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Advantages and Services Using Cell Broadcast

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"Reaching Millions in a Matter of Seconds"

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Cell Broadcast Forum

Bubenbergplatz 4, CH-3001 Berne, Switzerland
E-mail: info@cellbroadcastforum.org Internet: http://www.cellbroadcastforum.org/

About Cell Broadcast Forum

The Cell Broadcast Forum (CBF) is a non-profit Industry Association that supports the world standard for cell broadcast wireless information and telephony services on digital mobile phones and other wireless terminals. The primary goal of the Cell Broadcast Forum is to bring together companies from all segments of the wireless industry value chain to ensure product interoperability and growth of wireless market.

The Forum's mission includes

- Promotion of simple and easy-to-use, interoperable Cell Broadcast service solutions,
- Improving the technology and underlying standards
- Maximizing business for the mobile and related industry

Cell Broadcast Forum members represent the global handset market, carriers that together serve more than 100 million customers, leading infrastructure providers, software developers and other organisations providing solutions to the wireless industry.

http://www.cellbroadcastforum.org

Content

1 Definitions and Abbreviations

2G	Second Generation
2.5	Transition from 2G to 3G
3G	Third Generation
BSC	Base Station Controller
BTS	Base Transceiver Station
CB	Cell Broadcast
CBC	Cell Broadcast Centre
CBF	Cell Broadcast Forum
CBE	Cell Broadcast Entity
CBS	Cell Broadcast System
EMS-CB	Enhanced Messaging Service - CB
EU	European Union
FCC	Federal Communications Commission
GPS	Global Positioning System
GSM	Global System for Mobile communications
GUI	Graphical User Interface
IVR	Interactive Voice Response
LBS	Location Based Services
MBMS	Multimedia Broadcast Multicast Service
OMC	Operation and Maintenance Centre
OTA	Over-The-Air
PLMN	Public Land Mobile Network
SMS	Short Message Service
SMSC	Short Message Service Centre
SMS-CB	SMS Cell Broadcast
SIM	Subscriber Identification Module
STK	SIM Tool Kit
UMTS	Universal Mobile Telecommunications System
WAP	Wireless Application Protocol

2 Overview

2.1 Introduction

Where SMS is a service of individual messages, Cell Broadcast is capable of broadcasting one single message to reach all mobile handsets in an area as small as one radio cell and as big as the entire country. Only handsets that have CB-channels activated will receive the messages. It's fast and it's real-time! Sending a message to millions of handsets is indeed a matter of seconds.

2.2 History

Cell Broadcast was defined in 1993 in phase 2 of the GSM standard. It was not until May 1996 that a German operator started a project to investigate the possibilities of a commercial Cell Broadcast service. The first commercial system was launched in March 1998 in Lebanon.

Since then various companies have released Cell Broadcast systems and applications that provide some form of cell broadcast functionality.

In 2002 Cell Broadcast systems are being deployed in many GSM networks all over the world. Especially the Chinese market has proven to be a rapid growing market for cell broadcast.

2.3 Functionality

Cell Broadcast is a technology that allows a text or binary message to be defined and distributed to all mobile terminals connected to a set of cells. Whereas SMS messages are sent point-to-point, Cell Broadcast (SMS-CB) messages are sent point-to-area. This means that one SMS-CB message can reach a huge number of terminals at once. In other words, SMS-CB messages are directed to radio cells, rather than to a specific terminal.

SMS-CB is an unconfirmed push service, meaning that the originator of the message does not know who has received the message[1], allowing for services based on anonymity.

A Cell Broadcast Entity (CBE) is a multi-user front-end that allows the definition and control of SMS-CB messages. A CBE can be located at the site of a content provider.

At the site of the operator a so-called Cell Broadcast Centre (CBC) is located. The CBC is the heart of the Cell Broadcast System and acts as a server for all CBE clients. It takes care of the administration of all SMS-CB messages it receives from the CBEs and does the communication towards the GSM network. The GSM network itself takes care of delivering the SMS-CB messages to the mobile terminals.

[1] A dedicated SIM Toolkit application in the terminal could be used if end-user subscription is required.

3 Advantages of CB

For Telecom Operators, as well as Content Providers and Application Providers, it is important to understand the key advantages for launching successful CB services.

This section intends to list the main competitive advantages of SMS-CB.

1 ADVANTAGE # 1: Location Based Push Services

SMS-CB offers the ability to differentiate the push messages depending on the location. Messages can be broadcast to areas as small as one single radio cell, as big as the entire network and any cluster of areas in between. No other mature technology offers such a feature.

This possibility looks attractive for many reasons. Refer to section 4.2 for examples of location-based services.

2 ADVANTAGE # 2: Efficient Trade-off between SMS and CB

For the reasons detailed in the previous section, any time text messages are to be pushed to a large number of subscribers, this one-to-many-technology is more efficient than basic one-to-one SMS. This will impact the cost structure of such services, and makes network dimensioning more easy. In an average network it would take 100 SMS with the same content approx. 30 seconds to reach its destination, whereas in a network with a CB-message transmission path of 30 seconds, all the end-users (even 5.000.000) in that network (tuned in to a CB-channel) will be able to receive the message real-time.

3 ADVANTAGE # 3: CB messages provoke SMS, WAP and voice traffic

Once the customers enlist to a broadcast channel, he agrees to receive a significant number of messages, where reception of basic SMS messages may appear more intrusive.

A customer, having enlisted to a service on a CB channel, is now susceptible to various forms of teasing; as is any TV watcher who inexplicitly agrees on watching commercials. In the case of CB channel commercials could have the form triggers for SMS, WAP or voice services.

In may be obvious that too much advertising/promotion kills the media: depending on the target and the nature of services requested by the customer, the telecom operator could promote events or services and this promotion is part of the CB service.

4 ADVANTAGE # 4: Real Time Communication

The time to broadcast a message over a CB channel is non-sensitive to the number of subscribers who will receive the (push) message. In a typical network a broadcast message can be send in 30 seconds to reach all handsets. The bandwidth used to carry the message is non-sensitive to peak hours, i.e. the bandwidth is independent of the amount of handset users that actually read the message. Furthermore, CB does not use the signalling network (IN7) for carrying the messages like SMS does.

One CB message (with a maximum of 15 pages with 93 characters, in total 1395 characters) to a BSC carries as much data as 8 basic SMS messages. The network infrastructure to carry these CB messages is dedicated to SMS-CB and the peak traffic on SMS-CB does not collide with any other service.

5 ADVANTAGE # 5: Multi-Language Push Services

On one single CB channel, messages can be broadcast in various languages. Because handsets are sensitive to the selected language, only messages in that language will be displayed. Such a feature looks particularly attractive for multi-lingual countries, or for services dedicated to roamers to make them loyal to a network.

6 ADVANTAGE # 6: Emergency Location Based Info Services

In case of local emergencies, like chemical air pollution, fires or hurricanes, or to enforce citizen protection, Governmental institutions may want to broadcast emergency messages to handset users present in an area. This way citizens on the move can be reached as well as those listening to radio or TV, or working with the Internet.

The only currently existing technology for these emergency services on 2G and 3G networks is SMS-CB.

7 ADVANTAGE # 7: SMS-CB can broadcast binary messages

Next to broadcast of text-messages also binary data could be transmitted over a CB-channel. This means that encryption-decryption for subscribed services are a possibility as well as machine-to-machine communication using CB as a bearer. Applications of this type are given in section 4.27.

Other features are equally possible, like:

- Dynamic traffic updatesHandy OTA or SIM OTA through SMS-CB any time the same OTA message addresses a large list of subscribers
- Enhanced SMS-CB like EMS enabling ring tones or logo transmission
- Assisted GPS

8 ADVANTAGE # 8: Conceptual Opt-In and Opt-out features

Trends in privacy protection regulation are already translated into some EU regulations or even domestic laws. The development of Internet makes theses rules appear more necessary and become more acute (i.e. anti-spamming). Concepts with push services targeted at mobile handset users that require permission of the end-user need to be well defined.

Opt-In (the customer wants to access) and Opt-Out (the customer wants to step out) are conceptual features of CB technology. Therefore Content Providers will only reach those handset users that voluntarily switch on to a CB service. This allows for m-marketing campaigns to be targeted at just the right mobile community.

9 ADVANTAGE # 9: Messages stream and are not stored

A feature of a CB message is that it is displays only. In principle no information is stored, neither in the SIM nor in the handset, unless the user desires to archive the message. This means that CB messages could be seen as form of streaming content. Instead of with SMS no inboxes will ever overflow, just because the message never reaches any inbox.

In most new telephones there are different beep-settings (loud/medium/silent) not only in volume or appearance but also depending on the type of message (i.e. different for an SMS than for a CB-message).

10 ADVANTAGE # 10: Educational to text messaging

Users in emerging markets, who are predominantly using their mobile phone for voice calls, will need to be educated in the use of additional data services. Providing messages on CB channels that are free of charge will make the user familiar with text on the mobile phone.

An easily obtainable increase of one SMS per user per week to two SMS per week will generate large extra revenue.

Operators should drive market analysis to check if an increase in SMS reception generates an increase in average SMS sending. However, generally SMS-CB reception increases mobile originated SMS traffic (customer gets accustomed and teased to SMS), and that it could make SMS pedagogy easier.

4 Service Concepts with CB

4.1 Value Chain

To be able to successfully market a service that makes use of cell broadcast it must be clear which party supplies the information, and which party is going to pay for it.

The CBS value chain consists of four parties, as shown in Figure 4-1.

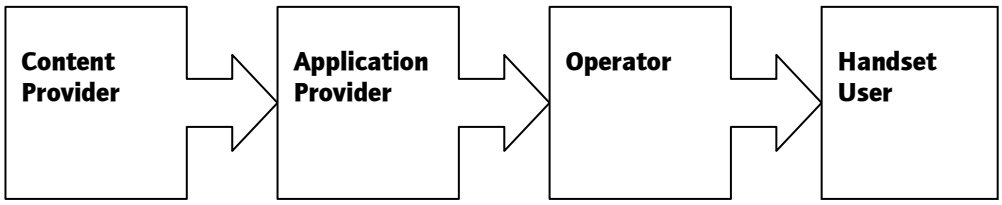

Figure 4-1: CBS Value Chain

In general two cases can be distinguished: Either the Handset User pays, or the Content Provider pays.

1 The Handset User pays

The Content Provider is the party that has information to share. It could be advertising, it could be tourist information, but it could also be a mobile marketing campaign. In the end, the Content Provider wants to make money from the service.

Obviously the Handset User is going to pay for all of it. Be it through the added premium rate SMS, IVR or WAP traffic that is generated, or through the fact that the Handset User responds to the request from the Content Provider and buys what is offered by the Content Provider.

The Handset User can also be charged for a subscription fee for channels above 999[2]. These channels cannot be activated from the handset, but must be activated by means of OTA. OTA messages are SMS messages and can be charged for.

The Application Provider is a party that formats the content by using its application. Formatting content into cell broadcast messages is just one of the possibilities. Using SMS messages is also a possibility when the contents are personalised. The Application Provider will also process the data that is sent back by the Handset User, e.g. by using profile databases. The Application Provider is being paid by the Content Provider, or gets a share of the revenue that is generated through the premium rate SMS, WAP or IVR responses from the Handset User.

The Operator provides the network over which messages are sent to the mobile Handset User. The Operator could be paid by the Application Provider for the use of the network, or the Operator takes a share of the revenue generated through the premium rate SMS, WAP or IVR responses from the Handset User.

[2] However, some handsets do allow manual activation of channels above 999.

2 The Content Provider pays

There is a business case where the Content Provider pays for the service, and the Handset User gets the messages for free. An example of that is when the Content Provider wants to broadcast emergency messages to an area to warn citizen of bad weather conditions, like tornado's, icy roads, or severe air pollution.

In such cases the Content Provider has financial resources from other parties, like a government body.

4.2 Examples of services

When reading through the examples below, it must be kept in mind that the Operator can perform the role of Application Provider, and even that of Content Provider.

1 Cell information

Perhaps the most common service is broadcast of cell information. Most networks already have this service on channel 50, which is done without a CBC. However, using a CBC for this purpose makes maintenance of cell information easier.

The Alcatel OMC no longer supports the cell information service. This means that in these networks a CBC is the only means to broadcast cell information.

2 Events

During events, like Cebit in Germany or a GSM World Congress, Cell Broadcast can be used to inform visitors of the start of presentations, special offers, etc. On the roads leading to the place of the event information can be broadcast with directions to follow to parking areas.

3 The nearest....

Especially visitors to a city may need to know where the nearest on-duty pharmacist is, the nearest car-park with free space, the telephone number of the nearest hospital, the nearest all-hours petrol station or the nearest hotel, or hostel.

4 Advertising

Cell Broadcast is well suited for advertising. However, it must be kept in mind that there must be a balance between advertising and 'useful' information, otherwise the Handset User may turn off the channel. 'Useful' information is information that the Handset User can use immediately like discounts for products being advertised or weather information, stock-exchange rates, etc.

5 Goal Service

In Turkey very popular is the goal service where (intermediate) scores of the four main football clubs are broadcast during games.

6 Airport Gate Service

Cell Broadcast can be used in airports to inform travellers when a gate opens for departure and of possible delay of flights.

7 Traffic Information Service

In-car navigation systems become increasingly more popular, especially for the business drivers that travel from destination to destination. Cell Broadcast is a very efficient bearer for information about traffic jams or road works, so the navigation system can calculate an alternate route.

8 Tourist Information

Tourist that visit an area may be interested in information on tourist routes, historic information on buildings, the nearest...

- beach information, like water temperature, sea conditions ("black flag") and beach events;
- ski information, like snow conditions, closed slopes, last ski lift, and next ski bus to village

9 Operator Information

The network operator can use Cell Broadcast to announce tariff changes, advertise for products and services, perhaps in exchange for free logos or ring tones to keep the Handset User interested in the channel.

10 Islamic Information

Cell Broadcast can be used in the Islamic world to broadcast the times of sunrise and sunset during Ramadan, and daily the times of prayer.

11 GSM-Rail

Although Cell Broadcast is not included in the definition of GSM-Rail, Cell Broadcast can be used to inform the traveller of reasons for delays, and inform the train drivers of local rail conditions, or of work that is being carried out on the track.

12 Solar Power regulation

More and more houses become equipped with solar power generators. When little power is consumed, the excess power can be fed back into the net. Electricity boards must have a means to control the amount of power fed back into the net. Cell Broadcast can be used in a machine-to-machine communication to control solar power generation in a group of houses in an area with too much sunshine.

All the above-mentioned applications are based on the use of a Cell Broadcast system as the only bearer of information. Many more services can be developed where Cell Broadcast is just one of the bearers. Personalised information is then sent via SMS, and responses of Handset Users can be entered via SMS, WAP, IVR, or a voice call. Possibly the User has to register on an Internet site first.

13 Auctions

Mobile auctions can start with a Cell Broadcast message. Users can enter their bids through SMS, or IVR and the end of the auction can again be announced with a broadcast message.

14 Chat Service

Mobile chat services nowadays are based on SMS traffic. Through Cell Broadcast however, the chat can be made local. Someone sends a premium SMS to start a chat and this announcement is broadcast to all Handset Users that are interested in chatting. During the chat session information on how many chatters are actively involved, and who just joined the chat can be broadcast regularly, making chatting more attractive. Especially dating services may profit from the fact that the service is local.

15 Emergency notification

Emergency services are one of the most wanted location-based services that people would like to have on their mobile telephone (according to Harris Interactive US market study on LBS). This preference for emergency services exists because local calamities are a fact of life: environmental disasters like Tornadoes, Typhoons, Tsunami and volcano eruptions; major traffic calamities; industrial disasters like explosions and recently terrorist actions happen all over the world.

The mobile phone already is an important communication device world-wide. 60% of first alerts are received from mobile phones at Public Safety Answering Points (PSAP) like 911 and 112. Mobile phones could also play an important role in spreading real-time emergency alerts to reach people where they are during their daily activities. Government organisations like the FCC in the USA, the LOCUS-project in the European Union and the State Development and Planning Commission (SDPC) in China, recognise this opportunity and come with regulations to facilitate and stimulate this development.

16 M-Marketing

A Mobile Marketing campaign is an activity where a company needs access to a large group who are willing to co-operate in a survey. The group of Handset Users is already large (hundreds of thousand to many millions of subscribers), and is still growing. These Handset Users might be willing when given the right incentive. Cell Broadcast can be used to trigger responses. Responses given through SMS or IVR are used to build a database with valuable marketing information.

17 Mobile Games

Mobile Games have become popular in the Stockholm area. Cell Broadcast could be used to announce the start of a new game. At the end the winner can be announced with a broadcast message.

18 Support of SMS Services

In many cases services based on SMS can be enhanced with the use of Cell Broadcast. The major advantage of using Cell Broadcast in these cases is that one single broadcast message replaces many thousands of SMS messages.

The above mentioned examples from 13 to 18 basically demonstrate how Cell Broadcast can be used as part of a total service where also other technologies, like SMS are involved.

Cell Broadcast is usually considered as a service where the Handset User is anonymous, and can therefore not be billed. This is, however, not necessarily always the case. With the use of OTA, new services can be defined where the subscriber's profile is known. Hence, the subscriber can receive targeted Cell Broadcast information, and can be billed.

19 Stock Exchange Rates

A SIM Toolkit application can be downloaded into a handset through OTA. The subscriber pays for the reception of the application.

Stock Exchange rates are broadcast in compressed binary format and sent to the STK application, rather than the display. The information is decompressed and deciphered and displayed on the screen.

5 Technology

5.1 Implementation

Base Transceiver Stations (or radio cells) in a GSM network are used to broadcast messages. A Base Station Controller controls a group of BTSs. For the purpose of Cell Broadcast all BTSs and BSCs form the total network, the PLMN. A network in Germany for instance can be as large as 50'000 BTSs.

BSCs contain some form of Cell Broadcast functionality. A message definition for a BSC contains a list of BTSs that must broadcast the message, the repetition rate and the number of times the message must be broadcast. To prevent displaying of the message (and beeping of the handset) each time it is broadcast, the message also has a message identifier.

The Cell Broadcast Centre is a mobile-network element that is used to schedule messages for broadcast. The CBC translates broadcast areas into lists of BTSs that cover the area. Other functionality includes maintaining network changes, and maintaining content provider parameters such as reserved air and storage capacity, and maximum update rates. For the back-office, the CBC is equipped with billing functions.

Connected to the CBC are one or more Cell Broadcast Entities (CBEs), which can be used locally or remotely. CBEs allow content providers to work off-line on a computer system to create and maintain messages for broadcast. A Graphical User Interface (GUI) is often also available in a CBE.

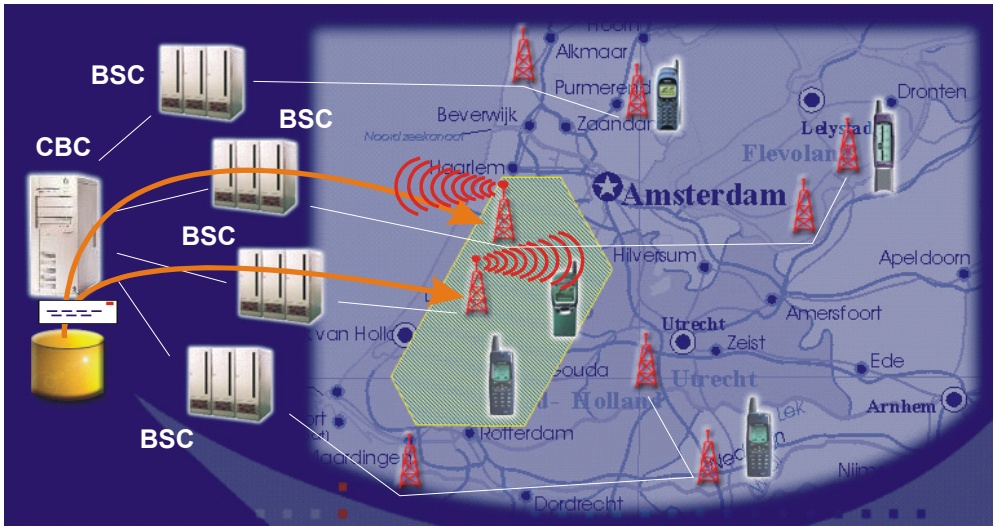

Figure 5-1: CBS Implementation

Content Providers can also design a CBE that enters messages automatically from for instance the Stock Exchange or the Internet.

Messages are defined according to a data-coding scheme. A data-coding scheme is in fact an alphabet, which means that messages can be broadcast in various languages. Handsets are sensitive to the selected data-coding scheme, so only one message in one language will be displayed.

For Cell Broadcast more than 64'000 channels are available. Each service can be allocated to a channel, but only the first 999 channels can be activated individually on a handset. The remaining channels can be activated through OTA provisioning.

An Index Message on channel 0 which is recognised as such on the handset displays the currently active channels, and these channels can be activated from the menu with a single key-press.

5.2 Performance

According to the GSM standard, Cell Broadcast messages can be sent every 1.883 seconds.

The CBC must distribute the message to all the required BTSs. The performance is limited by the network as well as by the CBC itself. For example, 40'000 BTSs can be addressed in about 30 seconds. If 15 Million subscribers in the entire network have activated their Cell Broadcast channels 500'000 subscribers can be reached per second: amazing figures! It requires 500 high performance SMSCs to match these figures, if SMS messages were used instead.

6 Future in 3G

6.1 The road to 3G

Cell Broadcast is currently used for broadcasting text messages, and sometimes for binary messages. Cell Broadcast is therefore often compared to SMS. However, various Application Providers have developed products to broadcast animated pictures and logos in 2G and 2.5G. The future in 3G will make it possible to broadcast streaming video.

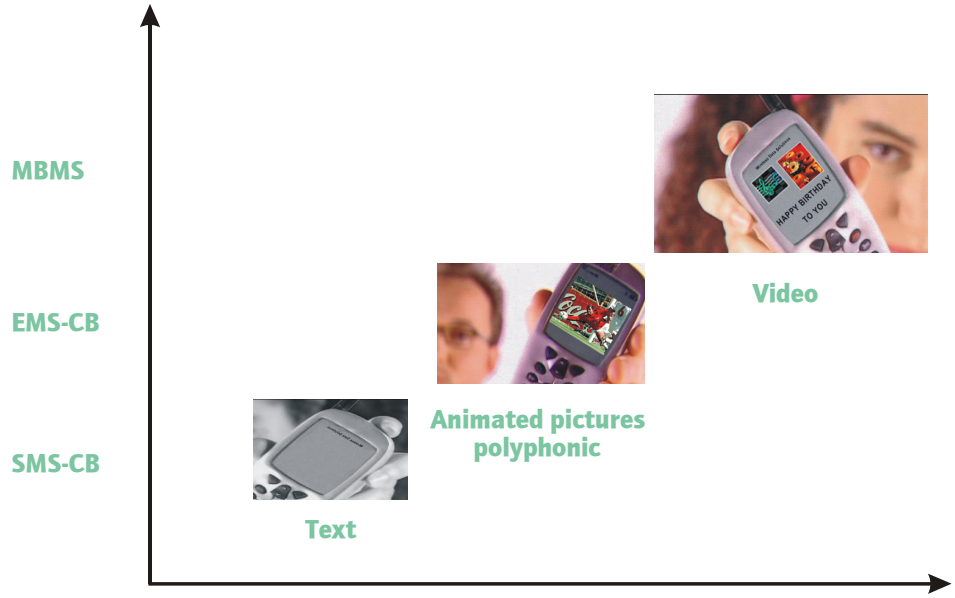

Figure 6-1: The Road to 3G

6.2 Cell Broadcast and UMTS

Cell Broadcast has been specified in the Release '99 of the UMTS standards, under the name Service Area Broadcast. This ensures continuity of service to operators migrating their Cell Broadcast service from GSM to UMTS; the same functionality as offered within GSM is also available within UMTS.

In the UMTS standards, the Cell Broadcast Centre is part of the UMTS Core Network. As a result, Service Area Broadcast has been standardised more strictly in UMTS than Cell Broadcast in GSM. There is an explicit standard for the interface between the Cell Broadcast Centre and the UMTS radio (base station) network.

Like GSM, UMTS is a network consisting of independent network elements, connected over a standard interface. From a Cell Broadcast perspective, the most relevant part of the UMTS network is the UTRAN

(UMTS Terrestrial Radio Access Network). This is consists of two network elements: Node B, which is equivalent to the GSM BTS, and the Radio Network Controller, which is equivalent to the GSM BSC.

GSM and UMTS standards for Location Services (LCS) have specified Cell Broadcast as an essential mechanism to distribute supporting data to the handsets, to improve the quality and efficiency of location measurements and/or calculations.

Network vendors expect UMTS to be available in 2003.

7 Revision History

This Document is a joint effort of various individuals active in a Cell Broadcast Forum Working Group. Every Full Member of the Cell Broadcast Forum can delegate participants to the Working Group and is welcome to contribute. See the Cell Broadcast Forum Web Site http://www.cellbroadcastforum.org for details of membership and its benefits.

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