

(21) Application No: **0323775.7**  
(22) Date of Filing: **10.10.2003**

(71) Applicant(s):  
**Motorola Inc**  
**(Incorporated in USA - Delaware)**  
**1303 East Algonquin Road, Schaumburg,**  
**Illinois 60196, United States of America**

(72) Inventor(s):  
**Yossi Mizrahi**  
**Alex Fridman**  
**Leonid Krasnopolsky**

(74) Agent and/or Address for Service:  
**Boult Wade Tennant**  
**Verulam Gardens, 70 Gray's Inn Road,**  
**LONDON, WC1X 8BT, United Kingdom**

(51) INT CL<sup>7</sup>:  
**H04Q 7/22**

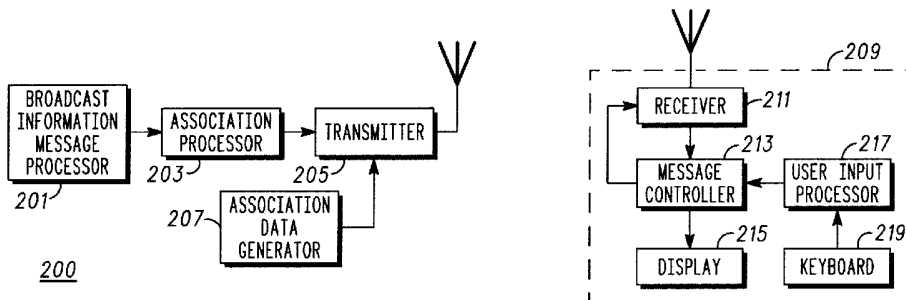
(52) UK CL (Edition X ):  
**H4L LDPC**

(56) Documents Cited:  
**WO 2003/012623 A3**  
**"3GPP TS 23.041 V3.5.0: Technical realisation of Cell**  
**Broadcast Service" - Release 1999**

(58) Field of Search:  
UK CL (Edition W ) **H4L**  
INT CL<sup>7</sup> **H04L, H04Q**  
Other:

(54) Abstract Title: **A cellular communication system and method of communicating broadcast information therefor.**

(57) The invention relates to a cell broadcast service in a cellular communication system (200). A broadcast information message generator (201) generates broadcast information messages in different content categories. The broadcast information messages are associated with broadcast channels in an association processor (203) and transmitted by a transmitter (205) comprising base stations. In addition, association information data indicating an association between broadcast channels and content categories is generated by an association data generator (207). The association information data is additionally broadcast by the transmitters. A user equipment (209) comprises a receiver (211) which receives the association information data and feeds it to a message controller (213). The message controller (213) receives an input from a user selecting a given content category. The message controller (213) determines corresponding broadcast channels for the selected content category using the association information data and configures the user equipment (209) to receive this broadcast channel. Hence, the user equipment may automatically configure itself to receive appropriate content categories.



**FIG. 2**

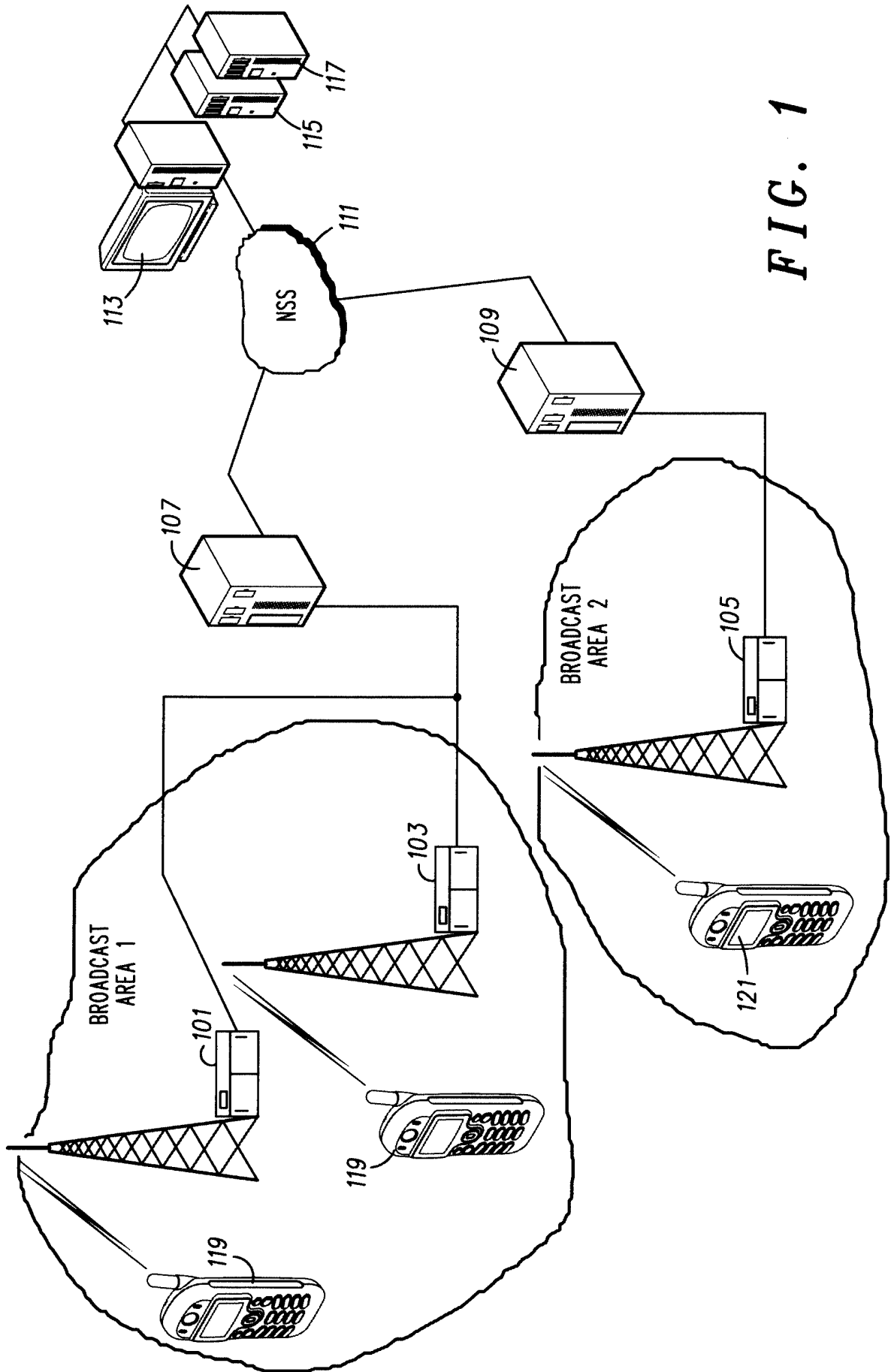


FIG. 1

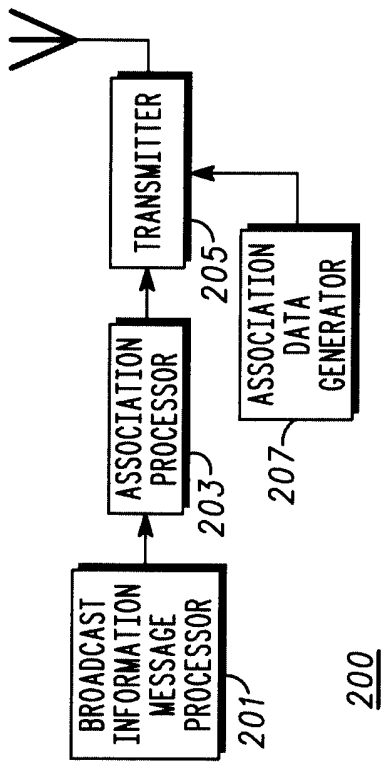
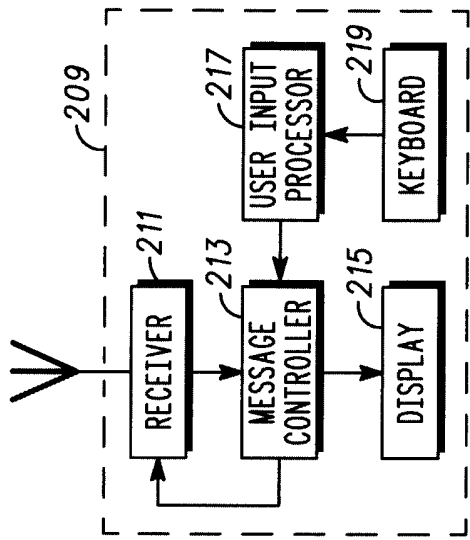
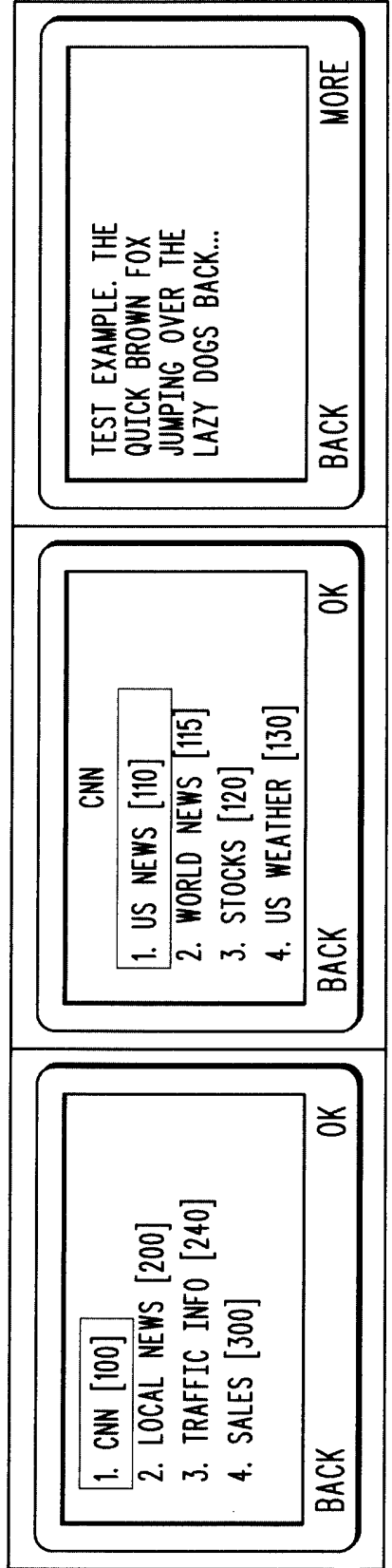


FIG. 2

FIG. 3



/

A CELLULAR COMMUNICATION SYSTEM AND METHOD OF  
COMMUNICATING BROADCAST INFORMATION THEREFOR

5 Field of the invention

The invention relates to a cellular communication system and method of communicating broadcast information therefor and in particular to communicating broadcast information messages.

10

Background of the Invention

In a cellular communication system, a geographical region is divided into a  
15 number of cells each of which is served by a base station. The base stations are interconnected by a fixed network through base station controllers (BSC) and a network subsystem (NSS). A mobile station is served via a radio communication link by the base station of the cell within which the mobile station is situated.

20

As a mobile station moves, it may move from the coverage of one base station to the coverage of another, i.e. from one cell to another. As the mobile station moves towards base station, it enters a region of overlapping coverage of two base stations and within this overlap region it changes to be supported by the  
25 new base station. As the mobile station moves further into the new cell, it continues to be supported by the new base station. If this occurs in an active call, it is known as a handover or handoff of a mobile station between cells, and if it occurs during an idle state, it is known as cell reselection.

30 A typical cellular communication system extends coverage over typically an entire country and comprises hundreds or even thousands of cells supporting

thousands or even millions of mobile stations. Communication from a mobile station to a base station is known as uplink, and communication from a base station to a mobile station is known as downlink.

- 5 The fixed network interconnecting the base stations is operable to route data between any two base stations, thereby enabling a mobile station in a cell to communicate with a mobile station in any other cell. In addition, the fixed network comprises gateway functions for interconnecting to external networks such as the Public Switched Telephone Network (PSTN), thereby allowing
- 10 mobile stations to communicate with landline telephones and other communication terminals connected by a landline. Furthermore, the fixed network comprises much of the functionality required for managing a conventional cellular communication network including functionality for routing data, admission control, resource allocation, subscriber billing, mobile
- 15 station authentication etc.

Currently, the most ubiquitous cellular communication system is the 2<sup>nd</sup> generation (or 2+) communication system known as the Global System for Mobile communication (GSM). GSM uses a technology known as Time Division

20 Multiple Access (TDMA) wherein user separation is achieved by dividing frequency carriers into 8 discrete time slots, which individually can be allocated to a user. A base station may be allocated a single carrier or a multiple of carriers. One carrier is used for a pilot signal which further contains broadcast information. This carrier is used by mobile stations for

25 measuring of the signal level of transmissions from different base stations, and the obtained information is used for determining a suitable serving cell during initial access or handovers. Further description of the GSM TDMA communication system can be found in 'The GSM System for Mobile Communications' by Michel Mouly and Marie Bernadette Pautet, Bay Foreign

30 Language Books, 1992, ISBN 2950719007.

To further enhance the services and performance of the GSM communication system, a number of enhancements and additions have been introduced to the GSM communication system over the years.

- 5 One such enhancement is the General Packet Radio System (GPRS), which is a system developed for enabling packet data based communication in a GSM communication system. Thus, the GPRS system is compatible with the GSM (voice) system and provides a number of additional services including provision of packet data communication, which augments and complements
- 10 the circuit switched communication of a traditional communication system. Furthermore, the packet based data communication may also support packet based speech services. The GPRS system has been standardised as an add-on to an existing GSM communication system, and can be introduced to an existing GSM communication system by introducing new network elements.
- 15 Specifically, a number of Serving GPRS Support Nodes (SGSN) and Gateway GPRS Support Nodes (GGSN) may be introduced to provide a packet based fixed network communication.

Currently, 3<sup>rd</sup> generation systems are being rolled out to further enhance the

20 communication services provided to mobile users. The most widely adopted 3<sup>rd</sup> generation communication systems are based on Code Division Multiple Access (CDMA) wherein user separation is obtained by allocating different spreading and scrambling codes to different users on the same carrier frequency. The transmissions are spread by multiplication with the allocated

25 codes thereby causing the signal to be spread over a wide bandwidth. At the receiver, the codes are used to de-spread the received signal thereby regenerating the original signal. Each base station has a code dedicated for a pilot and broadcast signal, and as for GSM this is used for measurements of multiple cells in order to determine a serving cell. An example of a

30 communication system using this principle is the Universal Mobile Telecommunication System (UMTS), which is currently being deployed.

Further description of CDMA and specifically of the Wideband CDMA (WCDMA) mode of UMTS can be found in 'WCDMA for UMTS', Harri Holma (editor), Antti Toskala (Editor), Wiley & Sons, 2001, ISBN 0471486876.

5 In a UMTS CDMA communication system, the communication network comprises a core network and a Radio Access Network (RAN). The core network is operable to route data from one part of the RAN to another, as well as interfacing with other communication systems. In addition, it performs many of the operation and management functions of a cellular communication  
10 system, such as billing. The RAN is operable to support wireless subscriber units over a radio link being part of the air interface. The wireless subscriber unit may be a mobile station, a communication terminal, a personal digital assistant, a laptop computer, an embedded communication processor or any communication element communicating over the air interface. The RAN  
15 comprises the base stations, which in UMTS are known as Node Bs, as well as Radio Network Controllers (RNC) which control the Node Bs and the communication over the air interface.

A service that has been introduced to cellular communication systems and in particular to GSM is the Cell Broadcast Service (CBS). The cell broadcast  
20 service allows for text information to be broadcast to user equipment to be displayed on a display of the user equipment. Thus CBS allows for a number of unacknowledged general CBS messages to be broadcast to all user equipment within a given region. CBS messages are broadcast in defined geographical  
25 areas known as cell broadcast areas. These areas may consist in one or more cells, or may comprise the area of the entire cellular communication system.

Individual CBS messages are assigned their own geographical coverage areas by mutual agreement between the information provider and the cellular  
30 communication system operator. For example, the location areas for CBS in New York can be divided into geographical areas like Manhattan, Brooklyn,

Bronx, etc. This allows for the information provider to broadcast specific messages in a specific location area. For example, information related to traffic conditions may only be broadcast in the location areas affected.

- 5 CBS messages may originate from a number of Cell Broadcast Entities (CBEs), which are connected to the Cell Broadcast Center. CBS messages are then sent from the CBC to the cells, in accordance with the CBS's coverage requirements. CBS messages are broadcast cyclically by the cell at a frequency and for a duration agreed with the information provider. The frequency at  
10 which CBS messages are repeated depends on the information contained. For example, faster changing information, such as road traffic information, will typically be transmitted more frequently than slower changing information such as weather information.
- 15 A Single Cell Broadcast message contains 82 octets, which results in 93 text characters per message (assuming the default characters set as defined the GSM standard for the Small Message Service (SMS) is used). The CBS messages may be transmitted on different broadcast channels. Typically, the channel used depends on the content type. For example, news may be sent on  
20 one channel, traffic information on another etc. The user may select one (or more) channels and accordingly receive the content transmitted on that channel.

However, in order to receive a given type of information, the user must know  
25 which broadcast channel number this is transmitted on. He must then manually set up the mobile to receive CBS messages on that channel in order to be presented with the desired information.

In order to obtain this information, the user must contact the provider in order  
30 to retrieve the channel numbers of the desired information. Typically, this requires a user to manually make a telephone call to the provider to retrieve



the information. However, this is a very cumbersome, impractical and time consuming process. Thus, currently no well defined association exists between channel numbers and topics resulting in a complicated and inflexible operation requiring specific manual setting up of the service by the individual user.

5

Furthermore, as the channel numbers used for specific types of content may vary within a network or between different networks, a setup for one network and/or location area may not work in other networks and/or location areas therefore requiring an amended setup to be manually configured by the user.

10 Furthermore, the user equipment has no information of changes in the use of the broadcast channels. For example, the user will be unaware of any new types of content being introduced.

Hence, an improved cellular communication system would be advantageous  
 15 and in particular a system allowing for an improved cell broadcast service and specifically for a cell broadcast service allowing for increased user friendliness, increased flexibility, improved information provision, automatic adaptation to changes and/or reduced interaction by a user would be advantageous.

20

### Summary of the Invention

Accordingly, the Invention seeks to preferably mitigate, alleviate or eliminate  
 one or more of the above mentioned disadvantages singly or in any  
 25 combination.

According to a first aspect of the invention there is provided a cellular communication system comprising: means for generating broadcast information messages; each broadcast information message comprising  
 30 information associated with a content category; means for associating broadcast information messages with a broadcast channel; means for

broadcasting the broadcast information messages; and means for transmitting association information data indicating an association between broadcast channels and content categories.

- 5 The content category may for example be indicative of an information type of the information provided in the broadcast information messages and may for example relate to whether the comprised information is news, traffic information, advertising, communication service update information etc. The broadcast channels may be different physical or logical channels. For example,
- 10 the same physical channel may be used for a plurality of broadcast information messages with each broadcast information message comprising information indicating the corresponding logical broadcast channel.

The association information data may allow a user equipment receiving the

15 information to determine the broadcast channel corresponding to a desired content category. Thus the invention may alleviate or obviate the need for a user to contact an information provider or network operator in order to set up a user equipment to receive desired broadcast information.

- 20 The invention may allow a cell broadcast service having significantly increased user friendliness and may significantly facilitate operation and reduce or obviate the need for manual operation and configuration. The invention may specifically provide for a facilitated setup of a user equipment for reception of desired broadcast information. For example, the invention may allow for an
- 25 automatic update of the setup of a user equipment to adapt to changes in the broadcast channel(s) used for a specific content category in different areas. The invention may further allow for information related to new content categories to be provided to a user equipment.
- 30 Hence, the invention may allow for an improved, more flexible and more user friendly broadcast service in a cellular communication system.

The cellular communication system is preferably a GSM or UMTS cellular communication system. The cellular communication system may comprise sub-communication systems or networks. For example, a cellular communication  
5 system may comprise a plurality of cellular sub-communication systems operated independently by separate network operators. A user may thus for example be allowed to roam between different operators and networks using different broadcast channel for different content categories without having to reconfigure the cell broadcast service setup of the user equipment.

10

According to a feature of the invention, at least part of the association information data is comprised in a first broadcast information message. This allows for convenient means of communicating the association information data. Specifically, it allows for existing means of communicating to be used  
15 thus obviating or alleviating requirements for standardisation of new features. It may furthermore allow for increased compatibility with existing user equipment.

According to a different feature of the invention, the first broadcast  
20 information message comprises a list of individual broadcast channels and a corresponding content category for each broadcast channel. This may facilitate implementation. Specifically, simple processing may be enabled allowing for an accurate determination of which broadcast channel(s) correspond to a specific content category. A content category may specifically correspond to a  
25 broadcast channel if (and possibly only if) the content category is transmitted in that physical and/or logical broadcast channel. The list may furthermore be structured such that it can be presented directly to a user allowing for a simple and comprehensible user interface. Specifically, the list may provide comprehensible to a user of an existing subscriber unit comprising only means  
30 for displaying broadcast information messages directly.

According to a different feature of the invention, the association information of the first broadcast information message is represented by alphanumeric characters.

5 Preferably, the association information data is comprised as textual information in the first broadcast information message. This may allow for the information of the first broadcast information message to be displayed directly to the user allowing him to derive the association between a desired content category and a corresponding broadcast channel. Furthermore, this allows for  
10 compatibility with existing cell broadcast services using text based broadcast information messages. It furthermore allows for the required information to be automatically extracted from the broadcast information messages using simple text analysis processing such as e.g. text parsing processes. Preferably the structure of the association information is such that it allows for simple  
15 automatic extraction of information as well as for a simple and user friendly presentation to a user.

According to a different feature of the invention, the association information of the first broadcast information message is represented by a protocol language.

20

The protocol language may be specifically suited for automatic derivation of information thus facilitating automatic operation. This may allow for more efficient communication of association information and for more complex association structures to be practically communicated thereby allowing for  
25 enhanced and more complex features.

According to a different feature of the invention, the protocol language is an eXtensible Markup Language (XML). This may allow for a highly efficient implementation and facilitates development and deployment and increases  
30 compatibility with other processes.

According to a different feature of the invention, the first broadcast information message comprises a message type data section. This allows for a practical and low complexity means of identifying which type of message a given broadcast information message is. The message type may for example  
5 indicate that the first broadcast information message is a message comprising association information data and may alternatively or additionally indicate characteristics of the broadcast channels and/or content categories for which the current broadcast information message comprises association information.

10 According to a different feature of the invention, the association information data is transmitted on a predefined broadcast channel. This may facilitate reception of the association information data and may allow for reduced complexity of the implementation. Specifically, the user equipment may be operable to monitor the predefined broadcast channel (and preferably only the  
15 predefined broadcast channel) for association information data.

According to a different feature of the invention, the means for transmitting is operable to transmit the association information data in response to an association information request received from a user equipment.

20

This may allow for association information data to be transmitted when it is required by the user equipment thereby allowing for a high probability that the available association information is current when required. For example, it may allow for new association information data to be transmitted when the  
25 user equipment determines that a change in operating conditions have occurred which may possible correspond to a change in the association between broadcast channels and content categories. For example, if the user equipment determines that it has moved by a certain distance from where the previous association information data was received, there is a possibility that  
30 the association between content categories and broadcast channels may have changed, and therefore updated association information data is requested.

Additionally or alternatively, this may allow for the association information data only to be transmitted when requested by the user equipment thus allowing for reduced resource use.

- 5 According to a different feature of the invention, the means for transmitting is operable to transmit the association information data in a plurality of broadcast information messages. This may allow for more association information to be provided thus allowing for more detailed association information allowing for a more detailed and accurate selection of information.

10

According to a different feature of the invention, the association information data comprises a hierarchical organisation of content categories and each broadcast information message of the plurality of broadcast information messages is associated with a level of the hierarchical organisation. This may  
15 allow for a low complexity, detailed and accurate association to be determined. Hence, it may allow for a simple presentation of association information and/or a user friendly selection process.

According to a different feature of the invention, the plurality of broadcast  
20 information messages comprise a top level index association information message indicating an association between broadcast channels and content categories and a lower level index association information message indicating an association between broadcast channels and content sub-categories.

25 Preferably the content sub-categories correspond to further subdivisions of the content categories. Hence, more detailed information may be provided in the lower level index association information messages allowing for a more accurate selection of desired content.

30 According to a different feature of the invention, the top level index association information message comprises an indication of a broadcast channel on which

the lower level index association information message is transmitted. This may allow for a highly practical and efficient implementation and may provide for a flexible transmission of association information data, as well as for accurate and reliable reception of the lower level index association information  
5 message.

According to a different feature of the invention, the cellular communication system further comprises a user equipment having: means for receiving the association information data; means for selecting a content category; means  
10 for receiving broadcast information messages in response to the selected content category and the association information data; and means for presenting the information comprised in the broadcast information messages to a user.

15 This may allow for a user of a user equipment to be presented with content information from the broadcast information messages. Specifically, it may allow for a low complexity implementation of a user equipment operable to receive broadcast information messages associated with specific content categories without requiring a time consuming and cumbersome setup.

20

According to a different feature of the invention, the means for receiving is operable to automatically select a broadcast channel in response to the selected content category and the association information data. This allows for improved user friendliness and reduces the inconvenience to a user. It may  
25 allow for information to be received without requiring a user to select a specific communication channel. Rather, a user may select a desired content category and the user equipment may automatically and dynamically adjust settings to ensure that broadcast information messages of this content category are received.

30

According to a different feature of the invention, the user equipment further comprises means for requesting a transmission of the association information data.

- 5 This may allow for association information data to be transmitted when it is required by the user equipment thereby allowing for a high probability that the available association information is current when required. For example, it may allow for new association information data to be transmitted when the user equipment determines that a change in operating conditions have
- 10 occurred which may possible correspond to a change in the association between broadcast channels and content categories. Additionally or alternatively, this may allow for the association information data only to be transmitted when requested by the user equipment thus allowing for reduced resource use.

15

- According to a different feature of the invention, the cellular communication system further comprises means for detecting that the user equipment has entered a new region of the cellular communication system and the means for requesting a transmission is operable to request the transmission of the
- 20 association information data in response to the detection.

- Typically in cell broadcast systems, the association between broadcast channels and content categories is not identical throughout an entire cellular communication network or may differ between different cellular
- 25 communication networks of a cellular communication system. Accordingly, the invention may facilitate adaptation to the changing conditions for a moving or roaming user equipment.

- According to a different feature of the invention, the means for detecting is
- 30 operable to detect that the user equipment has entered the new region in response to a handover to a new cell.



For example, the user equipment may request local updated association information data to be transmitted whenever it hands over to a new cell. This may allow for a simple determination of the user equipment entering a new  
5 region. Furthermore, as cell broadcast services are typically constant within a cell, this may allow for new association information data to be requested whenever the associations may possibly change. Furthermore, as a user equipment typically does not frequently handover, the resource usage of transmitting the association information data is acceptable.

10

According to a different feature of the invention, the means for receiving is operable to automatically change to a new broadcast channel for a first content category in response to receiving association information data indicating a new association between the first content category and the broadcast channels.  
15 This may allow for an automatic updating of the broadcast channel used for a given content category thus ensuring that information of this content category is still received despite a change in broadcast channels. Furthermore, it may allow for interaction from a user to be unnecessary.

20 Preferably the broadcast information messages are text messages.

According to a different feature of the invention, the broadcast information messages comprise a broadcast channel identifier indicating the broadcast channel associated with the broadcast information message. This may allow  
25 for a simple and reliable implementation of broadcast channels. For example, each broadcast information message may include a data section comprising a broadcast channel number to which the broadcast information message belongs.

30 According to a different feature of the invention, the means for transmitting is operable to broadcast the association information data. This provides for an

efficient and low complexity means of communicating the association information data resulting in reduced resource use.

According to a different feature of the invention, the means for transmitting is  
5 operable to broadcast the association information data at intervals.

For example, the association information data may be transmitted periodically at regular intervals. The intervals are preferably sufficiently short to ensure that a possible delay for initialisation of a user equipment for the cell  
10 broadcast service is acceptable yet ensuring that the resource consumption is not unacceptable. The feature may allow for a simple system which does not require any communication from the user equipment to the base station yet provides the improved user friendliness and performance.

15 According to a second aspect of the invention, there is provided a network for cellular communication system; the network comprising: means for generating broadcast information messages; each broadcast information message comprising information associated with a content category; means for associating broadcast information messages with a broadcast channel; means  
20 for broadcasting the broadcast information messages; means for transmitting association information data indicating an association between broadcast channels and content categories.

According to a third aspect of the invention, there is provided a user  
25 equipment for cellular communication system; the user equipment comprising: means for receiving broadcast information messages; each broadcast information message being associated with a broadcast channel and comprising information associated with a content category; means for receiving association information data from a base station; the association  
30 information data indicating an association between broadcast channels and content categories; means for selecting a content category; and means for

presenting the information comprised in the broadcast information messages to a user, wherein the means for receiving is operable to receive broadcast information messages in response to the selected content category and the association information data.

5

According to a fourth aspect of the invention, there is provided a method of communicating broadcast information in a cellular communication system comprising: generating broadcast information messages; each broadcast information message comprising information associated with a content  
10 category; associating broadcast information messages with a broadcast channel; broadcasting the broadcast information messages; and transmitting association information data indicating an association between broadcast channels and content categories.

15 These and other aspects, features and advantages of the invention will be apparent from and elucidated with reference to the embodiment(s) described hereinafter.

## 20 Brief Description of the Drawings

An embodiment of the invention will be described, by way of example only, with reference to the drawings, in which

25 FIG. 1 illustrates a cell broadcast system for a GSM cellular communication system;

FIG. 2 illustrates a cellular communication system allowing for broadcasting of association information data in accordance with an embodiment of the  
30 invention; and

FIG. 3 illustrates examples of broadcast information messages that may be presented to a user in accordance with an embodiment of the invention.

## 5 Detailed Description of a Preferred Embodiment of the Invention

The following description focuses on an embodiment of the invention applicable to a GSM cellular communication system. However, it will be appreciated that the invention is not limited to this application but may be  
10 applied to many other cellular communication systems including 3<sup>rd</sup> Generation cellular communication systems such as UMTS.

FIG. 1 illustrates a cell broadcast system for a GSM cellular communication system. The cellular communication system comprises a plurality of base  
15 stations 101, 103, 105. Two base stations 101, 103 are coupled to a first Base Station Controller (BSC) 107 whereas the third base station 105 is coupled to a second BSC 109. The BSCs are coupled to a Network Switching Subsystem (NSS) 111 comprising the required functionality for routing data between base stations, interfacing to other communication systems, operation and  
20 management functions etc. as is well known in the art.

The NSS 111 is further coupled to a Cell Broadcast Center (CBC) 113 which is coupled to a plurality of Cell Broadcast Entities (CBE) 115, 117. The CBEs 115, 117 generate cell broadcast messages which are to be broadcast by the  
25 base stations. Thus typically the CBEs 115, 117 are controlled by information providers which may be independent of the network operator. The cell broadcast messages are fed to the CBC 113 which forwards them to the appropriate base stations 101, 103, 105. The CBC 113 thus provides the interface between the CBEs and the rest of the cellular communication system  
30 and controls the distribution of the broadcast messages.

In the shown example, two base stations 101, 103 are defined to be in the same broadcast area and accordingly receive and transmit the same broadcast information messages. The third base station 105 is defined to be in a different broadcast area and may accordingly receive and transmit different messages  
5 than those of the other two base stations 101, 103.

In the described embodiment, the broadcast information messages generated by the CBEs 115, 117 consist in text messages comprising 93 alphanumeric characters. The broadcast information messages may comprise text  
10 information belonging to different content categories. For example, text messages may comprise information related to news, traffic information, advertising etc. The text messages are distributed to the appropriate base stations and are broadcast to the user equipment 119, 121 as text messages. Upon receiving the broadcast information messages, the user equipment 119,  
15 121 may display the text comprised in the broadcast information messages to the user.

In order to allow a user to select the desired information, the broadcast information messages are organised into different broadcast channels. Hence,  
20 each broadcast information message is allocated to a specific broadcast channel. In the described embodiment, all broadcast information messages are transmitted in the same physical channel of the GSM cellular communication system but are divided into different logical broadcast channels. Specifically, each broadcast information message comprises a broadcast channel identifier  
25 which indicates which broadcast channel the individual broadcast information message has been allocated to.

In the described embodiment, the broadcast channels are simply implemented by defining a number of channels each having an individual channel number.  
30 Each broadcast information message is allocated to a broadcast channel

number by including this broadcast channel number in the broadcast information message itself.

In the described embodiment, each of the broadcast information messages is  
5 allocated to a specific broadcast channel number in response to the content  
category of the broadcast information message. Thus, a number of content  
categories may be defined and one or more broadcast channel numbers may be  
allocated to each category. Thus for example, broadcast information messages  
comprising news may be allocated to broadcast channel number 100, broadcast  
10 information messages comprising traffic information may be allocated to  
broadcast channel number 200, etc.

It will be appreciated that the allocation of broadcast information messages to  
broadcast channel numbers may be performed at any suitable time and  
15 location and may specifically be performed in the CBEs or in the CBC.

Hence, a user of a user equipment 119, 121 may customise the user equipment  
to receive the content information he is specifically interested in. For example,  
if the user is interested in receiving news he may select this option at the user  
20 equipment. Accordingly, the user equipment will parse all received broadcast  
information messages to determine if they are allocated to the broadcast  
communication channel(s) corresponding to the news content category and  
discard all broadcast information messages not resulting in a match. For  
example, if the news content group is selected, the user equipment may decode  
25 all broadcast information messages to see if they comprise the broadcast  
channel number of 100, and only in that case will the information be presented  
to the user. It will be appreciated that the user may select a plurality of  
content categories for viewing.

30 This allows for a flexible and customisable information provision but assumes  
that knowledge of which broadcast channels are used for which content

categories is available at the user equipment. FIG. 2 illustrates a cellular communication system allowing for a broadcast of association information data in accordance with an embodiment of the invention.

- 5 In FIG. 2, a broadcast information message generator 201 generates broadcast information messages to be broadcast to users. Depending on the application, the broadcast information message generator 201 may be under the control of e.g. an information provider or of the network operator. For example, the broadcast information message generator 201 may be comprised in one or
- 10 more CBEs and may generate the broadcast information message by selecting and integrating the information. In other embodiments, the CBEs may be considered external to the communication system and the broadcast information message generator 201 may represent the internal network element generating the broadcast information messages for example simply by
- 15 receiving them from an external entity. Thus, the broadcast information message generator 201 may in some embodiments be comprised in a CBC, in the NSS or in an interface function. Thus, in some embodiments the broadcast information message generator 201 may simply generate the broadcast information messages by receiving the broadcast information messages from
- 20 an external source. In other embodiments, the broadcast information message generator 201 may modify or process protocol data, control data and/or user data of received broadcast information messages to generate the broadcast information messages to be broadcast.
- 25 The broadcast information message generator 201 is coupled to an association processor 203 which is operable to associate broadcast information messages with broadcast channels. Specifically, the association processor 203 may select a specific broadcast channel for each broadcast information message depending on the type of content comprised in the broadcast information
- 30 message. In the described embodiment, a plurality of broadcast channels are implemented by each broadcast information messages comprising a broadcast

channel identifier which specifically is a broadcast channel number. The broadcast channel number is comprised as alphanumeric characters in the broadcast information message. The association processor 203 may thus simply insert the alphanumeric characters corresponding to the broadcast  
5 channel number at a predefined location in the broadcast information message. Thus, the association processor 203 may insert the alphanumeric characters "100" if the corresponding content category is news, "200" if the corresponding content category is traffic information etc.

10 In other embodiments, the association is inherent in the broadcast information messages received from an external source. Specifically, a broadcast information message received from an external source may already comprise an indication of the broadcast channel to which the broadcast information message belongs.

15

It will be appreciated that the broadcast information message generator 201 and the association processor 203 are preferably but not necessarily implemented as functional modules in the same unit. For example, the broadcast information message generator 201 and the association processor  
20 203 may be implemented as different aspects of the same software programme. This facilitates implementation as the information of the appropriate content category is inherently available to the association processor 203. Specifically, the broadcast information message generator 201 and the association processor 203 may be implemented in a CBE. Thus, the CBE may generate a  
25 broadcast information message ready to be broadcast by including information data and setting the broadcast channel number to the appropriate value corresponding to the content category of the information. Thus, the CBE may for example generate a news broadcast information message by including the news information and inserting the alphanumeric characters corresponding to  
30 the broadcast channel number used for news broadcasts.



The association processor 203 is coupled to a transmitter 205 which broadcasts the broadcast information messages. In the described embodiment, the transmitter comprises the required functionality for broadcasting the broadcast information messages in the appropriate geographical areas and in accordance with the technical specifications of the cellular communication system. Furthermore, the transmitter 205 comprises the functionality for controlling when the broadcast information messages are transmitted. Thus the transmitter 205 of FIG. 2 may comprise functionality of the CBEs, the CBC, the NSS and/or one or more of the base stations of FIG. 1. For clarity and brevity, the following description will focus on the broadcasting of broadcast information messages in a single cell and thus the transmitter 205 will be described with reference to only a single base station.

The association processor 203 is furthermore coupled to an association data generator 207. The association data generator 207 is operable to generate association information data which indicates an association between broadcast channels and content categories. In the described embodiment, the association information data comprises information of which broadcast channel numbers are used for which content categories. In this embodiment, the association data generator 207 receives information from the association processor 203 related to the content categories used and the broadcast channel number(s) allocated to each of them. In response, the association data generator 207 generates the association information data.

It will be appreciated that the association data generator 207 may receive information relating to the association between the content categories and the broadcast channels in any suitable way and from any suitable source. For example, the association information may be predefined, standardised or provided manually to the association data generator 207.

The association data generator 207 is coupled to the transmitter 205 which is operable to transmit the association information data as well as the broadcast information messages received from the association processor 203. In the described embodiment, the association data generator 207 comprises the  
5 association information data in one or more broadcast information messages. Accordingly, the transmitter 205 may process the broadcast information messages received from the association data generator 207 in the same way as the broadcast information messages received from the association processor 203. This facilitates distribution, handling and processing of the association  
10 information data in the communication system. Furthermore, the broadcast information messages comprising association information data may be received by user equipment using the same functionality as used for receiving standard broadcast information messages.

15 The cellular communication system 200 of FIG. 2 further comprises a user equipment 209. The user equipment comprises a receiver 211 which is operable to receive the broadcast information messages transmitted from the transmitter 205. The receiver 211 is coupled to a message controller 213 which is operable to control the functionality of the user equipment to receive  
20 broadcast information. The message controller 213 is furthermore coupled to a display 215 which is operable to display text based information to a user. The message controller 213 is operable to retrieve a received broadcast information message from the receiver 211, to extract the text based information and to present this to the user on the display 215. Furthermore, the message  
25 controller 213 is operable to receive and store the association information data.

The user equipment 209 furthermore comprises a user input processor 217 which is coupled to a user input in the form of a keyboard 219. The user input processor 217 is coupled to the message controller 213 and is operable to  
30 determine a selection of a content category in response to the user activations of the keyboard 219. In the described embodiment, the keyboard 219 is used

together with the display 215 to provide a more user friendly way of selecting a content category. Specifically, the user input processor 217 may request that the message controller 213 generates a list of all available content categories and displays this on the display 215. The user may then select a content  
5 category by for example entering a number corresponding to the corresponding entry in the list or by highlighting a specific category and selecting this.

The user input processor 217 detects the user activations and compares the detected activation to the list of content categories. Thereby, the user input  
10 processor 217 determines a content category selected by the user. The information of the selected content category is fed to the message controller 213. In response to receiving the content category selection, the message controller 213 accesses the association information data to determine one or more broadcast channels corresponding to this content category. Subsequently,  
15 the message controller 213 proceeds to check each subsequently received broadcast information message to determine if it belongs to the corresponding broadcast channel. Specifically, the message controller 213 may perform a text parsing of all received broadcast information messages to determine if they comprise a broadcast channel number identical to a desired broadcast channel  
20 number. If so, the information of the broadcast information message is extracted and presented to the user. It will be appreciated that the presentation may not be immediate but that the information may be stored for later presentation.

25 Hence, the association information data allows for the user equipment to automatically identify broadcast channels which correspond to desired content categories. Hence, the user need not contact an information provider or network operator to obtain information on which broadcast channels are used. Rather, the user can simply select a suitable content category from a  
30 presented list and the user equipment may automatically configure itself to receive broadcast information messages of the content category. Indeed, the

user need not know or consider any aspects related to broadcast channels but need only consider which information is desired. Thus, the technical details may be hidden from the user thereby significantly facilitating operation and providing for an improved user interface and increased user friendliness.

5

Furthermore, the described embodiment allows for an increased flexibility in the information provision. For example, if a new content category is deployed, this may simply be included in the list presented to the user (for example, the association information data may comprise an explicit description of content categories and this may be presented to the user in the list). The user may thus access the newly deployed content category simply by selecting the content category from the display. Thus introduction of new content categories is significantly facilitated.

15 The system may furthermore allow for different broadcast channels to be used for different content categories in different cells without risking that this results in lost or erroneous information being received or requiring that the user reconfigures the user equipment. For example, a user equipment handing over from a cell wherein a news content category is transmitted in broadcast channel number 100 to a new cell wherein the news content category is transmitted in broadcast channel number 200 will receive association information data from the base station of the new cell indicating that the news content category is associated with broadcast channel number 200. Thus the message controller 213 may automatically update its operation to receive 20 messages in broadcast channel number 200 and ignore messages in broadcast channel number 100. Hence an automatically updating user equipment operation is enabled which does not require user re-configuration. This may allow for a more flexible operation and management of the broadcast of information in a cellular communication system.

30

In the described embodiment the association information data may be transmitted in a plurality of messages. Thus, in this embodiment, the amount of information that can be comprised in the association information data is not limited by the size of the broadcast information messages. In the embodiment,  
5 a structured hierarchical organisation is used allowing for a simple and comprehensible association information data provision. Specifically, the association information data comprises a hierarchical organisation of content categories and each broadcast information message of the plurality of broadcast information messages is associated with a level of the hierarchical  
10 organisation.

In the embodiment, a master index message is transmitted which comprises information of the main content categories broadcast by the base stations. The master index message further comprises information of broadcast channels  
15 used for transmitting sub-index messages. The sub-index messages comprise further sub-content categories for one or more of the main content categories and indicate which broadcast channels are used for these sub-content categories.

20 In the described embodiment, the association information data is transmitted as text information and thus the association information data is represented by alphanumeric characters. This allows compatibility with existing equipment for communication of text based broadcast information messages and allows for a representation of association information data that may  
25 conveniently be interpreted by a user or by automated processing.

Especially, the text information of the association information data is structured such that it may be directly presented to the user for easy interpretation. Thus, if a user equipment does not comprise dedicated circuitry  
30 to automatically utilise the association information data, the broadcast information messages comprising association information data may be

displayed to the user in the same way as any other broadcast information message thereby providing information allowing the user simply to select the appropriate broadcast channels without having to contact the information provider or the network operator.

5

A specific example of a protocol for transmitting association information data in broadcast information messages will be described in more detail in the following.

- 10 In accordance with the example protocol, a new index broadcast information message type is defined in addition to the existing broadcast information messages. The new index broadcast information type comprises a master index message type and a sub-index message type. The master index message comprises the main content categories and is used to index the sub-index
- 15 messages where further information of sub-content categories can be found. The index messages comprise references to the associated broadcast channels and thus provide the association information data.

In particular the index messages are structured as alphanumeric lists wherein

20 each item of the list comprises the following fields:

broadcast channel number; and  
content category text description field

The master index message is allocated to broadcast channel 0. In the specific

25 embodiment, it thus comprises a broadcast channel identifier of broadcast channel number "0".

In the proposed example protocol, the index messages are characterised by beginning with the characters "@#" and ending with the characters "#@". All

30 other messages are considered to be regular broadcast information messages.

In the index messages, the following fields are defined:

An optional header field comprised inside the character sets “!\*” and “\*!”

A list field wherein each line comprises the following fields:

- 5           A broadcast channel index, which is a decimal value represented by alphanumeric characters and comprised inside the character sets “(“ and “)”
- A content category description, which is a text based description of a corresponding content category. The content category
- 10           description comprises alphanumeric characters located inside the character sets “\*” and “\*”.

Thus the index messages comprise a list of broadcast channels and the corresponding content categories. The list of the master index message

15 specifically comprises the broadcast channels where the sub-index message for the corresponding content category is transmitted.

Thus, as a specific example of the usage of the protocol, the following example messages may be transmitted:

20

Master index message transmitted on broadcast channel 0:

0

@#!\*Index\*!

(100) \*CNN\*

25 (200) \*Local News\*

(240) \*Traffic\*

(300) \*Sales\*

#@

30 Sub-index message transmitted on broadcast channel 100:

100

@#!\*CNN\*!  
 (110) \*US News\*  
 (115) \*World News\*  
 (120) \*Stocks\*  
 5 (130) \*US Weather\*  
 #@

Regular message transmitted on broadcast channel 110:

110

10 Test example. The quick brown fox jumping over the lazy dogs back.

Hence, the transmitted broadcast information messages comprise information which can be retrieved automatically or which may be presented to a user. Specifically, a user of existing user equipment may initially be presented with  
 15 the master index message in the form shown above. If he is interested in news from CNN he may configure the user equipment to receive broadcast channel 100. He will then receive the sub-index message which may be presented as shown above. If the user is interested in news related to Stocks he may then configure the user equipment to receive broadcast channel 120 and he will  
 20 then proceed to receive the desired news information.

In the described embodiment, the received broadcast information messages may be modified before being presented to the user. For example, the control characters may be removed from the text information before being presented  
 25 to the user. FIG. 3 illustrates examples of broadcast information messages that may be presented to a user in accordance with an embodiment of the invention. The examples correspond to a possible presentation of the example broadcast information messages given above.

30 In this embodiment, the user may select CNN by pressing the "1" key on the keyboard or by selecting the first line by using functional positioning keys "↑"



or “↓” followed by an “Ok” softkey. Preferably, the user equipment automatically receives and stores all index messages. Therefore, in response to pressing the “1” key, the user is immediately presented with the list comprised in the sub-index message. He may then select the Stocks content category by  
 5 pressing the “3” on the keyboard or by using the functional positioning keys. In response to this selection, the user equipment will automatically configure the reception to receive broadcast channel 120 and thus to receive and present (or store) the information related to stocks.

10 Should the user move into a different cell wherein the stocks content category is transmitted using a different broadcast channel, the user equipment automatically detects the new broadcast channel from the association information data and reconfigures itself to receive this broadcast channel. Hence, it will be appreciated that the user simply needs to select a desired  
 15 content category and the user equipment will in the described embodiment automatically configure itself to receive this information and furthermore will automatically reconfigure itself in response to changes in the association between content categories and broadcast channels.

20 It will be appreciated that in other embodiments, other ways of transmitting the association information data may be implemented. Specifically, the association information data may be transmitted using a suitable protocol language such as for example Java or XML (eXtensible Markup Language). These protocol languages may comprise options and functionality allowing for  
 25 a more flexible user interface comprising features that cannot be achieved with simple text based communication. For example, the example index messages described above could be transmitted in the following XML representation:

30 Master index message:

```
<INDEX><HEAD>Index</HEAD>
```

```

<ITEM><TARGET URL="100">CNN <TARGET></ITEM>
<ITEM><TARGET URL="200">Local News</ITEM>
<ITEM><TARGET URL="240">Traffic</ITEM>
<ITEM><TARGET URL="300">Sales </ITEM>
5 </INDEX>

```

**Index message:**

```

<INDEX><HEAD>CNN</HEAD>
<ITEM><TARGET URL="110">US News<TARGET></ITEM>
10 <ITEM><TARGET URL="115">World News</ITEM>
<ITEM><TARGET URL="120">Stocks</ITEM>
<ITEM><TARGET URL="130">US Weather</ITEM>
<ITEM><TARGET URL="000">Back</ITEM>
</INDEX>

```

15

The association information data may be transmitted in accordance with any suitable scheduling or timing algorithm. Specifically, the transmission of association information data may be event driven and/or may be interval driven.

20

Thus, in some embodiments, each base station may at intervals broadcast association information data to all user equipment within the cell. Thus in this embodiment, the base station simply broadcasts the association information data in accordance with a scheduling algorithm. Specifically, the scheduling

25 algorithm may simply correspond to a periodic transmission of association information data. For example, each index message may be transmitted every five minutes thereby ensuring that user equipment may receive the full association information data within a time interval of five minutes.

Consequently, a user equipment may miss broadcast information for a

30 maximum period of five minutes which in many cases is acceptable.

Furthermore, a repetition interval of five minutes will result in relatively low resource usage for the transmission of association information data thereby

increasing the available resource for broadcast of content information. This implementation allows for a low complexity system with no requirements for any communication from the user equipment to the base stations.

- 5 In other embodiments, the user equipment may comprise functionality for requesting that association information data is transmitted. The base stations may transmit the association information data in response to receiving a request from a user equipment (and possibly only in response to receiving a request).

10

This may allow for the user equipment to determine when association information data is required and may ensure that the association information data is available when needed. Hence, this allows for a more complex but also more flexible and possibly better performing broadcast cell service. For

- 15 example, the user equipment may request that an association information data is transmitted when the user activates the cell broadcast option on the user equipment thereby reducing the maximum delay and possibly reducing the resource usage as association information data is only transmitted when necessary. In particular this implementation may be useful when association  
20 information data is customised and transmitted to specific users.

- In some embodiments, the user equipment may comprise means for detecting that it has entered a new region. For example, the user equipment may comprise location determination equipment such as a GPS receiver. It may  
25 then determine that it has entered a new region, if it detects that it has moved more than a given amount from the location where the previous association information data was received. Thus, the user equipment may request association information data if the distance between the current location and the location where the previous association information data was received is  
30 larger than a given threshold.

Alternatively or additionally, the user equipment may determine that it has entered a new region when it performs a handover to a new cell. Following a handover, the user equipment will receive broadcast information messages from the new serving cell. In some situations, different cells may use different  
5 broadcast channels for a given content category. Thus, the user equipment may request association information data following every handover. The received association information data will comprise information related to the associations between broadcast channels and content categories in the new cell, and the user equipment may accordingly check if these have changed. If a  
10 change is detected, the user equipment may reconfigure itself to receive broadcast information messages on the new broadcast channels. Thus, the user equipment will automatically update its configuration to ensure that the same content categories are received. This update may specifically occur without the user's knowledge. Hence a very flexible and user friendly cell  
15 broadcast service may be provided.

It will be appreciated that any suitable method of communicating association information data to user equipment may be used. For example, the association information data may be transmitted directly to individual or groups of user  
20 equipment or may be broadcast. The association information data may be transmitted using broadcast information messages or may use any other suitable communication protocol or convention. The association information data may relate to only a subset of content groups and/or content categories. The association information data may furthermore comprise other information  
25 related or not related to broadcast messages. The association information data transmitted to different user equipment may further be different for different user equipment.

It will be appreciated that the above embodiment for clarity is described with  
30 reference to specific functional modules but that the described functionality may be implemented in any suitable location and by any suitable unit or units.

Specifically, the invention can be implemented in any suitable form including hardware, software, firmware or any combination of these. However, preferably, the invention is implemented at least partly as computer software running on one or more data processors and/or digital signal processors. The  
5 elements and components of an embodiment of the invention may be physically, functionally and logically implemented in any suitable way. Indeed the functionality may be implemented in a single unit, in a plurality of units or as part of other functional units. As such, the invention may be implemented in a single unit or may be physically and functionally distributed between  
10 different units and processors.

Although the present invention has been described in connection with the preferred embodiment, it is not intended to be limited to the specific form set forth herein. Rather, the scope of the present invention is limited only by the  
15 accompanying claims. In the claims, the term comprising does not exclude the presence of other elements or steps. Furthermore, although individually listed, a plurality of means, elements or method steps may be implemented by e.g. a single unit or processor. Additionally, although individual features may be included in different claims, these may possibly be advantageously combined,  
20 and the inclusion in different claims does not imply that a combination of features is not feasible and/or advantageous. In addition, singular references do not exclude a plurality. Thus references to "a", "an", "first", "second" etc do not preclude a plurality.

## CLAIMS

1. A cellular communication system comprising:
  - means for generating broadcast information messages; each broadcast
  - 5 information message comprising information associated with a content
  - category;
  - means for associating broadcast information messages with broadcast
  - channels;
  - means for broadcasting the broadcast information messages; and
  - 10 means for transmitting association information data indicating an
  - association between broadcast channels and content categories.
  
2. A cellular communication system as claimed in claim 1 wherein at least
- 15 part of the association information data is comprised in a first broadcast
- information message.
  
3. A cellular communication system as claimed in claim 2 wherein the first
- broadcast information message comprises a list of individual broadcast
- channels and a corresponding content category for each broadcast channel.
- 20
4. A cellular communication system as claimed in claim 2 or 3 wherein the
- association information of the first broadcast information message is
- represented by alphanumeric characters.
  
- 25 5. A cellular communication system as claimed in claim 2 or 3 wherein the
- association information of the first broadcast information message is
- represented by a protocol language.
  
6. A cellular communication system as claimed in claim 5 wherein the
- 30 protocol language is XML (eXtensible Markup Language).

7. A cellular communication system as claimed in any of the claims 2 to 6 wherein the first broadcast information message comprises a message type data section.
- 5 8. A cellular communication system as claimed in any of the previous claims wherein the association information data is transmitted on a predefined broadcast channel.
9. A cellular communication system as claimed in any previous claim  
10 wherein the means for transmitting is operable to transmit the association information data in response to an association information request received from a user equipment.
10. A cellular communication system as claimed in any previous claim  
15 wherein the means for transmitting is operable to transmit the association information data in a plurality of broadcast information messages.
11. A cellular communication system as claimed in claim 10 wherein the association information data comprises a hierarchical organisation of content  
20 categories and each broadcast information message of the plurality of broadcast information messages is associated with a level of the hierarchical organisation.
12. A cellular communication system as claimed in claim 11 wherein the  
25 plurality of broadcast information messages comprises a top level index association information message indicating an association between broadcast channels and content categories and a lower level index association information message indicating an association between broadcast channels and content sub-categories.

13. A cellular communication system as claimed in claim 11 wherein the top level index association information message comprises an indication of a broadcast channel on which the lower level index association information message is transmitted.
- 5
14. A cellular communication system as claimed in any previous claim further comprising a user equipment having:
- means for receiving the association information data;
  - means for selecting a content category;
  - 10 means for receiving broadcast information messages in response to the selected content category and the association information data; and
  - means for presenting information comprised in the broadcast information messages to a user.
- 15 15. A cellular communication system as claimed in claim 14 wherein the means for receiving is operable to automatically select a broadcast channel in response to the selected content category and the association information data.
16. A cellular communication system as claimed in claim 14 or 15 wherein  
20 the user equipment further comprises means for requesting a transmission of the association information data.
17. A cellular communication system as claimed in any of the claims 14 to  
25 16 further comprising means for detecting that the user equipment has entered a new region of the cellular communication system and wherein the means for requesting a transmission is operable to request the transmission of the association information data in response to the detection.
18. A cellular communication system as claimed in claim 17 wherein the  
30 means for detecting is operable to detect that the user equipment has entered the new region in response to a handover to a new cell.



19. A cellular communication system as claimed in any of the claims 14 to 18 wherein the means for receiving is operable to automatically change to a new broadcast channel for a first content category in response to receiving  
5 association information data indicating a new association between the first content category and the broadcast channels.

20. A cellular communication system as claimed in any of the previous claims wherein the broadcast information messages are text messages.

10

21. A cellular communication system as claimed in any of the previous claims wherein the broadcast information messages comprise a broadcast channel identifier indicating the broadcast channel associated with the broadcast information message.

15

22. A cellular communication system as claimed in any of the previous claims wherein the means for transmitting is operable to broadcast the association information data.

20 23. A cellular communication system as claimed in claim 22 wherein the means for transmitting is operable to broadcast the association information data at intervals.

24. A cellular communication system as claimed in any of the previous  
25 claims wherein the association between broadcast channels and content categories is different in at least a first cell and a second cell of the cellular communication system.

25. A cellular communication system as claimed in any of the previous  
30 claims wherein the cellular communication system is a Global System for Mobile communication (GSM) cellular communication system.

26. A network for a cellular communication system; the network comprising:
- means for generating broadcast information messages; each broadcast information message comprising information associated with a content category;
  - means for associating broadcast information messages with broadcast channels;
  - means for broadcasting the broadcast information messages;
  - 10 means for transmitting association information data indicating an association between broadcast channels and content categories.
27. A user equipment for cellular communication system; the user equipment comprising:
- 15 means for receiving broadcast information messages; each broadcast information message being associated with a broadcast channel and comprising information associated with a content category;
  - means for receiving association information data from a base station; the association information data indicating an association between broadcast
  - 20 channels and content categories;
  - means for selecting a content category; and
  - means for presenting the information comprised in the broadcast information messages to a user, wherein
  - the means for receiving is operable to receive broadcast information
  - 25 messages in response to the selected content category and the association information data.
28. A method of communicating broadcast information in a cellular communication system comprising:
- 30 generating broadcast information messages; each broadcast information message comprising information associated with a content category;

associating broadcast information messages with broadcast channels;  
broadcasting the broadcast information messages; and  
transmitting association information data indicating an association  
between broadcast channels and content categories.



INVESTOR IN PEOPLE

Application No: GB0323775.7

41

Examiner: Mr David McWhirter

Claims searched: 1-28

Date of search: 2 April 2004

### Patents Act 1977: Search Report under Section 17

#### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular reference
X	1-9 & 14-28	WO 2003/012623 A3 (MARKPORT) see page 9 line 19 - page 10 line 5
A	None	"3GPP TS 23.041 V3.5.0: Technical realisation of Cell Broadcast Service" - Release 1999

#### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

#### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>W</sup> :

H4L

Worldwide search of patent documents classified in the following areas of the IPC<sup>07</sup>

H04Q

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI, PAJ