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(54) Title: APPARATUS AND METHOD OF EXPLICIT INDICATION OF CALL FROM EMERGENCY CALL CENTRE

(57) Abstract: Herein are disclosed an apparatus and method of explicit indication of call from emergency call centre. The method includes the steps of forming an emergency signal in relation to the mobile station terminated call; sending the emergency signal to the mobile station on behalf of the emergency call centre; and detecting the emergency signal at the mobile station. The apparatus includes emergency signal forming means for forming an emergency signal in relation to the mobile station terminated call; emergency signal sending means for sending said emergency signal to the mobile station on behalf of the emergency call centre; and emergency signal detecting means for detecting said emergency signal at the mobile station. A global emergency call information record is disclosed for use in cdma2000 type networks and the like. The apparatus and method may apply to other networks.
APPARATUS AND METHOD OF EXPLICIT INDICATION OF CALL FROM EMERGENCY CALL CENTRE

TECHNICAL FIELD

This application relates to mobile communication techniques in general, and to an apparatus and method of explicit indication of call from emergency call centre, in particular.

BACKGROUND ART

When a mobile station places an emergency call, the network typically routes the call to an emergency call centre such as Public Safety Answering Point (PSAP). When the emergency call ends, the MS typically stays in an emergency callback mode for at least the duration of time known as the emergency callback period. During this time, the Emergency Call Centre may attempt to callback the MS.

Mobile stations that subscribe to caller id may attempt to determine that an incoming call is a callback from an emergency call centre by screening the caller id of incoming calls. However, this may not work if the caller id is not recognized as belonging to an emergency call centre. Furthermore, this will not work if the user of the mobile station has not subscribed to the caller id service, or even having subscribed to the caller id service, if a caller invokes caller id restriction when placing a call to the user during the emergency callback period. In addition, if the user does not subscribe to the call-waiting feature, this may prevent the emergency call centre from reaching the user if the user decides to take a non-emergency voice call. This could also happen at any time outside of emergency callback period.

Consequently, there is a need for a standard mechanism on mobile stations to adequately differentiate between an incoming call from an Emergency Call Centre, and an incoming non-emergency call.

DISCLOSURE OF THE INVENTION

According to one aspect of the present application, there is provided a method of explicitly indicating that a mobile station terminated call is from an emergency call centre, the method comprising the steps of: forming an emergency signal in relation to the mobile station terminated call; sending said emergency signal to the mobile station on behalf of the emergency call centre; and detecting said emergency signal at the mobile station.
According to another aspect of the present application, there is provided an apparatus for explicitly indicating that a mobile station terminated call is from an emergency call centre, the apparatus comprising: emergency signal forming means for forming an emergency signal in relation to the mobile station terminated call; emergency signal sending means for sending said emergency signal to the mobile station on behalf of the emergency call centre; and emergency signal detecting means for detecting said emergency signal at the mobile station.

Other aspects and features of the present application will become apparent to those ordinarily skilled in the art upon review of the following description of specific embodiments of an apparatus and method of explicit indication of call from emergency call centre in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present application will now be described, by way of example only, with reference to the attached figures, wherein:

FIG. 1 is a block diagram illustrating a mobile station in one embodiment of the apparatus and method of the current application;

FIG. 2 is a block diagram illustrating in greater detail the apparently continuous emergency call aspect provided in accordance with one embodiment of the apparatus and method of the current application;

FIG. 3 is a block diagram illustrating in greater detail the location privacy aspect provided in accordance with one embodiment of the apparatus and method of the current application; and

FIG. 4 is a block diagram illustrating in greater detail the emergency notification aspect provided in accordance with one embodiment of the apparatus and method of the current application.

Same reference numerals are used in different figures to denote similar elements.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring to FIG. 1, FIG. 1 is a block diagram illustrating a mobile station in one embodiment of the apparatus and method of the current application. When a mobile station 10 places an emergency call 20, the wireless network 30 typically routes the call to an emergency call centre 40 such as a Public Safety Answering Point (PSAP). After the emergency call 20 ends, due to normal termination or fading, the mobile station 10 typically stays in emergency callback mode 35 for a certain duration. The idea is to stay on the system so that emergency call centre 40 can call the subscriber 80 back if necessary.
Advantageously, by providing a new emergency signal 60 in accordance with the apparatus and method of the present application, FIG. 1 shows that mobile station 10 is enabled to adequately differentiate between an incoming non-emergency call 60 and an incoming call from emergency call centre 40, such as emergency callback 70.

Further advantageously, mobile station 10 is enabled to block any non-emergency calls destined to the mobile station 10, such as but not limited to non-emergency call 50, while mobile station 10 is in emergency callback mode 35.

Yet further advantageously, subscriber 80 operating mobile station 10 has not had to rely on caller id in order to determine that an incoming call, such as one of call 50 and call 70, is from an emergency call centre 40, and this even if caller 90 invokes caller id restriction when placing call 50 to the subscriber 80.

Yet further still advantageously, even if subscriber 80 did not subscribe to a call-waiting feature for mobile station 10, emergency call centre 40 is systematically enabled to callback mobile station 10. Stated otherwise, in the absence of emergency signal 60 provided in accordance with the apparatus and method of the present application, the lack of call-waiting may traditionally prevent emergency call centre 40 from reaching the subscriber 80 if the subscriber decides to take a non-emergency voice call.

These advantages can work together to enable an apparently continuous emergency call 100 whereby mobile station originated emergency call 20, mobile station terminated emergency call 70, and any subsequent mobile station terminated emergency calls thereto can be made to appear to subscriber 80 as though one continuous emergency call 100 results from mobile originated emergency call 20, and this independent of fade-outs, non-emergency call attempts, such as 50, to reach the mobile station 10, the presence or absence of call waiting functionality at the mobile station 10, and the presence or absence of caller id functionality at the mobile station 10. This is analogous to how a "911" call is handled on fixed line circuit switched phone call, i.e. the circuit remains "open" to provide a life line to the caller.

Turning now to FIG. 2, FIG. 2 is a block diagram illustrating in greater detail the apparently continuous emergency call aspect provided in accordance with one embodiment of the apparatus and method of the current application. During emergency calls 210, such as emergency call 20 and emergency callback 70 of FIG. 1, mobile station 10 maintains an emergency callback timer 220 controlled by emergency continuity controller 230. Emergency continuity controller monitors the start of all calls 240, the end of all calls 250, as well as detecting emergency signal 60, to ensure that if subscriber 80 sets emergency options 230 to appear continuous, regardless of how many mobile
originated or mobile terminated calls occur in emergency calls 210, these substantially appear as a single continuous emergency call 100 to subscriber 80.

Operationally, when subscriber 80 makes an emergency call, such as emergency call 20 of FIG. 1, emergency continuity controller 220 monitors the start call start 240, determines that an emergency call has been requested, and prepares to monitor the call end 250. When the emergency call ends, emergency continuity controller 230 starts emergency callback timer 220, which places the mobile station 10 in emergency callback mode 35.

When an incoming call arrives, emergency continuity controller 230 determines if emergency signal 60 was detected to indicate that the incoming call, such as emergency callback 70, was from emergency call centre 40. If so determined, emergency continuity controller examines the emergency options 230 to determine if the emergency calls 210 should appear continuous. If so determined, emergency continuity controller 230 handles call set up on behalf of subscriber 80, for example by answering the call automatically if subscriber 80 does not answer within certain time and/or by enabling speakerphone capability if mobile station 10 is so equipped. Emergency continuity controller 230 may additionally determine if the emergency callback mode 35 is still active, and if so, resets the emergency callback timer 220 once the incoming emergency call starts.

Conversely, if emergency signal 60 was not detected, emergency continuity controller can rely on other traditional techniques such as caller id and call waiting to assist subscriber 80, or block the incoming call to ensure that emergency call centre 40 is able to reach subscriber 80 for at least the duration of emergency callback timer 220.

Given the ability to make one or more emergency calls 210 substantially appear as one continuous emergency call, it is envisaged to be within the scope of the present application to have a mobile station deliberately terminate either of the mobile originated or mobile terminated emergency calls. In one CDMA embodiment, since some CDMA frequencies can interfere with GPS frequencies, it is envisaged that the mobile station deliberately terminates an emergency call so as to turn its CDMA transmitter off to make accurate GPS measurements for emergency location services. Once the GPS measurements have been taken the mobile station turns it’s CDMA transmitter back on and awaits to detect an emergency signal from the emergency call centre, or originates a new call to the emergency call centre to provide location information and benefit from location based services. Since it is the mobile station which is performing these acts on behalf of the subscriber, it appears to the subscriber as if one continuous emergency call is in progress.
It is also envisaged to be within the scope of the present application to have the emergency call centre or wireless network deliberately discontinue either of the mobile originated or mobile terminated emergency calls. In one exemplary embodiment for example, it is envisaged that the emergency call centre deliberately drop the emergency call in order to enable first responders, such as the fire department, police, or ambulance, to be able to reach the mobile station and communicate with the subscriber.

It is also further envisaged to combine both of these deliberate termination of emergency calls so as to first enable the mobile station to determine it’s location, to provide the mobile station location to the emergency call centre, and then enable the emergency call centre to hand the mobile station off to a first responder which is nearest to the determined location of the mobile station, all the while maintaining the appearance of a single emergency call to the mobile station subscriber.

Turning now to FIG. 3, FIG. 3 is a block diagram illustrating in greater detail the location privacy aspect provided in accordance with one embodiment of the apparatus and method of the current application. In FIG. 3, the presence of an explicit indication that the call is indeed from an emergency call centre, such as the presence of emergency signal 60, can advantageously enable the resolution of privacy issues associated with location services 320. For example, the subscriber 80 can decide to allow location services 220 if he/she gets a call 370 from emergency call centre 40 outside of emergency callback period. In the exemplary embodiment shown in FIG. 3, if the emergency callback timer 220 expires, then the locator 340 that provides location services 320 is disabled. An example locator is a GPS measurement device, which makes measurements of GPS signals and conveys these measurements to the wireless network to process and send back location information. In FIG. 3, mobile station 10 is not currently operating in emergency callback mode when location privacy controller 360 detects emergency signal 60. If location service options 350 configure location privacy controller 360 to allow location services outside emergency callback mode, then locator 340 and location services 320 are enabled. Conversely, if location privacy controller 360 is configured not to allow location services outside emergency callback mode, then also advantageously locator 340 and location services 320 are disabled. Regardless of location service options, location privacy controller 360 preferably enforces any requirements mandated by law, such as for example ensuring locator 340 and location services 320 are enabled during emergency callback mode, if so required. This is illustrated in greater detail in FIG. 4.

Turning to FIG. 4, FIG. 4 is a block diagram illustrating in greater detail the emergency notification aspect provided in accordance with one embodiment of the
apparatus and method of the current application. The detection of an emergency signal can improve emergency roaming conditions when the subscriber may not even understand the language of local emergency call centre service, but may still want to allow location services 320 if there is an explicit language-independent indication from the network.

Referring to FIG. 4, the subscriber 80 can decide to allow location services 320, such as GPS location services, if he/she gets a call 370 from the emergency call centre 40 outside of emergency callback period so long as that call includes emergency signal 60. Emergency notification controller 410 determines if there is an explicit network indication that the call is indeed from emergency call centre 40. If so determined, emergency notification controller 410, depending on notification options 420, can decide to allow location services 320 if mobile station 10 gets a call from emergency call centre outside of emergency callback period. Advantageously, notification options 420 include the preferred locale of subscriber 80, so that emergency notification controller 410 localizes localizable emergency information 430 to provide useable emergency information 440 to subscriber 80.

The precise nature of the emergency information 440 may further depend on the notification options 420 as configured through emergency operation 450 by subscriber 80, either prior to or during emergency calls. Emergency information 440 is preferably adapted to the preferred locale of the subscriber 80 so that when subscriber 80 observes emergency information 440 it is in a form that is readily understood.

For example, consider a subscriber 80 who's preferred locale is "English (U.S.)", as illustrated in notification options 420. Regardless of where subscriber 80 is roaming with his mobile station 10, localized emergency information that is readily understood by the subscriber, such as the "English (U.S.)" localized message "Emergency Call", is observed in emergency information 440. Another subscriber who's preferred locale is "Français" would observe a message such as "Appel d'urgence", while yet another subscriber who's preferred locale is "Español" would observe a message such as "Llamada de emergencia".

One of many mechanisms that can be used at the mobile station 10 to accomplish this is to use tables to store the various localized emergency information, and then use the locale to look up the localized emergency information within the tables. To continue with the example "Emergency Call" message above, a table EMERGENCY_CALL could be provided in localizable emergency information 430. EMERGENCY_CALL could include the following emergency information messages ("Emergency Call", "Emergency Call", "Emergency Call", "Appel d'urgence", "Llamada de emergencia", "Emergency Call", "Emergency Call", "Emergency Call", "Appel d'urgence", "Llamada de emergencia", "Emergency Call", "Emergency Call", "Emergency Call", "Appel d'urgence", "Llamada de emergencia", "Emergency Call", "Emergency Call", "Emergency Call", "Appel d'urgence", "Llamada de emergencia"),
"Chiamata di emergenza", "Notruf") each of which corresponds to the following locales 
{"English (U.S.)", "English", "English (United Kingdom)", "English (Nederland)", "Français", 
"Español", "Italiano", "Dutch"}.

Although not expressly shown in FIG. 4, instead of indicating a single preferred 
locale in notification options 420, it is envisaged that subscriber 80 may want to rank them 
in order of preference. Thus, using the list of locales as an example of a preferred 
ranking, if emergency notification controller 410 cannot find localizable emergency 
information 440 corresponding to the preferred locale of the subscriber 80, emergency 
notification controller proceeds to attempt to find localizable emergency information 440 
for each of the next preferred locales in order, i.e. it tries "English (U.S.)", "English", 
"English (United Kingdom)", "English (Nederland)", "Français", "Español", "Italiano", and 
finally "Dutch". If no localizable emergency information can be located after exhausting 
the preferred ranking of locales, pre-programmed default emergency information is used.

Although not expressly shown in the drawings, it is contemplated that localizable 
emergency information may further depend on the nature of the emergency. For 
example, if emergency signal 60 carries an emergency code to qualify the nature of the 
emergency, then emergency notification controller 410 advantageously provides localized 
emergency information to enable subscriber 80 to better cope with the nature of the 
specific emergency. The emergency call centre could have, for example, determined the 
emergency signal code corresponding to the nature of the emergency, and may even 
update the code during the emergency call or callback. Thus, the specific emergency 
information observed by a subscriber who has just experienced a car collision could be 
different than the specific emergency information observed by a subscriber who is 
attempting to deliver a baby.

Although messages were used in the above example for localizable emergency 
information, localizable non-textual emergency information may also be included in 
localizable emergency information 430. The types of emergency information 440 which 
may be observed by subscriber 80 include, but is not limited to, text, audio, audible 
signals, icons, graphics, pictures, pictograms, guidelines, instructions or just about any 
other type of information which may be helpful in assisting the subscriber during the 
emergency.

One mechanism which could accomplish this flexibility would be to provide a list of 
localizable URLs so that the mobile station could fetch the various types of emergency 
information using a highly standardized emergency browser. These URLs could either be 
stored locally in the mobile station, or preferably be updated automatically, either prior to
or during an emergency call. In the latter case, the URLs could, for example, be included along with the above mentioned emergency code in the emergency signal.

Furthermore, to enforce the apparent continuity of emergency services, it is envisaged that some notifications remain observable throughout multiple emergency calls. For example, the message “Emergency Call” may be continually displayed transparently over the visual interface, while an audible repetitive “Beep” may be heard. The specific type of notification may also further be limited depending on the nature of the emergency. For instance, it may be detrimental to the subscriber if the repetitive “Beep” is heard if the nature of the emergency requires the subscriber to remain silent. As another example, instead of talking to the subscriber, the nature of the emergency may suggest that the emergency centre use short messaging service instead of a voice call to communicate emergency information to the subscriber.

Thus subscriber 80 is thus enabled to receive emergency services under roaming conditions even when the user may not understand the language of local emergency call centre service, but may still allow location services if there is an explicit language-independent indication from the network.

Returning now to the concept of the emergency signal, any explicit indication that is conveyed to the subscriber of a mobile station for mobile station terminated calls from an emergency centre is a valid alternative. With such a mechanism provided, in view of the present application, then the subscriber will be able to make better decisions whether to take an incoming call or not when he/she is expecting a call from the emergency centre. This concept can be applied to a first incoming call as well as any call-waiting call.

In case of a cdma2000 standards based embodiment, an explicit indication, i.e. an emergency signal, can be provided as follows. Define a new information record to indicate global emergency callback, similar to current Global Emergency Call Record defined in ballot version of IS-2000 release D for mobile-originated calls. The network includes this new record when it sends "Alert/Flash with Info" (AWI/FWI) message to alert the user of incoming call from emergency call centre. If the subscriber does not have call-waiting, then he/she can decide whether to take a call during emergency callback period or anytime after that. The network includes this new record when it sends Flash with Info message to alert the user of incoming call-waiting call from an emergency call centre when the user is in call. This is applicable when the user has call-waiting feature.

The details of a specific exemplary cdma2000 standard embodiment are made clearer by considering some changes that could be made to the cdma2000 standard in order to support the techniques of this application. First, consider the proposed change to Table 3.7.5-1:
### Proposed Information Record

<table>
<thead>
<tr>
<th>Information Record</th>
<th>Record Type (binary)</th>
<th>Message Type</th>
<th>f-csch</th>
<th>f-dsch</th>
<th>P_REV_I N_USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Emergency Call</td>
<td>00010111</td>
<td>AWI</td>
<td>N</td>
<td>Y</td>
<td>≥ 11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FWI</td>
<td>N</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

Next, consider the addition of paragraph 3.7.5.24:

5 **3.7.5.24 Global Emergency Call**

This information record allows the network to inform the mobile station that a call is an emergency callback call from the PSAP.

This information record includes no type-specific fields.

The above-described embodiments of the present application are intended to be examples only. Those of skill in the art may effect alterations, modifications and variations to the particular embodiments without departing from the scope of the application.

15 **INDUSTRIAL APPLICABILITY**

The present invention is directed at an apparatus and method of explicit indication of call from emergency call centre.
WHAT IS CLAIMED IS:

1. A method of explicitly indicating that a mobile station terminated call is from an emergency call centre, the method comprising the steps of:
   forming an emergency signal in relation to the mobile station terminated call;
   sending said emergency signal to the mobile station on behalf of the emergency call centre; and
   detecting said emergency signal at the mobile station.

2. The method as recited in claim 1, further comprising the step of placing a mobile station originated emergency call.

3. The method as recited in claim 1, further comprising the step of receiving the mobile station terminated emergency call.

4. The method as recited in claim 2, further comprising the step of receiving the mobile station terminated emergency call.

5. The method as recited in claim 4, further comprising the step of maintaining an apparently continuous emergency call.

6. The method as recited in claim 5, further comprising the step of automatically transitioning from said mobile station originated emergency call to the mobile terminated emergency call.

7. The method as recited in claim 5, further comprising the step of blocking a non-emergency mobile station terminated call in favour of one of said mobile station originated emergency call and the mobile terminated emergency call.

8. The method as recited in claim 5, further comprising the step of maintaining an emergency callback timer having an emergency callback period during which the mobile station operates in emergency callback mode.

9. The method as recited in claim 8, further comprising the step of determining if the mobile terminated emergency call occurs outside of the emergency callback period, and if
so determined resetting the emergency callback timer so as to cause the mobile station to operate in emergency callback mode.

10. The method as recited in claim 5, further comprising the step of determining the location of the mobile station.

11. The method as recited in claim 5, wherein the apparently continuous emergency call comprises at least one call with a first responder.

12. The method as recited in claim 11, wherein the location of the mobile station is communicated to said first responder.

13. The method as recited in claim 2, further comprising the step of providing location privacy at the mobile station.

14. The method as recited in claim 13, further comprising the step of maintaining an emergency callback timer having an emergency callback period during which the mobile station operates in emergency callback mode.

15. The method as recited in claim 14, further comprising the steps of determining if the mobile terminated emergency call occurs outside of the emergency callback period; and if so determined enabling location services.

16. The method as recited in claim 14, further comprising the steps of determining if the mobile station is configured to allow location services outside the emergency callback period; and if so determined preventing location services from being enabled outside the emergency callback period.

17. The method as recited in claim 14, further comprising the steps of determining if the emergency callback timer has expired; and if so determined disabling location services.

18. The method as recited in claim 2, further comprising the step of notifying emergency information at the mobile station.
19. The method as recited in claim 18, wherein said emergency information is derived from said emergency signal.

20. The method as recited in claim 19, further comprising the step of adapting said emergency information to be more readily understood by the subscriber of the mobile station.

21. The method as recited in claim 20, further comprising the step of determining a locale at the mobile station.

22. The method as recited in claim 21, wherein said locale is a default locale at the mobile station.

23. The method as recited in claim 21, wherein said locale is a preferred locale at the mobile station.

24. The method as recited in claim 21, wherein said locale is a function of a preferred ranking of locales at the mobile station.

25. The method as recited in claim 19, wherein said emergency signal includes an emergency code.

26. The method as recited in claim 25, wherein said emergency information is a function of said emergency code.

27. The method as recited in claim 25, wherein said emergency code describes the nature of the emergency in a non-localized fashion.

28. The method as recited in claim 25, wherein said emergency code is determined by the emergency call centre as a function of the nature of the emergency ascertained during the mobile station terminated call.

29. The method as recited in claim 1, wherein said emergency signal includes a global emergency call record.
30. The method as recited in claim 1, wherein said emergency signal is sent in an alert with info message.

31. The method as recited in claim 1, wherein said emergency signal is sent in a flash with info message.

32. The method as recited in claim 1, further comprising the step of automatically answering the mobile station terminated emergency call.

33. The method as recited in claim 32, further comprising the step of waiting for the subscriber to manually answer the mobile station terminated emergency call for a predetermined amount of time before automatically answering the mobile station terminated emergency call.

34. The method as recited in claim 32, further comprising the step of determining if the mobile station has speakerphone capability, and if so determined turning on the speakerphone automatically.

35. An apparatus for explicitly indicating that a mobile station terminated call is from an emergency call centre, the apparatus comprising:

   emergency signal forming means for forming an emergency signal in relation to the mobile station terminated call;
   emergency signal sending means for sending said emergency signal to the mobile station on behalf of the emergency call centre; and
   emergency signal detecting means for detecting said emergency signal at the mobile station.

36. The apparatus as recited in claim 35, further comprising an emergency callback timer to keep track of the amount of time that has elapsed since the end the mobile station terminated call.

37. The apparatus as recited in claim 36, further comprising an emergency continuity controller to control said emergency callback timer as a function of said emergency signal.
38. The apparatus as recited in claim 35, further comprising a locator for providing location based services.

39. The apparatus as recited in claim 38, further comprising a location privacy controller to control said location services as a function of said emergency signal.

40. The apparatus as recited in claim 35, further comprising an emergency notification controller to provide emergency information to the subscriber of the mobile station as a function of said emergency signal.

41. The apparatus as recited in claim 40, wherein said emergency information includes location information.

42. The apparatus as recited in claim 41, wherein said location information includes a map.

43. The apparatus as recited in claim 40, wherein said emergency information is localized to be understood by the subscriber of the mobile station.

44. The apparatus as recited in claim 40, wherein said emergency information is visual.

45. The apparatus as recited in claim 40, wherein said emergency information is audible.
Subscriber

3/4

Microphone

Controls

Display

Speaker

Location Services Options:

Emergency Callback Mode Only [ ]

Configures

Location Privacy Controller

Optionally allows

Location Services

Provides

Locator

Mobile Station

Disables

Emergency Callback Timer

Detects

Emergency Call Centre

Emergency Call Signal

Call

FIG. 3
FIG. 4
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q/7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the International search (name of database and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category *</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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</table>
| Y          | WO 00/49829 A (QUALCOMM INC)  
24 August 2000 (2000-08-24)  
page 2, line 27 - page 3, line 13  
page 5, line 13 - line 31 | 1-4, 32-35 |
| Y          | US 5 764 747 A (YUE DRINA C ET AL)  
9 June 1998 (1998-06-09)  
column 3, line 16 - line 31  
column 7, line 52 - column 8, line 24 | 1-4, 32-35 |
| Y          | EP 1 124 394 A (LUCENT TECHNOLOGIES INC)  
16 August 2001 (2001-08-16)  
paragraph '0008!' - paragraph '0012!'  
paragraph '0031!' - paragraph '0037!' | 1-6, 10-12, 18-28, 35, 38, 40-45 |

* Special categories of cited documents:

*A* document defining the general state of the art which is not considered to be of particular relevance

*E* earlier document but published on or after the international filing date

*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other specialist reason (as specified)

*C* document referring to an oral disclosure, use, exhibition or other means

*P* document published prior to the international filing date but later than the priority date claimed

*Y* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

*YY* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

* & document member of the same patent family

Date of the actual completion of the international search

1 September 2004

Date of mailing of the international search report

08/09/2004

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European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

Poort, I
<table>
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<td>Y</td>
<td>EP 1 168 872 A (MITSUBISHI ELECTRIC CORP) 2 January 2002 (2002-01-02)</td>
<td>1–6, 10–12, 18–28, 35, 38, 40–45</td>
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