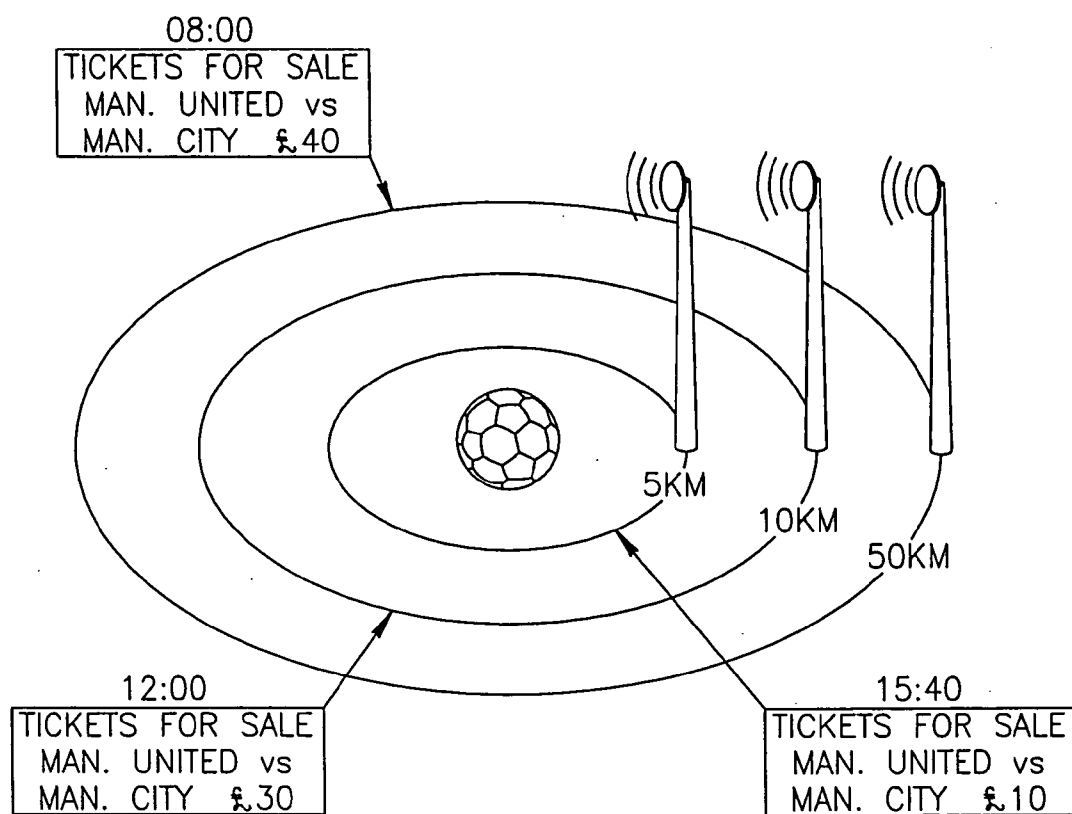


FIG. 4

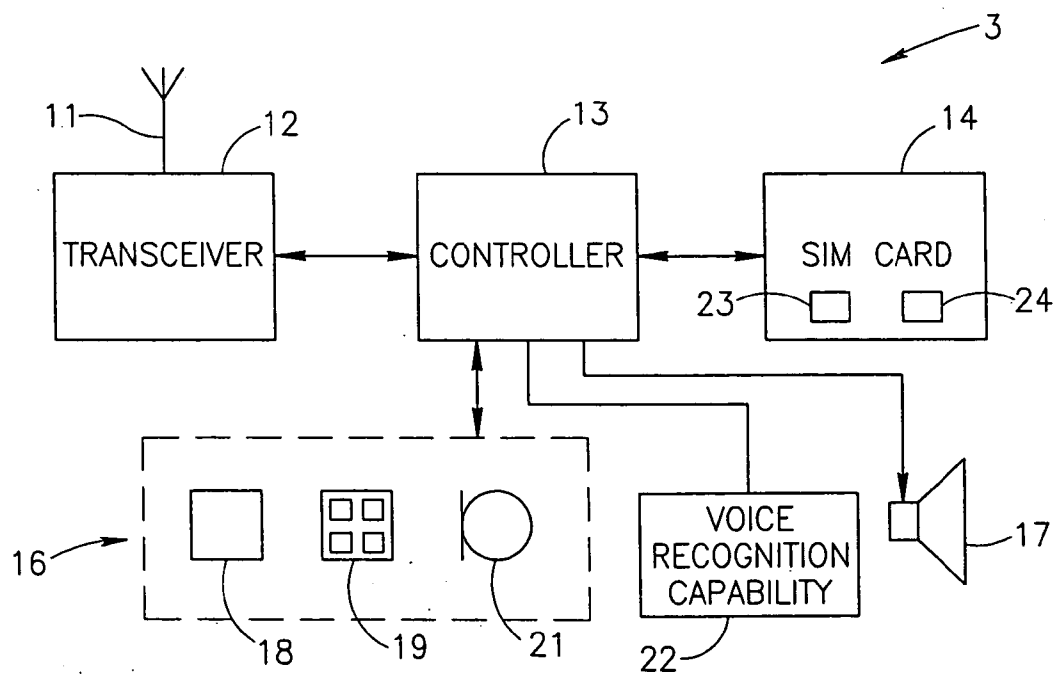


FIG. 5

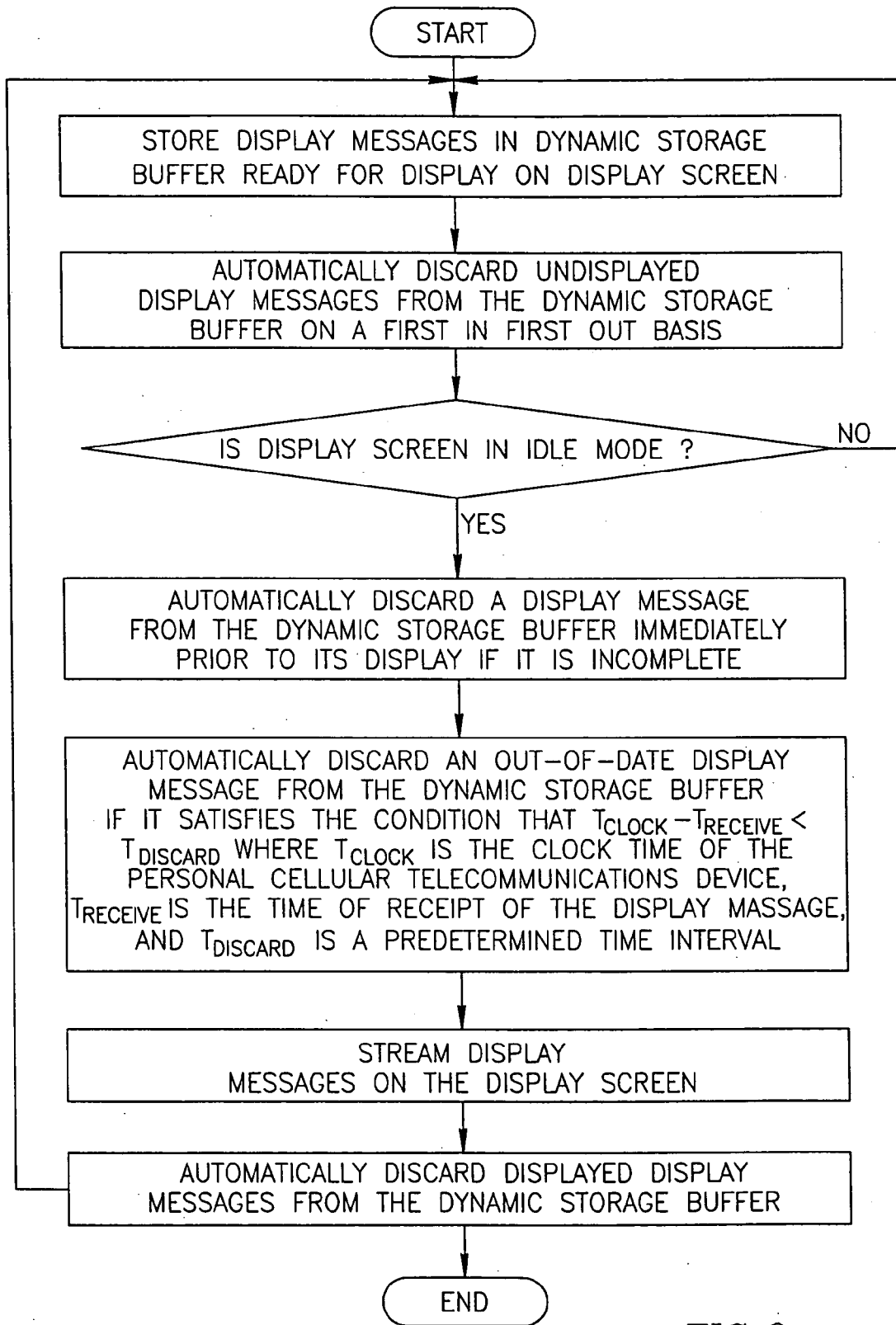


FIG.6

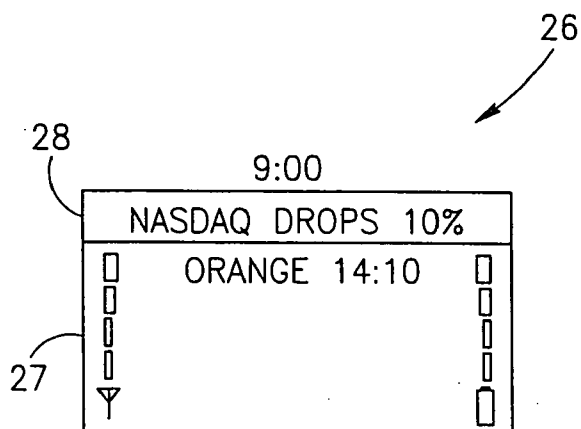


FIG. 7A

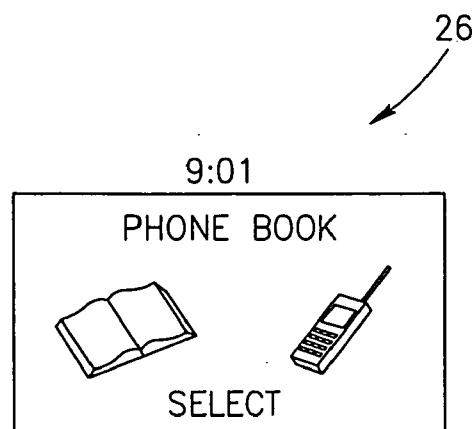


FIG. 7B

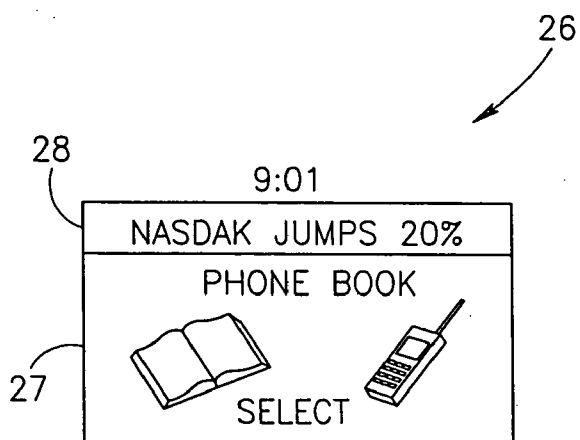


FIG. 7C

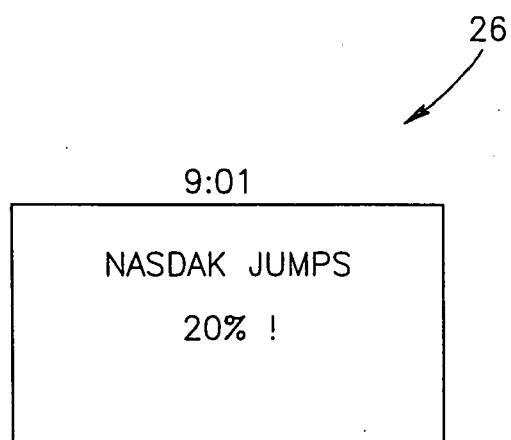


FIG. 7D

**METHOD FOR OPERATING A CELLULAR
TELECOMMUNICATIONS NETWORK, AND
METHOD FOR OPERATING A PERSONAL
CELLULAR TELECOMMUNICATIONS DEVICE**

**CROSS-REFERENCE TO RELATED
APPLICATIONS**

[0001] This application is a divisional application of prior application Ser. No. 09/980,114 filed Nov. 30, 2001, which in turn was the National Stage of International Application No. PCT/IL01/00037 having an international filing date of Jan. 14, 2001, which in turn claims priority on Israeli application No. 134,035 filed Jan. 13, 2000 and is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The invention relates to the operation of cellular telecommunications networks, and personal cellular telecommunications devices.

BACKGROUND OF THE INVENTION

[0003] Global Networks for Mobile Communications (GSM) digital cellular telecommunications networks have now been deployed alongside wireline telecommunications networks in over a 100 countries. GSM supports a so-called Short Message Service (SMS) functionality in two flavors: point-to-point for sending a point-to-point message (SMS/PP) from a network operator to a single personal cellular telecommunications device, and point-to-multipoint for sending a Cell Broadcast (SMS/CB) message from a network operator to a plurality of personal cellular telecommunications devices located in one or more cells. For more details regarding the different classes of SMS messages, reference can be made to ETSI TS 100 900 Version 7.2 (GSM 03.38 Version 7.2), the contents of which are incorporated by reference.

[0004] In WO98/10604 entitled "Interactive Cell Broadcast Service", there is illustrated and described a method and apparatus for transmitting SMS/CB display messages to subscribers who are prompted to respond by depressing a pushbutton for immediately originating either a telephone call or an SMS/PP message to an embedded callback number. One particular application of the interactive cell broadcast service is for requesting a service which can then be provided by so-called over the air programming. Each SMS/CB message is displayed on the entire display screen either immediately upon its receipt, or when requested by the user (see page 11, lines 27-29 of the specification). Both approaches severely limit the interactive cell broadcast service in terms of the rate at which SMS/CB messages can be transmitted as follows. In the former, immediately displaying SMS/CB messages on a display screen annoyingly interrupts the operation of the device from the point of view of the subscriber who would therefore be inclined to disable the service. And in the latter, storing SMS/CB messages requires considerable memory resources, and requiring a user to retrieve each SMS/CB message individually (and thereafter delete them individually) is time consuming and battery wasteful.

SUMMARY OF THE INVENTION

[0005] Broadly speaking, the present invention is directed toward the streaming of mostly different content at least

some interactive display messages on personal cellular telecommunications devices for the benefit of subscribers for no more than their occasional glancing at their personal cellular telecommunications devices' display screens which they often do anyway, for example, to check the time. The present invention can display both Point-To-Point (PTP) display messages and Point-To-MultiPoint (PTMP) display messages but in the case that PTP display messages and PTMP display messages are simultaneously transmitted over their respective air interface channels, the former display messages typically have a higher display priority than the latter such that they are preferentially displayed.

[0006] The display messages are intended to have mostly different content including inter alia news items, financial information, promotional offers, and the like, in the form of alphanumeric messages, graphic messages, video clips, and the like. Whilst some display messages will by their nature be repeated on a regular basis, for example, display messages advertising a soft drink, the term mostly different is intended to convey that identical display messages are not displayed during consecutive time intervals of, say, between 1 minute and 5 minutes. At least some of the display messages are intended to be interactive in the sense that a subscriber can automatically activate a point-to-point transmission response mechanism from a dedicated response means integrally provided in a display message. The existence of a dedicated response means does not necessarily have to be indicated on a display message to a subscriber but can be understood by him as being available a matter of course. A response mechanism can be pushbutton activated, voice activated, or touchpad activated. In the case of pushbutton activated response means, each response means may be a dedicated "MORE INFO" key, or a key selectively dedicated for the response means but otherwise a conventional key, for example, the key "*" as may appear in a display message, for example, "PRESS * FOR MORE INFO". The display messages are preferably transmitted at a maximum rate of a new display message about every 5 seconds on a so-called 24/7 basis i.e. all day every day, thereby, on the one hand, rendering an interesting eye catching service of streaming display messages but, on the other hand, still providing sufficient response time for a subscriber to activate a response mechanism. Obviously, display messages can be transmitted at slower rates, say, down to one display message about every 2 minutes, or even slower, say, one display message about every 5 minutes, and for shorter periods, say, 10 minutes of display messages on the hour during peak broadcasting hours only.

[0007] The display messages can occupy different regions of a display screen as follows: First, they can replace a so-called "idle screen" typically occupying the entire space of a display screen for displaying inter alia network related information, for example, the name of an operator, time, signal strength, battery strength, the presence of one or more voice messages and/or SMS messages stored in a permanent storage buffer prior to their deletion, and the like. And second, they can occupy a portion of a split screen, for example, a horizontally disposed banner portion, also typically having a major portion for normally displaying an idle screen. In the latter instance, the banner portion may be a permanent feature of a display screen or it may be replaced together with the first portion in a similar manner to the first instance on the invoking of a non-idle activity specific screen having at least some indication of an ongoing activist

including inter alia the entire process from establishment to tear down of a voice call irrespective of whether a subscriber is the originating party or the receiving party, and any other subscriber initiated activity, for example, retrieving an item stored in memory, playing a game, writing a memo, and the like. An exemplary "idle screen" within the spirit of the present invention is displayed in the so-called User Idle Screen Available Event (see 3GPP TS 31.111 V4.0.0 3rd Generation Partnership Project; Technical Specification Group Terminals; USIM Application Toolkit (USAT) (Release 4)).

[0008] The envisaged streaming of display messages provides a most convenient platform for m-commerce applications, and in particular interactive m-commerce applications catering for a wide range of ages, lifestyles, and the like. It is believed that its exposure to the general public will be far greater than that of conventional radio, television and cable broadcasting services taking into consideration the ubiquity of personal cellular telecommunications devices, the fact that most subscribers now take their personal cellular telecommunications devices wherever they go, and the fact that they are in idle mode for most of the time that they are powered on. Moreover, unlike conventional broadcasting services which are at best regional services, since each BTS can be individually addressed, the present invention readily facilitates the transmitting of far more location specific content down to the granularity of a single BTS than hitherto achievable. In this connection, additional BTSs can also be readily deployed for the sole purpose of transmitting specific content at particular locations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] In order to understand the invention and to see how it can be carried out in practice, a preferred embodiment will now be described, by way of a non-limiting example only, with reference to the accompanying drawings, in which similar parts are likewise numbered, and in which:

[0010] **FIG. 1** is a schematic representation of a cellular telecommunications network for transmitting a multi-programming channel 24/7 cellular broadcasting service for the streaming of display messages on personal cellular telecommunications device in a screen saver-like manner;

[0011] **FIG. 2** is a schematic representation of a voice activated display message for enabling subscriber activation of one of at least two point-to-point transmission response mechanisms;

[0012] **FIG. 3** is a schematic representation showing the programs to be broadcast during the first hour of each of three programming channels of the cellular broadcasting service;

[0013] **FIG. 4** is a schematic representation showing a staggered sequence of display messages for advertising tickets for a football game over progressively smaller geographical areas at progressively lower purchase prices;

[0014] **FIG. 5** is a schematic representation of a personal cellular telecommunications device for supporting the streaming of display messages thereon in a screen saver-like manner;

[0015] **FIG. 6** is a flow diagram for streaming display messages on a personal cellular telecommunications device in a screen saver-like manner; and

[0016] **FIGS. 7A-7D** are schematic representations of different modes of operation of a personal cellular telecommunications device having a split screen display screen.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] **FIG. 1** shows a cellular telecommunications network 1 capable of transmitting a multi-programming channel 24/7 cellular broadcasting service to a plurality of individually addressable BTSs 2 each providing bidirectional signal coverage over a predefined geographical area ranging from so-called typically indoor pico cells each covering a few square meters through so-called micro cells each covering anywhere from a few tens to a few hundreds of square meters up to cells covering several square kilometers. The BTSs 2 are each capable of transmitting Point-To-MultiPoint (TMP) display messages and Point-To-Point (PTP) display messages for streaming mostly different content, mostly interactive display messages on personal cellular telecommunications devices 3. The PTMP display messages are dispatched from a Point-To-MultiPoint Display Message Dispatcher 4 and the PTP display messages are dispatched from a Point-To-Point Display Message Dispatcher 6. Both the PTMP display messages and the PTP display messages originate at a Display Message Input Entity 7. The devices 3 include inter alia simple handset phones, smartphones, combined PDA/phones, combined MIP3 music players/phones, and the like.

[0018] **FIG. 1** also shows two exemplary successive time-sensitive display messages displayed in a screen saver-like manner replacing a normally displayed idle screen. The display messages include "NASDAQ DROPS 10% PRESS SND FOR DETAILS" display at 9:00 and "NASDAQ JUMPS 20%" displayed at 9:01. The 9:00 display message is an example of a display message prompting a subscriber as to the action required by him to obtain additional information from an information provider. Against this, the 9:01 display message is an example of a display message which does not prompt a subscriber as to which action is needs to take to obtain additional information since he is already cognizant of the fact that pressing the SND key will automatically connect him to a suitable information service. **FIG. 2** shows a display message prompting a subscriber to activate a point-to-point transmission response mechanism from the list of a voice call; an SMS; a data session, for example, an Internet browsing session, a SIM browsing session, and the like; e-mail; and a facsimile transmission.

[0019] **FIG. 3** shows that a cellular broadcasting service can include a non-geocoded or nationwide programming channel, and one or more geocoded programming channels for transmitting streams of PTMP and PTP display messages from logical groups of BTSs each including one or more BTSs. Each logical group of BTSs either covers an extended contiguous geographical area, for example, a metropolitan area or geographical areas sharing a common theme, for example, schools, along highways, and the like. The programming channels typically include time slots for transmitting programs which are either common to both the nationwide programming channel and the geocoded programming channels, for example, the News, or dedicated to a particular logical group of BTSs, for example, an Anti-drug program for transmission at BTSs of the logical group of BTSs which cover schools, Traffic updates for transmis-

sion at BTSs of the logical group of BTSs which cover major highways, and the like. Also, a geocoded programming channel can be itself segmented to two or more so-called geocoded programming sub-channels each to be transmitted at a subset of the BTSs of the logical group of BTSs associated with the geocoded programming channel. For example, the school programming channel can be segmented to an elementary school programming sub-channel, a high school programming sub-channel, and a college programming sub-channel.

[0020] It should be noted that a BTS may be assigned to one or more geocoded programming channels depending on its location, for example, a BTS which covers a geographical area containing both a football stadium and a shopping mall in most likelihood will be assigned to both a sports programming channel and a shopping programming channel of the cellular broadcasting service to maximize its efficacy in terms of geocoded content. In such instance, a programming channel allocation scheme 8 can be provided for determining which stream of PTMP or PTP display messages should be displayed at each BTS. The schemes can be time dependent, for example, sports programming channel be transmitted during a time interval starting 2 hours before the start of a football match and ending 2 hours after the football match ends, the shopping programming channel be transmitted at other times when available for transmission, and the nationwide programming channel be transmitted at all other times that neither the sports programming channel nor the shopping programming channel are available for transmission.

[0021] FIG. 4 shows a staggered sequence of display messages for advertising tickets for a football game to take place at a stadium over progressively smaller geographical areas and at progressively lower prices on the same day as the game assuming that unsold tickets still available. Such display messages may be either PTMP display messages, or PTP display messages transmitted to subscribers listed in the fan club of the stadium's home team. The geographical areas are usually centered around the stadium, and are such that a subscriber can still reach the stadium in time for kick-off. Such an advertising campaign can be readily applied to other items with either a fixed "sell by" date or a limited stock, for example, for advertising a clearance sale of consumer items at a retail outlet.

[0022] FIG. 5 shows a GSM based personal cellular telecommunications device 3 including an antenna 11, a transceiver 12, a controller 13 providing a clock time denoted T_{CLOCK} , a SIM card 14 (constituting a smart card), a subscriber interface 16, and a loudspeaker 17. The subscriber interface 16 includes a display screen 18, a keypad 19, and a microphone 21. The display screen 18 may be a touchpad. The device 3 may also include a voice recognition capability 22 for supporting voice activated activities including inter alia dialing, invoking a response mechanism, and the like. The SIM card 14 includes two fixed size dynamic storage buffers 23 and 24 for temporarily storing PTMP display messages and PTP display messages, respectively, passed thereto by the controller 13 prior to their being automatically discarded in accordance with a display message discard scheme irrespective of their having been displayed or not. The entire handling of a display message from its receipt through to its being automatically discarded is a completely silent process irrespective of whether the display message is displayed or not.

[0023] The operation of the screen saver-like application in respect of each of the dynamic storage buffers 23 and 24, as shown in FIG. 6, is as follows: The display message discard scheme automatically discards undisplayed display messages from a dynamic storage buffer on a First In First Out basis, thereby ensuring that the dynamic storage buffer only stores the most recently received display messages, and automatically discards display messages after they are displayed. In addition, assuming that the display screen is available for display of a display message, immediately before a display message is actually displayed, the following checks are made: First, since display messages may be incomplete due to any one of several occurrences, for example, air interface interference, hand over between cells, and the like, each display message is checked for completeness and if it is found to be incomplete, it is automatically discarded. Second, since at least some of the display messages are time sensitive, each display message is checked for its not being out-of-date by its satisfying the following condition:

$$T_{\text{CLOCK}} - T_{\text{RECEIVE}} < T_{\text{DISCARD}};$$

[0024] where T_{CLOCK} is the clock time, T_{RECEIVE} is the time of receipt of the message, and T_{DISCARD} is a predetermined time interval, for example, three minutes, which is necessary.

[0025] FIGS. 7A-7D show different modes of streaming of display messages on a personal cellular telecommunications device having a split screen display screen 26 including a major portion 27, and a minor horizontal banner portion 28. FIG. 7A shows that the major portion 27 displays an idle screen whilst the banner portion 28 shows a stream of at least some interactive display messages whilst FIG. 7B shows that the display messages are only displayed on the banner portion 28 when the idle screen is displayed on the major portion 27. FIG. 7C shows that the banner portion 28 is a permanent feature of the split screen display screen 26 either occupying only a portion thereof, or that it can be extended to include the entire display screen 26 instead of the major portion 27 displaying an idle screen (see FIG. 7D).

[0026] While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications, and other applications of the invention can be made within the scope of the appended claims. For example, whilst the present invention has been described in parts with reference to its GSM implementation, it is suitable for implementation by both existing or still evolving technologies including inter alia PCS, GPRS, 3G, CDMA, UMTS, W-CDMA, and the like, and/or both existing and still evolving services including inter alia PTM-M, PTM-G, IP-M, MDS, and the like.

We claim:

1. For use in a cellular telecommunications network including a plurality of individually:

addressable Base Transceiver Stations (BTSs) providing bidirectional signal coverage over a predefined geographical area, and each capable of transmitting mostly different content, at least some interactive display messages where each interactive display message enables a subscriber to automatically activate a response mecha-

nism integrally provided in a display message and can be actuated by a dedicated response means associated therewith,

a method for operating a personal cellular telecommunications device having at least one dynamic storage buffer, and a subscriber interface including a split screen display screen including a first portion and a second portion, the method comprising the steps of:

(a) temporarily storing display messages in a dynamic storage buffer ready for display on the second portion of the display screen;

(b) normally displaying an idle screen on the first portion of the display screen; and

automatically streaming display messages from the dynamic storage buffer on the second portion of the display screen;

(c) provisioning on the subscriber interface a dedicated response means that can be selectively actuated by the subscriber for actuating a response mechanism integrally formed with a display message;

(d) displaying a non-idle activity specific screen on at least the first portion of the display screen, if invoked; and

(e) automatically discarding display messages from the dynamic storage buffer in accordance with a display message discard scheme irrespective of their having been displayed on the display screen or not.

2. The method according to claim 1 wherein the display message discard scheme automatically discards undisplayed display messages from the dynamic storage buffer on a First In First Out basis.

3. The method according to claim 1 wherein the display message discard scheme automatically discards a display message immediately prior to its display if it is incomplete.

4. The method according to claim 1 wherein the display message discard scheme automatically discards an out-of-date display message prior to its display if it satisfies the condition that

$$T_{\text{CLOCK}} - T_{\text{RECEIVE}} < T_{\text{DISCARD}}$$

where T_{CLOCK} is the clock time of the personal cellular telecommunications device, T_{RECEIVE} is the time of receipt of the display message at the personal cellular telecommunications device, and T_{DISCARD} is a predetermined time interval.

5. The method according to claim 1 wherein the display message discard scheme automatically discards displayed display messages from the dynamic storage buffer.

6. The method according to claim 1 wherein a PTP display message ready for display is displayed on the display screen in preference to a PTMP display message ready for display.

7. The method according to claim 1 wherein the entire handling of a display message from its receipt through to its being automatically discarded is a completely silent process irrespective of whether the display message was displayed on the display screen or not.

8. The method according to claim 1 wherein a display message enables a subscriber to automatically activate one of at least two point-to-point transmission response mechanisms from the list of a voice call; an SMS; a data session; e-mail; and a facsimile transmission, each response mechanism

integrally provided in a display message and can be actuated by a dedicated response means associated therewith.

9. The method according to claim 8 wherein the at least two point-to-point transmission response mechanisms are displayed in response to subscriber activation of a dedicated response means integrally provided in a display message.

10. A computer program loadable into a personal cellular telecommunications device so that the personal cellular telecommunications device programmed in this way is capable of or adapted to carrying out a method in accordance with claim 1.

11. A program storage device readable by a personable cellular telecommunications device tangibly embodying a program of instructions executable by the personal cellular telecommunications device for carrying out a method in accordance with claim 1.

12. A smart card operable with a personal cellular telecommunications device so that the personal cellular telecommunications device is capable of or adapted to carrying out a method in accordance with claim 1.

13. For use in a cellular telecommunications network including a plurality of individually addressable Base Transceiver Stations (BTSs) providing bidirectional signal coverage over a predefined geographical area, and capable of transmitting mostly different content, at least some interactive display messages where each interactive display message enables a subscriber to automatically activate a response mechanism integrally provided in a display message that can be actuated by a dedicated response means,

a method for operating a personal cellular telecommunications device having at least one dynamic storage buffer, and a subscriber interface including a split screen display screen including at least two portions, the method comprising the steps of:

(a) temporarily storing display messages in a dynamic storage buffer ready for display on the second portion of the display screen;

(b) permanently streaming display messages from the dynamic storage buffer on at least one portion of the display screen; and

(c) automatically discarding display messages from the dynamic storage buffer in accordance with a display message discard scheme irrespective of their having been displayed on the display screen or not.

14. The method according to claim 13 wherein the display messages are only displayed on one portion of the display screen.

15. The method according to claim 13 wherein the display messages are either displayed on one portion of the display screen or the entire display screen.

16. The method according to claim 13 wherein a PTP display message ready for display is displayed on the display screen in preference to a PTMP display message ready for display.

17. The method according to claim 13 wherein a display message enables a subscriber to automatically activate one point-to-point transmission response mechanism from the list of: a voice call; an SMS; a data session; e-mail; and a facsimile transmission, each response mechanism integrally provided in a display message and is actuated by a dedicated response means.

18. The method according to claim 17 wherein at least two point-to-point transmission response mechanisms are displayed in response to subscriber activation of a dedicated response means integrally provided in a display message.

19. A computer program loadable into a personal cellular telecommunications device so that the personal cellular telecommunications device programmed in this way is capable of or adapted to carrying out a method in accordance with claim 13.

20. A program storage device readable by a personable cellular telecommunications device tangibly embodying a program of instructions executable by the personal cellular telecommunications device for carrying out a method in accordance with claim 13.

21. A smart card operable with a personal cellular telecommunications device so that the personal cellular telecommunications device is capable of or adapted to carrying out a method in accordance with claim 13.

22. For use in a cellular telecommunications network including a plurality of Base Transceiver Stations (BTSs) including a plurality of individually addressable Base Transceiver Stations (BTSs) providing bidirectional signal coverage over a predefined geographical area,

a display message for display on the display screen of a personal cellular telecommunications device, the display message comprising

at least two integrally formed point-to-point transmission response mechanisms from the list of a voice call, an SMS, a data session, email, and a facsimile transmission, and

having a dedicated response means associated therewith whereby a subscriber is capable of automatically activating one of the at least two point-to-point transmission response mechanisms.

23. The display message according to claim 22 wherein the at least two point-to-point transmission response mechanisms are displayed on the display screen in response to subscriber activation of a dedicated response means integrally provided in the display message.

24. The display message according to claim 22 wherein the display message is a PTMP display message.

25. The display message according to claim 22 wherein the display message is a PTP display message.

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