Applicant's claim does not just have the single feature of a list or a multiple entry list. Applicant's claim 3 includes creating a multiple entry list and allowing transmission of location information to the multiple entry list.

Applicant, solely in order to expedite prosecution and without prejudice previously amended claim 3 where the list is operable to be modified by the first wireless device and removing on said first wireless telephonic device said allowance of the transmission of location information associated with said first wireless telephonic device to said multiple entry list.

Kahlthoff's FIG. 16A does not show or suggest such a feature. Kahlthoff merely alleges enabling friend alerts for individual names. Kahlthoff is silent on applicant's claim of creating a multiple entry list and allowing location information to be sent to the multiple entry list. An individual name is not a list – let alone a list of the features of applicant's claim 3. Barclays does not correct this deficiency. Barclay does not show or suggest providing an allowance and removing an allowance for location information for a device to a multiple entry list that is created and is operable to be modified.

The Examiner noted:

> "It would have been obvious … to have incorporated … Sheha in order to accommodate more than one or two users. For Example, a team or group." (Office Action, page 3)

Applicant, solely in order to expedite prosecution and without prejudice previously amended claim 3 where the list is operable to be modified by the first wireless device and removing on said first wireless

telephonic device said allowance of the transmission of location information associated with said first wireless telephonic device to said multiple entry list.

The Examiner stated that:

> "Note the notification of Fig. 4 is requesting whether to send the location information or not and the user can decline such." (Office Action, pages 3-4)

Declining a location request is not removing an allowance. Neither Barclay, Kalthoff, nor Sheha, show or suggest applicant's claim 3 that includes such features.

Accordingly, none of the references, used either alone or in combination, show or suggest applicant's claim 3. For at least this reason, applicant respectfully requests that the Examiner's rejection of claim 3 be withdrawn.

Claim 7

Claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay in view of Kahlthoff and Sheha.

Claim 7 provides a stationary computer that receives manual input to identify a user profile and identifying the user profile associated with this stationary computer.

In Kahlthoff and Barclay, alleged portable devices are fixed to a person (e.g., a child). Such a portable device is not a stationary computer for receiving manual input to identify a user profile – let alone claim 7 that includes a server that sends location information to the stationary computer associated with the identified user profile after a first permission is verified. Furthermore, solely to expedite prosecution and without prejudice

applicant previously amended claim 7 to include receives manual input to identify a user profile and provide a password for said user profile. Sheha does not correct for these deficiencies.

Accordingly, none of the references, used either alone or in combination, show or suggest applicant's invention of claim 7.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection of claims 7, and any claims dependent therefrom, be withdrawn.

Claim 12

Claims 12 was rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay in view of Kalthoff and further in view of Sheha.

None of the prior art, used either alone or in combination, shows or suggests claim 12 that includes providing a display screen on a first wireless telephonic device for said first wireless telephonic device to request the location of a different wireless device and entering said telephone number on said display screen – let alone requesting on the different wireless device that said different wireless device provides access information for said first wireless telephonic device.

The Examiner stated:

> "note paragraph 0099 of Sheha et al…" (Office Action, page 4)

Sheha's POI appears to be a label. Sheha's POI does not show or suggest providing a display screen on a first wireless telephonic device for said first wireless telephonic device to request the location of a different wireless device and entering said telephone number on said

display screen – let alone requesting on the different wireless device that said different wireless device provides access information for said first wireless telephonic device.

None of the references, used either alone or in combination, show or suggest such a feature.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection of claim 12, and any claims dependent therefrom, be withdrawn.

Claim 18

Claims 18-19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay in view of Kalthoff and further in view of Krasner and further in view of Sheha.

None of the references, including Sheha, however, shows or suggests applicant's invention of claim 18 of providing a highlight window for selecting one of the list of users on the first wireless telephonic device.

Similarly, none of the references, including Sheha shows or suggests applicant's invention of claim 18 of selecting, using the highlight window, one of the users from the list of users.

The Examiner stated:

> "note paragraph 0010 of Sheha et al." (Office Action, page 4)

Sheha's paragraph 10 does not appear to be relevant – merely discusses resolutions. With respect to applicant's feature, Sheha merely includes dragging and dropping – and doing so in an unrelated system.

Accordingy, none of the references, used either alone or in combination, shows or suggests applicant's

invention of claim 18 of selecting, using the highlight window, one of the users from the list of users.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection of claims 18, and any claims dependent therefrom, be withdrawn.

Claim 20

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over:

Barclay;
in view of Kalthoff;
in view of Krasner;
in view of Bates;
in view of Grube;
in view of Calvert;
in view of Sheha; and
in view of:
Parupudi; or in the alternative
Meadows; or in the alternative
Ganesh.

The examiner stated that the first six references:

> "teach the claimed limitations except for …" (Office Action, page 4).

The six references do not show or suggest applicant's invention of claim 20 that has five elements. Electronic locating technologies have been around for a very long time. The mere fact that a single reference does not show or suggest applicant's invention is a bone fide showing of patentability. Furthermore, the six references are all precision devices and merely stitching together

modified elements of each of the references would only eviscerate the spirit of the individual devices and lead to an inoperable system.

The Examiner stated, with respect to Parupudi, to see example 10. Given the inadequate six-reference combination above, any additional reference is irrelevant.

Example 10 of Parupudi, however, merely accounts for disabling a login of one device if the devices are not in the same location.

Parupudi does not show or suggest claim 20 that includes determining an identity, by utilizing a login and password, and utilizing this identity to determine if the device is allowed to access the location. Furthermore, Parupudi is also a precision device and could not be integrated with the six other structures.

The Examiner also stated to see FIG. 4A of Meadows. Given the inadequate six-reference combination above, any additional reference is irrelevant.

However, Meadows merely describes an access code for a parent to monitor a child.

Meadows does not show or suggest claim 20 that includes determining an identity, by utilizing a login and password, and utilizing this identity to determine if the device is allowed to access the location. Furthermore, Meadows is also a precision device and could not be integrated with the six other structures.

The Examiner also stated to see FIG. 3 of Ganesh. Given the inadequate six-reference combination above, any additional reference is irrelevant.

FIG. 3 of Ganesh, however, merely provides a carrier's webpage with a login ID. The web-page is preset to a telephone number. The webpage allegedly provides the

location of the phone of the telephone number. Furthermore, Ganesh is also a precision device and could not be integrated with the six other structures.

Solely to expedite prosecution and without prejudice, applicant previously amended claim 20. Amended claim 20 includes, utilizing a login and a password entered on a first wireless telephonic device to determine an identity of said first wireless telephonic device and the location of said identity based on the location of said first wireless telephonic device, requesting the location of a second wireless telephonic device by said first device; utilizing said identity to determine whether said first wireless telephonic device is allowed to access the location of said second wireless telephonic device, wherein said access is provided by said second device and is stored remotely; and determining whether to provide the location of said second wireless telephonic device to said first wireless telephonic device based on said access.

None of the references, used either alone or in combination show or suggest claim 20 that includes determining an identity, by utilizing a login and password, and utilizing this identity to determine if the device is allowed to access the location and the location of said identity based on the location of the first wireless telephonic device, and requesting the location of a second wireless telephonic device by the first device.

Applicant's specification includes numerous discussions on identifying users on different devices utilizing a login and password. For example, applicant turns the Examiner's attention to paragraphs 14 and 16.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection of claims 20, and any claims dependent therefrom, be withdrawn.

Conclusion

Applicant respectfully submits that this application, including the pending claims, is in condition for allowance. Accordingly, applicant respectfully requests that a favorable action be issued.

The Director is hereby authorized to charge and fees due in conjunction with this filing, or to credit any overpayment of the same, to Deposit Account No. 50-3855.

Respectfully Submitted,

/Jeffrey D. Mullen/

Jeffrey D. Mullen
Applicant (Reg. No. 52,056)
Customer No. 32733
2212 Hassinger Lane
Glenshaw, PA 15116
Tel.: (914) 837-7741

Electronic Patent Application Fee Transmittal

Application Number:	11834674
Filing Date:	06-Aug-2007
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Filer:	Jeffrey David Mullen
Attorney Docket Number:	JDM/002 CON4

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	2820	1	950	950
		Total in USD ($)		**1650**

Electronic Acknowledgement Receipt	
EFS ID:	34029980
Application Number:	11834674
International Application Number:	
Confirmation Number:	1117
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Customer Number:	32733
Filer:	Jeffrey David Mullen
Filer Authorized By:	
Attorney Docket Number:	JDM/002 CON4
Receipt Date:	16-OCT-2018
Filing Date:	06-AUG-2007
Time Stamp:	20:39:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1650
RAM confirmation Number	101718INTEFSW00006712503855
Deposit Account	503855
Authorized User	Jeffrey Mullen
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	JDM-002CON4--RCE.pdf	697797 34202f882dfc39a02790c6e8ec54456b39554921	no	3
Warnings:					
Information:					
2		JDM-002CON4--Reply.pdf	170818 158b93bbc77a1ab77d5329e82950c0beb344ee53	yes	21

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment Submitted/Entered with Filing of CPA/RCE	1	1
	Claims	2	10
	Applicant Arguments/Remarks Made in an Amendment	11	21

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32745 19da7b6bb17138a59fc21de5a586f6adb550a282	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	901360		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/834,674	Filing Date 08/06/2007	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	10/16/2018	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0	X $50 =	0
	Independent (37 CFR 1.16(h))	* 16	Minus	***16	= 0	X $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
MARTHA NEWMAN

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/834,674	08/06/2007	Jeffrey D. Mullen	JDM/002 CON4	1117

32733 7590 12/26/2018

JEFFREY D. MULLEN
2212 Hassinger Lane
Glenshaw, PA 15116

EXAMINER	
DEANE JR, WILLIAM J	

ART UNIT	PAPER NUMBER
2652	

MAIL DATE	DELIVERY MODE
12/26/2018	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 11/834,674	Applicant(s) Mullen, Jeffrey D.	
	Examiner WILLIAM J DEANE JR	Art Unit 2652	AIA Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 12/25/2018.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 3-20 is/are pending in the application.

5a) Of the above claim(s) 4-6,8-11,13-17 and 19 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 3,7,12,18 and 20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC §103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3, 7, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application No. 2003/0119522 (Barclay et al.) in view of U.S. Patent Application No. 2001/0048364 (Kalthoff et al.) and further in view of U.S. Patent Application No. 2004/0054428 (Sheha et al.).

With respect to claim 3, note that Barclay et al. teach determining a location of a first wireless device (FIG. 4, step 407 and paragraph 0012);

providing said location to a facility (the service provider in paragraphs 0016 and 0017);

requesting said location of said first wireless device by a second wireless device (paragraph 0020 and step 413). In addition, note Fig.5;

providing a permission by said first wireless device for said second wireless device to access location information about said location storing said permission in said facility,

wherein said facility is located remotely from said first and second wireless devices (paragraph 0018 and service provider) ;

providing said location information about said location from said facility to said second wireless device in accordance with said permission (paragraph 0018).

What Barclay et al. do not disclose is the, "creating on a first wireless telephonic device a list including a plurality of users, wherein each one of said plurality of users is associated to a different one of a plurality of wireless telephonic devices." However, such is believed to be inherent in Barclay et al. If this is argued, note Fig. 16A of Kalthoff et al. It would have been obvious to one of ordinary skill in the art to have created such a list as taught by Kalthoff et al. into the Barclay et al. in order to have a more efficient system. In addition, it would have been obvious to one of ordinary skill in the art to have incorporated a multiple entry list as such would only duplicative of what the art above teach.

With respect to the new claim language in claim 3, please note paragraphs 0012, 0013, 0024, 0025, 0027 - 0029, 0087 - 0092 and 0103 of Sheha et al. It would have been obvious to one of ordinary skill in the art to have incorporated the teachings of Sheha et al. into Barclay et al./Kalthoff et al. system and method in order to accommodate more than one or two users. For example, for a team or group.

With respect to removing the location information allowance, note at least Fig. 4B. Note also that location information is held locally and/or remotely (see paragraphs of Sheha et al. noted above. Note the notification of Fig. 4 is requesting whether to send the location information or not and the user can decline such and this is all done with the real-time communication system 150.

With respect to claim 12, such a limitation would be obvious in light of the references cited above. Specifically, note paragraph 0099 of Sheha et al. along with the other paragraphs of Sheha et al. above.

With respect to Claim 18, note paragraph 0010 of Sheha et al.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application No. 2003/0119522 (Barclay et al.) in view of U.S. Patent Application No. 2001/0048364 (Kalthoff et al.) and further in view of U.S. Patent Application No. 2003/0069692 (Krasner et al.) and U.S. Patent Application No. 2009/0029717 (Bates) and U.S Patent No. 6,885,874 (Grube et al.) and U.S. Patent

Application No. 2002/0102989 (Calvert et al.) and U.S. Patent Application No. 2004/0054428 (Sheha et al.) and further in view of U.S. Patent No. 7,072,956 (Parupudi et al.) or in the alternative U.S. Patent No. 6,716,101 (Meadows et al.) or alternatively U.S. Patent No. 7,013,148 (Ganesh et al.)

Barclay et al./Kalthoff et al./Krasner et al./Bates et al./Grube et al./Calvert et al./Sheha et al. teach the claimed limitations except for the login aspects. However, note that Parupudi et al. teach such login aspects (see example 10). It would have been obvious to one of ordinary skill in the art to have incorporated such login aspects as taught by Parupudi et al. into the Barclay et al./Kalthoff et al./Krasner et al./Bates et al./Grube et al./Calvert et al./Sheha et al. system in order to provide better security.

In the alternative, note Fig. 4A of Meadows et al. It would have been obvious to one of ordinary skill in the art to have incorporated such login aspects as taught by Meadows et al. into the Barclay et al./Kalthoff et al./Krasner et al./Bates et al./Grube et al./Calvert et al./Sheha et al. system in order to provide better security.

Alternatively, note Fig 3 of Ganesh et al. It would have been obvious to one of ordinary skill in the art to have incorporated such login aspects as taught by Ganesh et al. into the Barclay et al./Kalthoff et al./Krasner et al./Bates et al./Grube et al./Calvert et al./Sheha et al. system in order to provide better security.

In addition, the use of a login and password is notoriously old in the art to obtain permission to enter a database containing user profiles, a website, or file system and the like. Parupudi et al., Meadows and Ganesh et al. show that the use of a login, passwords, pins and the like were widely known before the time of Applicant's priority date. The references, in particularly, those used the rejection of claim 3 above do what Applicant claims except for the logging in aspects. Plowever, the system must recognize the user is some fashion before location information is past. This could be obviously done by login and password (which is probably done initially by password or pin manually) or automatically by the system recognizing the computer or phone via MAC address or MIN number or the like. To require a login or password manually would have been obvious to one of ordinary skill in the art.

Response to Arguments

The examiner's response is the same as in the previous Office Action as no new arguments were made except for Applicant's comment that Sheha et al. is in itself not prior art (see page 12 of Applicant's Response). If Applicant believes that the parts relied on in Sheha et al. from the provisional application are not found in the non-provisional application, applicant should point such out. If Applicant has evidence and can antedate the Sheha et al. reference then Applicant should do so.

Applicant should note Figs. 1 and 2 of the Jorasch et al. recited on the accompanying 892

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Note the Abstracts and Figs, of the additional references cited on the accompanying 892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William Deane whose telephone number is 571-272-7484. The examiner can normally be reached on Monday - FRIDAY from 9:00 A.M. to 5:00 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ahmad Matar, can be reached on 571-272-7488. The official fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. However, unofficial faxes can be direct to the examiners computer at 571 273 - 7484.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.aov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

25Dec2018

/WILLIAM J DEANE JR/
Primary Examiner, Art Unit 2652

Notice of References Cited	Application/Control No. 11/834,674	Applicant(s)/Patent Under Reexamination Mullen, Jeffrey D.	
	Examiner WILLIAM J DEANE JR	Art Unit 2652	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-7010110-B2	03-2006	Jorasch; James A.	H04M1/2535	379/207.04
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	**Art Unit**
	WILLIAM J DEANE JR	2652

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant					☐ CPA		☐ T.D.		☐ R.1.47	
CLAIM		**DATE**								
Final	Original	06/06/2009	03/25/2010	12/06/2010	09/12/2011	09/06/2013	06/25/2014	04/05/2015	01/06/2016	12/25/2018
	1	✓	✓	✓	-	-	-	-	-	-
	2	✓	✓	✓	-	-	-	-	-	-
	3	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	N
	5	✓	✓	✓	✓	✓	✓	✓	✓	N
	6	✓	✓	✓	✓	✓	✓	✓	✓	N
	7	✓	✓	✓	✓	✓	✓	✓	✓	✓
	8	✓	✓	✓	✓	✓	✓	✓	✓	N
	9	✓	✓	✓	✓	✓	✓	✓	✓	N
	10	✓	✓	✓	✓	✓	✓	✓	✓	N
	11	✓	✓	✓	✓	✓	✓	✓	✓	N
	12	✓	✓	✓	✓	✓	✓	✓	✓	✓
	13	✓	✓	✓	✓	✓	✓	✓	✓	N
	14	✓	✓	✓	✓	✓	✓	✓	✓	N
	15	✓	✓	✓	✓	✓	✓	✓	✓	N
	16	✓	✓	✓	✓	✓	✓	✓	✓	N
	17	✓	✓	✓	✓	✓	✓	✓	✓	N
	18	✓	✓	✓	✓	✓	✓	✓	✓	✓
	19	✓	✓	✓	✓	✓	✓	✓	✓	N
	20	✓	✓	✓	✓	✓	✓	✓	✓	✓

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	456.1	06May2009	WJD
	415		
	457		
	435		
	404.1		
	Updated the prior search	25Mar2010	WJD
	Updated the prior search	06Dec2010	WJD
	Updated the search above	12Sep2011	WJD
	Updated the search above	06Sep2013	WJD
	Updated the search above	25Jun2014	WJD
	Updated the search above	05Apr2015	WJD
	Updated the search above	06Jan2015	WJD
	Updated the search above	07Aug2015	WJD
	Updated the searches above	14Apr2018	WJD
	Updated the above searches	12/25/2018	WJD

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

Search Notes		
Search Notes	Date	Examiner

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/834,674	Filing Date 08/06/2007	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $25 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $ 100 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/26/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 18	Minus	** 18	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 15	Minus	*** 16	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ANTHONY TYSON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

SMALL ENTITY
JDM/002 CON4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Jeffrey D. Mullen
Application No.	:	11/834,674
Confirmation No.	:	1117
Filed	:	August 6, 2007
For	:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
Group Art Unit	:	2614
Examiner	:	William Deane Jr.

Mail Stop: Amendment
Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pittsburgh, PA 15116
June 26, 2018

REPLY TO OFFICE ACTION

Sir:

This is in Reply to the Office Action dated April 16, 2018. A three-month extension of time is and a Request for Continued Examination is applicable hereto and submitted herewith. In Reply to the Office Action, applicant amends the application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 10 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-2. (cancelled)

3. (previously presented) A method comprising:

creating on a first wireless telephonic device a multiple entry list including a plurality of users, wherein each one of said plurality of users is associated to a different one of a plurality of wireless telephonic devices and said plurality of users on said multiple entry list is operable to be modified by said first wireless telephonic device;

allowing on said first wireless telephonic device, transmission of location information associated with said first wireless telephonic device to said multiple entry list, wherein said allowance is provided to, and stored on, a remote server;

receiving at said remote server said location information and storing said location information;

providing said location information, as a result of said allowance, to at least one of said plurality of users on said multiple entry list by providing said location information to said different wireless telephonic device associated to the provided at least one users; and

removing on said first wireless telephonic device said allowance of the transmission of location information associated with said first wireless telephonic device to said multiple entry list.

4. (withdrawn) A method comprising:

selecting a first location alert listing for a second wireless device from a plurality of location alert listings on a first wireless device, wherein a first one of said plurality of location alert listings is associated with said second wireless device entering a first location area and a second one of said plurality of location alert listings is associated with said second wireless device entering a second location area;

obtaining a location of said second wireless device;

determining whether said location is in ~~a~~ said first location area;

determining whether said second wireless device has provided said first wireless device with permission to obtain information associated with said location of said second wireless device; and

providing an alert to said first wireless device if said location is in said first location area and if said second wireless device has provided said first wireless device with permission to obtain information associated with said location of said second wireless device.

5. (withdrawn) The method of claim 4, wherein a positioning system is utilized to provide said location.

6. (withdrawn) A system comprising:

a first wireless telephone;

a second wireless telephone; and

a server located remotely from said first and second wireless telephones, wherein said server receives

and stores a first location representative of the location of said first wireless telephone, said server receives and stores a second location representative of the location of said second wireless telephone, said server receives and stores a first permission from said first wireless telephone for said second wireless telephone to receive location information associated with said first location according to a first level of location access from several levels of location access selectable from a first graphical interface on said first wireless telephone after selecting said second wireless telephone on a second graphical interface on said first wireless telephone from a plurality of wireless telephones, and said server sends said location information to said second wireless telephone after verifying said first permission.

7. (previously presented) A system comprising:

a first wireless telephone;

a stationary computer, wherein said stationary computer receives manual input to identify a user profile and receives a password ~~for~~ to access said user profile; and

a server located remotely from said first and second wireless telephones, wherein said server receives and stores a first location representative of the location of said first wireless telephone, said server receives and stores a first permission from said first wireless telephone for said user profile to receive location information associated with said first location, and said server sends said location information to said stationary computer after verifying said first permission and identifying said user profile associated with said

stationary computer.

8. (withdrawn) A method comprising:

providing a first level of location access for information associated with a location of a first wireless device to a second wireless device by said first wireless device on a first graphical interface on said first wireless device after selecting said second wireless device on a second graphical interface from a plurality of wireless devices on said first wireless device, wherein said first graphical interface includes a plurality of selectable levels of location access;

storing said first level of access; and

providing said information to said second wireless device in accordance with said first level of access.

9. (withdrawn) A method comprising:

allowing a device to locate a first wireless device in accordance with access information stored on a remote server, wherein said access information was provided by said first wireless device;

locating said first wireless device a plurality of times and determining a travel speed based on said locating;

utilizing said travel speed and an assumed route to determine an estimated arrival time of said first wireless device to a destination; and

providing said estimated arrival time to said device.

10. (withdrawn) A method comprising:

allowing a device to locate a plurality of wireless devices based on access information for said device provided by each one of said plurality of wireless devices, wherein said access information is stored on a remote server;

determining a travel speed for at least one of said plurality of wireless devices;

utilizing said travel speed and an assumed route to determine an arrival time to a destination; and

displaying on said device the location of said plurality of wireless devices on a map on said device.

11. (withdrawn) A method comprising:

allowing a device to locate a plurality of wireless devices based on access information provided by each one of said plurality of wireless devices, wherein said access information is stored on a remote server; and

providing an option to said device of finding the closest one of said plurality of wireless devices to said device.

12. (previously presented) A method comprising:

providing a display screen on a first wireless telephonic device for said first wireless telephonic device to request the location of a different wireless device;

entering a telephone number on said display screen, wherein said telephone number is associated with said different wireless device;

requesting on said different wireless device that said different wireless device provides access information for said first wireless telephonic device; and

storing said access information on a remote server.

13. (withdrawn) A method comprising:

determining whether a looking for profile of a first dating service user matches a profile of a second dating service user;

alerting said first dating service user of said second dating service user, wherein a first location of a first wireless telephonic device of said first dating service user and a second location of said second wireless telephonic device of said second service user are utilized in said determining and said first and second locations are stored on a remote server; and

requesting access to a form of communication between said first and second dating service users from said first dating service user.

14. (withdrawn) A method comprising:

determining the location of a first wireless device by a second wireless device in accordance with location access information stored on a remote server for said second wireless device by said first wireless device; and

utilizing the location of said second wireless device and the location of said first wireless device to determine the distance between said first and second wireless devices, wherein said distance is displayed on a display screen of said second wireless device and a directional indicia is displayed on said display screen_to indicate the location of said first wireless device relative to the location of said second wireless device.

15. (withdrawn) A method comprising:

determining the location of a first wireless device by a second wireless device in accordance with location access information stored on a remote server for said second wireless device by said first wireless device; and

utilizing the location of said second wireless device and said first wireless device to determine the shortest path between said first and second wireless devices, wherein said shortest path is displayed on a display screen of_said second wireless device.

16. (withdrawn) A method comprising:

determining the location of a first wireless device by a second device in accordance with location access information stored on a remote server for said second device by said first wireless device;

determining that the location of a first wireless device is on a type of travel;

determining an assumed route for a destination utilizing said determination that the location of a first wireless device is on said type of travel; and

estimating an arrival time for said destination utilizing said determined assumed route and a travel speed, wherein said estimated arrival time is displayed on said second device.

17. (withdrawn) The method of claim 16, wherein said type of travel is driving.

18. (previously presented) A method comprising:

providing a list of users on a first wireless telephonic device;

providing a highlight window for selecting one of said list of users on said first wireless telephonic device;

selecting, using said highlight window, one of said users from said list of users; and

providing a display screen on said first wireless device for selecting location access rights from a plurality of location access rights for said selected user with respect to the location of said first wireless telephonic device.

19. (withdrawn) A method comprising:

providing a display screen on a first device for selecting one of a plurality of location alerts for a second wireless device, wherein at least two of said plurality of location alerts are associated with a different location area; and

alerting said device in accordance with said selected location alert.

20. (previously presented) A method comprising:

utilizing a login and a password entered on first wireless telephonic device to determine an identity of said first wireless telephonic device and the location of said identity based on the location of said first wireless telephonic device;

requesting the location of a second wireless telephonic device by said first device;

utilizing said identity to determine whether said first wireless telephonic device is allowed to access the

location of said second wireless telephonic device, wherein said access is provided by said second device and is stored remotely; and

determining whether to provide the location of said second wireless telephonic device to said first wireless telephonic device based on said access; and

providing the location of aid second wireless telephonic device to said first telephonic wireless device based on said determination.

REMARKS/ARGUMENTS

Summary of Office Action

Claims 3-20 are pending.

Claims 2-6, 8-11, 13-17, and 19 are withdrawn.

The Examiner rejected claims 3, 7, 12, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application No. 2003/0119522 (hereinafter "Barclay et al.") in view of Application No. 2001/0048364 (hereinafter "Kalthoff") and further in view of Sheha et al. U.S. Patent Application No. 2004/0054428 (hereinafter "Sheha").

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over:

Barclay;
in view of Kalthoff;
in view of Krasner;
in view of Bates;
in view of Grube;
in view of Calvert;
in view of Sheha; and
in view of:
Parupudi U.S. Patent No. 7,072,956 (hereinafter "Parupudi"); or in the alternative to
Meadows U.S. Patent No. 6,716,101 (hereinafter "Meadows"); or in the alternative
Ganesh U.S. Patent No. 7,013,148 (hereinafter "Ganesh").

Summary of Applicant's Amendments

Applicant respectfully traverses the Examiner's rejections. Applicant reserves the right to claim any subject matter lost by any amendments or cancellations

during the prosecution of this application, or to claim any subject matter included in the present application, in one or more continuation or divisional applications.

Prima Facie Evidence of Patentability

Location and ranging technologies have existed for hundreds, if not thousands, of years. The Examiner has provided rejections with substantially more references than claimed elements. For example, the Examiner's rejection of claim 20 includes nine references for a claim with five elements. As location and ranging technology has existed for such a material amount of time, and an extraordinary number of references are needed for the rejection – almost double the number of references as elements in the claim the rejection itself is evidence of the patentability of applicant's claims. Furthermore, in addition to the above, there is no motivation or operability to combine nine separate references to show five elements in a technology that may be hundreds, if not thousands, of years old.

Examiner Rejections

Applicant has made several arguments that have not been specifically addressed by the Examiner. As per just one example, claim 7 does not even appear to have any positions by the Examiner other than the rejection itself. Applicant respectfully requests that each element of every claim be shown in a reference in the rejection and the merits of each of applicant's arguments be addressed. In doing so, prosecution can be expedited and applicant can provide positions supporting applicant's position as well as amend the claims without prejudice and to expedite prosecution.

Applicant's Response to the 35 U.S.C. 103 Rejections

The Examiner rejected claims 3, 7, 12, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay in view of Kalthoff and further in view of Sheha.

Claim 3

Claims 3 was rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay in view of Kahlthoff and further in view of Sheha.

The Examiner previously stated:

> "Barclay et al. do not disclose is the, 'creating on a first wireless telephonic device a list including a plurality of users, wherein each one of said plurality of users is associated to a different one of a plurality of wireless telephonic devices.' … it would have been obvious to one of ordinary skill in the art to have created such a list as taught by Kalthoff et al. into the Barclay et al. in order to have a more efficient system" (Office Action, page 3).

The Examiner's statement is incorrect. Applicant's claim 3 however, include a multiple entry list - not a list. Applicant's claim 3 further includes creating the multiple entry list and allowing transmission of location information to the multiple entry list.

Kahlthoff's FIG. 16A does not show or suggest such a multiple entry list, creating a multiple entry list, and allowing transmission of location information to a multiple entry list.

Kahlthoff merely alleges enabling friend alerts for individual names. Enabling friend alerts for individual names is not a multiple entry list, creating a

multiple entry list, or allowing transmission of location information to a multiple entry list. Kahlthoff's individual name is not a list – let alone a list of the features of applicant's claim 3.

The Examiner utilizes Kahlthoff in the Examiner's rejection for such features and states that Barclay does not show or suggest this feature. *See* Office Action, page 3. Applicant agrees with the Examiner that Barclays does not correct the deficiency. However, as shown above, neither does the Kahlthoff reference relied upon by the Examiner.

For at least the above reasons, applicant respectfully requests that rejection of applicant's claim 3, and any claims dependent therefrom, be withdrawn.

Furthermore, applicant stated with respect to removing an allowance:

> "Note the notification of Fig. 4 is requesting whether to send the location information or not and the user can decline such." (Office Action, pages 3-4)

Declining a location request, however, does not show or suggest applicant's claim 3 of removing an allowance of the transmission to said multiple entry list. None of the references, used either alone or in combination -- neither Barclay, Kalthoff, nor Sheha -- show or suggest applicant's claim 3 that includes such features.

Accordingly, none of the references, used either alone or in combination, show or suggest applicant's claim 3. For at least this reason, applicant respectfully requests that the Examiner's rejection of claim 3 be withdrawn.

Claim 7

Claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay in view of Kahlthoff and Sheha.

Applicant's claim 7 includes receiving manual input to identify a user profile for a stationary computer and sending location information to the stationary computer associated with the identified user profile after a permission is verified.

Neither Kahlthoff nor Barclay, used either alone or in combination show or suggest such a feature. Both Kahlthoff and Barclay fix portable devices to a person.

A portable device is, by definition, not applicant's claim 7 of a stationary computer.

Fixing a person to a device is not applicant's claim 7 of receiving manual input to identify a user profile.

Sheha was not utilizes by the Examiner for these elements.

Moreover, none of the references, used either alone or in combination, show or suggest applicant's invention of claim 7. In light of the foregoing, applicant respectfully requests that the Examiner's rejection of claims 7, and any claims dependent therefrom, be withdrawn.

Claim 12

Claims 12 was rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay in view of Kalthoff and further in view of Sheha.

None of the prior art, used either alone or in combination, shows or suggests claim 12 that includes

providing a display screen on a first wireless telephonic device for said first wireless telephonic device to request the location of a different wireless device and entering said telephone number on said display screen and requesting on the different wireless device that said different wireless device provides access information for said first wireless telephonic device.

The Examiner stated:

> "note paragraph 0099 of Sheha et al…" (Office Action, page 4)

Sheha's POI appears to be a label.

Sheha's POI does not show or suggest applicant's claim 12 of providing a display screen on a first wireless telephonic device for said first wireless telephonic device to request the location of a different wireless device and entering said telephone number on said display screen and requesting on the different wireless device that said different wireless device provides access information for said first wireless telephonic device.

None of the references, used either alone or in combination, show or suggest such a feature. In light of the foregoing, applicant respectfully requests that the Examiner's rejection of claim 12, and any claims dependent therefrom, be withdrawn.

Claim 18

Claims 18-19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay in view of Kalthoff and further in view of Krasner and further in view of Sheha.

None of the references, including Sheha, however, shows or suggests applicant's claim 18 of providing a highlight window for selecting one of the list of users on

the first wireless telephonic device.

Similarly, none of the references, including Sheha shows or suggests applicant's invention of claim 18 of selecting, using the highlight window, one of the users from the list of users.

Furthermore, the Examiner stated:

> "note paragraph 0010 of Sheha et al." (Office Action, page 4)

Sheha's paragraph 10 merely discusses resolutions and Sheha merely includes dragging and dropping. Resolutions and dragging and dropping is not applicant's claim 18 of providing a highlight window for selecting one of the list of users on the first wireless telephonic device.

Accordingly, none of the references, used either alone or in combination, shows or suggests applicant's invention of claim 18 of selecting, using the highlight window, one of the users from the list of users. In light of the foregoing, applicant respectfully requests that the Examiner's rejection of claims 18, and any claims dependent therefrom, be withdrawn.

Claim 20

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over:

Barclay;
in view of Kalthoff;
in view of Krasner;
in view of Bates;
in view of Grube;
in view of Calvert;
in view of Sheha; and

in view of:

Parupudi; or in the alternative

Meadows; or in the alternative

Ganesh.

The Examiner stated, with respect to Parupudi, to see example 10. Example 10 of Parupudi, however, merely accounts for disabling a login of one device if the devices are not in the same location. Parupudi does not show or suggest claim 20 that includes determining an identity, by utilizing a login and password, and utilizing this identity to determine if the device is allowed to access the location.

The Examiner also stated to see FIG. 4A of Meadows. Given the inadequate six-reference combination above, any additional reference is irrelevant. However, Meadows merely describes an access code for a parent to monitor a child. Meadows does not show or suggest claim 20 that includes determining an identity, by utilizing a login and password, and utilizing this identity to determine if the device is allowed to access the location. Furthermore, Meadows is also a precision device and could not be integrated with the six other structures.

The Examiner also stated to see FIG. 3 of Ganesh. Given the inadequate six-reference combination above, any additional reference is irrelevant. FIG. 3 of Ganesh, however, merely provides a carrier's webpage with a login ID. The web-page is preset to a telephone number. The webpage allegedly provides the location of the phone of the telephone number. Furthermore, Ganesh is also a precision device and could not be integrated with the six other structures.

Furthermore, none of the references, used either alone or in combination show or suggest claim 20 that includes determining an identity, by utilizing a login and password, and utilizing this identity to determine if the device is allowed to access the location and the location of said identity based on the location of the first wireless telephonic device, and requesting the location of a second wireless telephonic device by the first device.

The Examiner stated "This could be obviously done by login and password (which is probably done initially by password or pin manually) or …" (Office Action, page 6).

Applicant's invokes his right to have the Examiner provide documentary evidence and not the Examiner's knowledge to form the rejection. Regardless, the Examiner's position of a login and password does not show or suggest applicant's claim that includes determining an identity, by utilizing a login and password, and utilizing this identity to determine if the device is allowed to access the location and the location of said identity based on the location of the first wireless telephonic device, and requesting the location of a second wireless telephonic device by the first device.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection of claims 20, and any claims dependent therefrom, be withdrawn.

Conclusion

Applicant respectfully submits that this application, including the pending claims, is in condition for allowance. Accordingly, applicant respectfully requests that a favorable action be issued.

The Director is hereby authorized to charge and fees due in conjunction with this filing, or to credit any overpayment of the same, to Deposit Account No. 50-3855.

Respectfully Submitted,

/Jeffrey D. Mullen/

Jeffrey D. Mullen
Applicant (Reg. No. 52,056)
Customer No. 32733
2212 Hassinger Lane
Glenshaw, PA 15116
Tel.: (914) 837-7741

Electronic Patent Application Fee Transmittal

Application Number:	11834674
Filing Date:	06-Aug-2007
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Filer:	Jeffrey David Mullen
Attorney Docket Number:	JDM/002 CON4

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
		Total in USD ($)		**700**

Electronic Acknowledgement Receipt	
EFS ID:	36424431
Application Number:	11834674
International Application Number:	
Confirmation Number:	1117
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Customer Number:	32733
Filer:	Jeffrey David Mullen
Filer Authorized By:	
Attorney Docket Number:	JDM/002 CON4
Receipt Date:	26-JUN-2019
Filing Date:	06-AUG-2007
Time Stamp:	21:24:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$700
RAM confirmation Number	062719INTEFSW00006981503855
Deposit Account	503855
Authorized User	Jeffrey Mullen
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		JDM-002CON4--Reply.pdf	193037 e1f563adc300fe7c8364f35aded43d74fc5f3b64	yes	20

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	10
	Amendment/Req. Reconsideration-After Non-Final Reject	11	20

Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30773 be644dd63fb2fc55543388983118f1fe285f0f8a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	223810		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/834,674	08/06/2007	Jeffrey D. Mullen	JDM/002 CON4	1117

32733 7590 09/25/2019

JEFFREY D. MULLEN
2212 Hassinger Lane
Glenshaw, PA 15116

EXAMINER	
DEANE JR, WILLIAM J	

ART UNIT	PAPER NUMBER
2652	

MAIL DATE	DELIVERY MODE
09/25/2019	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 11/834,674	**Applicant(s)** Mullen, Jeffrey D.	
	Examiner WILLIAM J DEANE JR	**Art Unit** 2652	**AIA (FITF) Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 06/26/2019.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 3,7,12,18 and 20 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 3,7,12,18 and 20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Interview Suggested

It is suggested that an Interview be setup to discuss this case. It appears that we are not making much headway by sending Office Actions and Responses to each other in this case. We could also get my Supervisor involved in the Interview about the claim limitations, if Applicant would desire such an Interview. If Applicant would like an Interview with the examiner or with the examiner and the examiner's supervisor, Applicant can contact the examiner at 571 272-7484 or via email at william.deane@uspto.gov and we can setup a mutually agreeable date and time.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*,

686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 3 and 7 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 3 and 21 of co-pending Application No.

11/486161). Although the claims at issue are not identical, they are not patentably distinct from each other because the main difference is that the co-pending calls for location information to be provided outside of the call. However, note at least Col. 13, lines 27 – 31 and Col. 17, lines 32 – 43 of Jorasch et al. It would have been obvious to one of ordinary skill that location information could be sent during the call or outside the call.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 3 and 7 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claim 3 of co-pending Application No. 11/387384. Although the claims at issue are not identical, they are not patentably distinct from each other because applicant only uses small language changes. For example, changing the list of users. It would be obvious to one of ordinary skill in the art to allow changes in the list of users note at least Fig. 9 of the instant application.

Claims 3 and 7 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1of co-pending Application No. 11/387384. Although the claims at issue are not identical, they are not patentably distinct from each other because applicant only uses small language changes.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claim 3, is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 3- 20 of Patent No. 9,204,283 in view of U.S. Patent No. 7,366,522 (Thomas). The main difference between claims 3 and 20 of the instant application and claim 3 of the co-pending application is the login and password limitation. This limitation is also found in claim 20 of the instant application. The use of a login and password would have been obvious to one of ordinary skill to ensure privacy. If this is argued note (Col. 5, lines 49 – 57 of Thomas. It would have been obvious to one of ordinary skill in the art to incorporating the teaches of Thomas into the Jorasch et al. system and method in order to offer security and control over whether a monitoring party gets access to the monitored parties location information.

Claim 7 and 12 are rejected on the ground of nonstatutory double patenting as being unpatentable over claim 3 - 20 of U.S. Patent No. 9,240,283. Although the claims at issue are not identical, they are not patentably distinct from each other.

With respect to a profile in claim 7, note client database 328 of Jorasch et al. It would have been obvious to one of ordinary skill in the art to incorporate records/profiles wherever and whenever it was deemed necessary

With respect to claim 12, note Col.14, lines 56 – 67 and Figs. 6, &A, * and 13 of Jorasch et al. Also note, Col 2, lines 12 – 18 of Jorasch et al. Displays are notoriously old in the art and it would have been obvious to one of ordinary skill in the art to provide a display wherever and whenever it was deemed necessary.

Claim18 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 3 - 20 of U.S. Patent No. 9,204,283 in view of U.S. Patent Application No. 2004/0054428 (Sheha et al.).

The main difference between claim 20 of the instant application and claims 3 - 20 of U.S. Patent No. 9,635,540 is the limitation of using a highlight means for selecting a monitored or monitoring party. The use of a highlight is notoriously old in the art as shown by Sheha et al. at paragraph 0010. It would have been obvious to one of ordinary skill in the art to have incorporating the teachings of Sheha et al. into the system and method of Jorasch et al. as an obvious convenience for a user in selecting a party to be monitored or for selecting a monitoring party.

Claims 3, 7, 12 and 20 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1 - 35 of U.S. Patent No. 9,204,283. The claims are mostly identical except certain limitations like login/password are found in claim 7 and 20 of the instant application are found in at least claim 13 of the patent. It would have been obvious to move limitations up or down in the claims as in the end it is the same invention.

With respect to claims 3 and 7, such claims read on the claims of the patent. Only different wording is used.

Drawings

In addition to Replacement Sheets containing the corrected drawing figure(s), applicant is required to submit a marked-up copy of each Replacement Sheet including annotations indicating the changes made to the previous version. The marked-up copy must be clearly labeled as “Annotated Sheets” and must be presented in the amendment or remarks section that explains the change(s) to the drawings. See 37

CFR 1.121(d)(1). Failure to timely submit the proposed drawing and marked-up copy will result in the abandonment of the application.

Specifically, there is no, "stationary computer" in the drawings.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112(a):

> (a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of the first paragraph of pre-AIA 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 7 is rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, or for pre-AIA the inventor(s), at the time the application was filed, had possession of the claimed invention.

Specifically, claim 7 recites "a stationary computer", however, there is no such language in the, "Detailed Description" of the specification.

The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7 is rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Specifically, there is no mention of a "stationary computer" as claimed in claim 7. In fact, there is no mention of a stationary computer at all in the, Detailed Description" of the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim(s) 3 is/are rejected under pre-AIA 35 U.S.C. 102(a) as being anticipated by U.S. Patent No. 7, 010,110 (Jorasch) et al.

A method comprising: creating on a first wireless telephonic device a multiple entry list including a plurality of users, wherein each one of said plurality of users is associated to a different one of a plurality of wireless telephonic devices and said plurality of users on

said multiple entry list is operable to be modified by said first wireless telephonic device; (see Abstract, Fig. 2, Fig 6, Fig. 7A, Fig. 7B and Fig. 8). In addition, note Col. 2, lines 12 – 35. Essentially the system can be a one to many or many to one configuration.

allowing on said first wireless telephonic device, transmission of location information associated with said first wireless telephonic device to said multiple entry list, wherein said allowance is provided to, and stored on, a remote server; (see col. 2, lines 12 – 54 and note central server 204). Again, essentially the system can be a one to many or many to one configuration

receiving at said remote server said location information and storing said location information; (see Col. 3, lines 40 – 47)

providing said location information, as a result of said allowance, to at least one of said plurality of users on said multiple entry list by providing said location information to said different wireless telephonic device associated to the provided at least one users (see Col. 3, lines 40 – 47 and Col. 4, lines 56 - 65); and

removing on said first wireless telephonic device said allowance of the transmission of location information associated with said first wireless telephonic device to said multiple entry list. Note at least Col. 12, line 40 – Col. 13, line 31. It is noted that location is a status and each party can control what status updates are sent and to which party will

receive such updates (see at least Col. 7, lines 17 – 31, Col. 9, lines 45 – 49, Col. 11, lines 54 – 58, Col. 16, lines 4 – 10 and the columns cited above).

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 7 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch) et al.

With respect to claim 7, note the rejection of claim 3 above. With respect to the "stationary computer" aspects, as best as can be determined, note input 502 and processor 504. In addition, note the registration service 314, notification service 316, accounting services 418 and monitoring service 324 could all be standalone services, which receives inputs form user to access user records. For example, note, "appropriate identifiers" in col. 15, line 25; Col. 16 lines 4 – 21; note Col. 17, lines 16 – 26 (note plurality of devices, which are stationary computers in different regions). In addition, note Col. 9, line 1 (DTMF code database), Col. 12, line 43 – line 49 (different level access codes) and Col. 13, lines 3 – 5 (special access codes). These codes the examiner equates to a password. Obviously, one of ordinary skill in the art would recognizes that the use of a password or pin or code could be used if for nothing else than to keep the information secured. Also note the use of encryption 318 of Fig. 5 and digital signature 336 of Fig. 5. Note also, Col. 5, line 64 – Col. 6, line 15 (note SPID). If

this is argued, note the rejection of claim 20 below with respect to the Thomas reference.

Claim 12 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch) et al.

With respect to claim 12, note Col. 14, lines 56 – 67 and Figs. 6, 7A, 8 and 13. Also note Col. 2, lines 12 – 17.

Claim 18 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch et al.) in view of U.S. Patent Application No. 2004/0054428 (Sheha et al.).

With respect to claim 18, note the rejection of claims 1 and 12 above. Note the window in Fig. 13. Also note, one can scroll through the numbers in the window 1304. However, there is no disclosure in Jorasch et al. with respect to use of a highlight. With respect to hue of highlighting note paragraph 0010 of Sheha et al. It would have been obvious tone of ordinary skill in the art to incorporate highlighting as a means for selecting a party as taught by Sheha et al. into the Jorasch et al. device and system as an obvious convenience for a user for selecting a party.

Claim 20 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch et al.) in view of U.S. Patent No. 7,366,522 (Thomas).

With respect to claim 20, note the rejection of claim 3 above. In addition, note Col. 4, lines 37 – 41, Col. 4 lines 56 – 63, Col. 13, line 5 of Jorasch et al. Therefore, the inputs can be inputted at either a monitoring telephone or a monitored telephone. Note also, that Jorasch et al. use DTMF codes and access codes as shown above.

Additionally, note in Jorasch et al. one must register to get permissions and give permissions for location information. It would have been obvious to one of ordinary skill in the art to use a login and/or password in this situation in order to have security for accessing the location information.

If this is argued, note that Thomas uses a login and/or password to access location information (see Col. 5, lines 49 – 57 of Thomas and use of user name (identity) and identities used in Figs. 6 and 13 of Jorasch et al.). It would have been obvious to one of ordinary skill in the art to incorporating the teaches of Thomas into the Jorasch et al. system and method in order to offer security and control over whether a monitoring party gets access to the monitored parties location information.

Response to Arguments

Applicant's arguments with respect to claims 3, 7, 12, 18 and 20 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

With respect Applicant's argument in the earlier Response dated October 16, 2018 that Sheha et al. is not prior art, it is noted that Sheha's provisional application filed March 1, 2002, is earlier than Applicant's non-provisional date of March 25, 2002. In addition, the information relied on about highlighting a user name in rejecting such a limitation in Applicant's claims is found throughout the provisional application of Sheha et al. For example, note page 14, line 13, page 34, line 21, page 40, line 15, page 41, line 18 and line 21, page 43, line 7, page 50, line19, page 54, line 3 and line 6, page 55,

line 4, page 56, line 17, page 57, line 19 and page 58, line 1, line 4, line 6 and line 18. Therefore, Sheha et al. is prior art.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Note the Abstracts and Figs, of the additional references cited on the accompanying 892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William Deane whose telephone number is 571 -272-7484. The examiner can normally be reached on Monday - FRIDAY from 9:00 A.M. to 5:00 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ahmad Matar, can be reached on 571-272-7488. The official fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. However, unofficial faxes can be direct to the examiners computer at 571 273 - 7484.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-

direct.uspto.aov. Should you have questions on access to the Private PAIR system,

contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

08Sep2019

/WILLIAM J DEANE JR/

Primary Examiner, Art Unit 2652

Notice of References Cited	Application/Control No. 11/834,674	Applicant(s)/Patent Under Reexamination Mullen, Jeffrey D.	
	Examiner WILLIAM J DEANE JR	Art Unit 2652	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-7366522-B2	04-2008	Thomas; C. Douglass	H04W8/10	455/456.1
*	B	US-7870293-B2	01-2011	Tso; Michael M.	G06Q30/04	709/246
*	C	US-5375124-A	12-1994	D'Ambrogio; William J.	H04Q11/0428	370/420
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	456.1	06May2009	WJD
	415		
	457		
	435		
	404.1		
	Updated the prior search	25Mar2010	WJD
	Updated the prior search	06Dec2010	WJD
	Updated the search above	12Sep2011	WJD
	Updated the search above	06Sep2013	WJD
	Updated the search above	25Jun2014	WJD
	Updated the search above	05Apr2015	WJD
	Updated the search above	06Jan2015	WJD
	Updated the search above	07Aug2015	WJD
	Updated the searches above	14Apr2018	WJD
	Updated the above searches	12/25/2018	WJD
	Updated the searches above	09/08/2019	WJD

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

Search Notes		
Search Notes	Date	Examiner

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	**Art Unit**
	WILLIAM J DEANE JR	2652

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	06/06/2009	03/25/2010	12/06/2010	09/12/2011	09/06/2013	06/25/2014	04/05/2015	01/06/2016	09/08/2019
	1	✓	✓	✓	-	-	-	-	-	-
	2	✓	✓	✓	-	-	-	-	-	-
	3	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	N
	5	✓	✓	✓	✓	✓	✓	✓	✓	N
	6	✓	✓	✓	✓	✓	✓	✓	✓	N
	7	✓	✓	✓	✓	✓	✓	✓	✓	✓
	8	✓	✓	✓	✓	✓	✓	✓	✓	N
	9	✓	✓	✓	✓	✓	✓	✓	✓	N
	10	✓	✓	✓	✓	✓	✓	✓	✓	N
	11	✓	✓	✓	✓	✓	✓	✓	✓	N
	12	✓	✓	✓	✓	✓	✓	✓	✓	✓
	13	✓	✓	✓	✓	✓	✓	✓	✓	N
	14	✓	✓	✓	✓	✓	✓	✓	✓	N
	15	✓	✓	✓	✓	✓	✓	✓	✓	N
	16	✓	✓	✓	✓	✓	✓	✓	✓	N
	17	✓	✓	✓	✓	✓	✓	✓	✓	N
	18	✓	✓	✓	✓	✓	✓	✓	✓	✓
	19	✓	✓	✓	✓	✓	✓	✓	✓	N
	20	✓	✓	✓	✓	✓	✓	✓	✓	✓

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/834,674	Filing Date 08/06/2007	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $25 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $100 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	03/25/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 16	Minus	*** 16	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/MARQUITA D JONES/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

SMALL ENTITY
JDM/002 CON4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Jeffrey D. Mullen
Application No.	:	11/834,674
Confirmation No.	:	1117
Filed	:	August 6, 2007
For	:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
Group Art Unit	:	2614
Examiner	:	William Deane Jr.

Mail Stop: Amendment
Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pittsburgh, PA 15116
March 25, 2020

REPLY TO OFFICE ACTION

Sir:

This is in Reply to the Office Action dated April September 25, 2019. A three-month extension of time is applicable hereto and submitted herewith. In Reply to the Office Action, applicant amends the application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 10 of this paper.

Electronic Patent Application Fee Transmittal	
Application Number:	11834674
Filing Date:	06-Aug-2007
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Filer:	Jeffrey David Mullen
Attorney Docket Number:	JDM/002 CON4
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
		Total in USD ($)		**700**

Electronic Acknowledgement Receipt	
EFS ID:	38969658
Application Number:	11834674
International Application Number:	
Confirmation Number:	1117
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Customer Number:	32733
Filer:	Jeffrey David Mullen
Filer Authorized By:	
Attorney Docket Number:	JDM/002 CON4
Receipt Date:	25-MAR-2020
Filing Date:	06-AUG-2007
Time Stamp:	18:00:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$700
RAM confirmation Number	E20203OI01071013
Deposit Account	503855
Authorized User	Jeffrey Mullen
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		JDM-002CON4--Reply.pdf	141313 86e22b8297b64ed6a4cd27466b2c6d5cde3ad088	yes	22

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	12
	Applicant Arguments/Remarks Made in an Amendment	13	22

Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30772 b767823b7d6fbcc9ac9976521c3f86cf370ca1de	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	172085		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-2. (cancelled)

3. (currently amended) A system ~~method~~ comprising:

~~creating on~~ a first wireless portable telephonic device, wherein a multiple entry list is operable of being created on said first wireless portable telephonic device, said multiple entry list includes ~~including~~ a plurality of entities ~~users,~~ ~~wherein~~ each one of said plurality of entities ~~users~~ is associated to a different one of a plurality of wireless telephonic portable devices, ~~devices~~ and said plurality of entities ~~users~~ on said multiple entry list is operable to be manually modified by said first wireless telephonic portable device via a graphical user interface, ~~device; allowing on said first wireless telephonic device, transmission of location information associated with said first wireless telephonic device to said multiple entry list, wherein said~~ an allowance is operable to be provided to, and stored on, a remote server, ~~server;~~ from said first wireless telephonic portable device, said allowance permits transmission of location information associated with said first wireless telephonic portable device to said multiple entry list, ~~receiving at said remote server said~~ location information is operable to be received and stored on said remote server, ~~and storing said location information; providing said location~~

~~information,~~ as a result of said allowance ~~allowance,~~ said location information is operable to be provided to at least one of said plurality of entities ~~users~~ on said multiple entry list by being operable to provide ~~providing~~ said location information to said different wireless telephonic device associated to the provided at least one entities, ~~users;~~ and

~~removing on said first wireless telephonic device~~ said allowance is operable to be removed by said first wireless portable telephonic device. ~~of the transmission of location information associated with said first wireless telephonic device to said multiple entry list.~~

4. (withdrawn) A method comprising:

selecting a first location alert listing for a second wireless device from a plurality of location alert listings on a first wireless device, wherein a first one of said plurality of location alert listings is associated with said second wireless device entering a first location area and a second one of said plurality of location alert listings is associated with said second wireless device entering a second location area;

obtaining a location of said second wireless device;

determining whether said location is in ~~a~~ said first location area;

determining whether said second wireless device has provided said first wireless device with permission to obtain information associated with said location of said second wireless device; and

providing an alert to said first wireless device if said location is in said first location area and if said

second wireless device has provided said first wireless device with permission to obtain information associated with said location of said second wireless device.

5. (withdrawn) The method of claim 4, wherein a positioning system is utilized to provide said location.

6. (withdrawn) A system comprising:

a first wireless telephone;

a second wireless telephone; and

a server located remotely from said first and second wireless telephones, wherein said server receives and stores a first location representative of the location of said first wireless telephone, said server receives and stores a second location representative of the location of said second wireless telephone, said server receives and stores a first permission from said first wireless telephone for said second wireless telephone to receive location information associated with said first location according to a first level of location access from several levels of location access selectable from a first graphical interface on said first wireless telephone after selecting said second wireless telephone on a second graphical interface on said first wireless telephone from a plurality of wireless telephones, and said server sends said location information to said second wireless telephone after verifying said first permission.

7. (currently amended) A system comprising:

a first wireless <u>portable</u> telephone;

a stationary computer, wherein said stationary computer receives manual input <u>login</u> to identify a <u>entity</u>

~~user~~ profile and receives a manual input password ~~for~~ to access said entity ~~user~~ profile; and

a server located remotely from said first wireless portable telephone and said stationary computer ~~second wireless telephones~~, wherein said server receives and stores a first location representative of the location of said first wireless portable telephone, said server receives and stores a first permission from said first wireless portable telephone for said entity ~~user~~ profile to receive location information associated with said first location, and said server sends said location information to said stationary computer after verifying said first permission and identifying said entity ~~user~~ profile associated with said stationary computer.

8. (withdrawn) A method comprising:

providing a first level of location access for information associated with a location of a first wireless device to a second wireless device by said first wireless device on a first graphical interface on said first wireless device after selecting said second wireless device on a second graphical interface from a plurality of wireless devices on said first wireless device, wherein said first graphical interface includes a plurality of selectable levels of location access;

storing said first level of access; and

providing said information to said second wireless device in accordance with said first level of access.

9. (withdrawn) A method comprising:

allowing a device to locate a first wireless device in accordance with access information stored on a remote server, wherein said access information was provided by said first wireless device;

locating said first wireless device a plurality of times and determining a travel speed based on said locating;

utilizing said travel speed and an assumed route to determine an estimated arrival time of said first wireless device to a destination; and

providing said estimated arrival time to said device.

10. (withdrawn) A method comprising:

allowing a device to locate a plurality of wireless devices based on access information for said device provided by each one of said plurality of wireless devices, wherein said access information is stored on a remote server;

determining a travel speed for at least one of said plurality of wireless devices;

utilizing said travel speed and an assumed route to determine an arrival time to a destination; and

displaying on said device the location of said plurality of wireless devices on a map on said device.

11. (withdrawn) A method comprising:

allowing a device to locate a plurality of wireless devices based on access information provided by each one of said plurality of wireless devices, wherein said access information is stored on a remote server; and

providing an option to said device of finding the closest one of said plurality of wireless devices to said device.

12. (currently amended) A system ~~method~~ comprising:

~~providing a display screen on~~ a first wireless telephonic device for providing on a display screen ~~said first wireless telephonic device~~ to request the location of a different wireless device, wherein ~~device; entering~~ a telephone number is operable to be entered on said display screen, ~~wherein~~ said telephone number is associated with said different wireless device, ~~device;~~ requesting on said different wireless device that said different wireless device provides access information for said first wireless telephonic device, ~~device; and~~ storing said access information on a remote server, and sending the locaton information of said different wireless device based on said access information.

13. (withdrawn) A method comprising:

determining whether a looking for profile of a first dating service user matches a profile of a second dating service user;

alerting said first dating service user of said second dating service user, wherein a first location of a first wireless telephonic device of said first dating service user and a second location of said second wireless telephonic device of said second service user are utilized in said determining and said first and second locations are stored on a remote server; and

requesting access to a form of communication between said first and second dating service users from said first dating service user.

14. (withdrawn) A method comprising:

determining the location of a first wireless device by a second wireless device in accordance with location access information stored on a remote server for said second wireless device by said first wireless device; and

utilizing the location of said second wireless device and the location of said first wireless device to determine the distance between said first and second wireless devices, wherein said distance is displayed on a display screen of said second wireless device and a directional indicia is displayed on said display screen_to indicate the location of said first wireless device relative to the location of said second wireless device.

15. (withdrawn) A method comprising:

determining the location of a first wireless device by a second wireless device in accordance with location access information stored on a remote server for said second wireless device by said first wireless device; and

utilizing the location of said second wireless device and said first wireless device to determine the shortest path between said first and second wireless devices, wherein said shortest path is displayed on a display screen of_said second wireless device.

16. (withdrawn) A method comprising:

determining the location of a first wireless device by a second device in accordance with location access information stored on a remote server for said second device by said first wireless device;

determining that the location of a first wireless device is on a type of travel;

determining an assumed route for a destination utilizing said determination that the location of a first wireless device is on said type of travel; and

estimating an arrival time for said destination utilizing said determined assumed route and a travel speed, wherein said estimated arrival time is displayed on said second device.

17. (withdrawn) The method of claim 16, wherein said type of travel is driving.

18. (currently amended) A system ~~method~~ comprising:

~~providing a list of users on~~ a first wireless portable telephonic device, wherein a list of entities is provided on said first wireless portable telephonic, ~~device;~~ ~~providing~~ a highlight window is operable to be provided on said first wireless portable telephonic device for selecting one of said list of entities ~~users~~ on said first wireless portable telephonic device, ~~device;~~ manual input is operable to be received to select ~~selecting~~, using said highlight window, one of said entities ~~users~~ from said list of entities, ~~users;~~ and ~~providing~~ a display screen is operable to be provided on said first wireless device for selecting location access rights from a plurality of location access rights for said selected entity ~~user~~ with

respect to the location of said first wireless telephonic device, and the location is operable to be sent based on said selected location access rights.

19. (withdrawn) A method comprising:

providing a display screen on a first device for selecting one of a plurality of location alerts for a second wireless device, wherein at least two of said plurality of location alerts are associated with a different location area; and

alerting said device in accordance with said selected location alert.

20. (currently amended) A system ~~method~~ comprising:

~~utilizing a login and a password entered on~~ a first wireless portable telephonic device operable to utilize a login and a password entered on the first wireless telephonic device, to determine an identity of said first wireless portable telephonic device and the location of said identity based on the location of said first wireless portable telephonic device, wherein ~~device; requesting~~ the location of a second wireless portable telephonic device is operable to be requested by said first device, ~~device; utilizing~~ said identity is operable to be utilized to determine whether said first wireless telephonic device is allowed to access the location of said second wireless portable telephonic device, ~~wherein~~ said access is operable to be provided by said second device and is stored remotely, ~~remotely; and~~ a determination is operable to be provided ~~determining~~ whether to provide the location of said second wireless portable telephonic device

to said first wireless telephonic device based on said access, ~~access;~~ and ~~providing~~ the location of ~~aid~~ said second wireless telephonic device is operable to be provided to said first telephonic wireless device based on said determination.

REMARKS/ARGUMENTS

Summary of Office Action

Claims 3-20 are pending.

Claims 2-6, 8-11, 13-17, and 19 are withdrawn.

The Examiner provisionally rejected claims 3 and 7 as being unpatentable over claims 3 and 21 of co-pending Application No. 11/486,161 (hereinafter the '161 applicatio).

The Examiner provisionally rejected claims 3 and 7 as being unpatentable over claims 3 and 21 of co-pending Application No. 11/387,384 (hereinafter the '384 applicatio).

The Examiner rejected claim 3 on the ground of nonstatutory double patenting as being unpatentable over claims 3-20 in view of U.S. Patent No. 9,204,283 (hereinafter "the '283 patent") in view of Thomas.

The Examiner rejected claims 7 and 12 on the ground of nonstatutory double patenting as being unpatentable over claims 3-20 of the '283 patent.

The Examiner rejected claim 18 on the ground of nonstatutory double patenting as being unpatentable over claims 3-20 of the '283 patent and Sheha U.S. Patent Application No. 2004/0054428 (hereinafter "Sheha").

The Examiner rejected claims 3, 7, 12, and 20 on the ground of nonstatutory double patenting as being unpatentable over claims 1-35 of the '283 patent.

The Examiner objected to the drawings as there is no "stationary computer" in the drawings.

The Examiner rejected claim 7 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The Examiner rejected claim 7 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention.

The Examiner rejected claim 3 under 35 U.S.C. 102(a) as being unpatentable over U.S. Patent No. 7,010,110 (hereinafter "Jorasch").

The Examiner rejected claim 7 and 12 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7,010,110 (hereinafter "Jorasch").

The Examiner rejected claim 18 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Sheha U.S. Patent No. 7,366,522 (hereinafter "Sheha").

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Thomas U.S. Patent No. 7,366,522 (hereinafter "Thomas").

Summary of Applicant's Amendments

Without prejudice and solely in order to expedite prosecution, applicant has amended claims 3, 7, 12, 18, and 20.

Applicant respectfully traverses the Examiner's rejections. Applicant reserves the right to claim any subject matter lost by any amendments or cancellations during the prosecution of this application, or to claim any subject matter included in the present application, in one or more continuation or divisional applications.

Applicant's Response to the Double Patenting Rejections

The Examiner rejected claims 3, The Examiner provisionally rejected claims 3 and 7 as being unpatentable over claims 3 and 21 of the '161 application. The Examiner

provisionally rejected claims 3 and 7 as being unpatentable over claims 3 and 21 of the ‘384 application. The Examiner rejected claim 3 on the ground of nonstatutory double patenting as being unpatentable over claims 3-20 in view of the ‘283 patent. The Examiner rejected claims 7 and 12 on the ground of nonstatutory double patenting as being unpatentable over claims 3-20 of the ‘283 patent. The Examiner rejected claim 18 on the ground of nonstatutory double patenting as being unpatentable over claims 3-20 of the ‘283 patent and Sheha. The Examiner rejected claims 3, 7, 12, and 20 on the ground of nonstatutory double patenting as being unpatentable over claims 1-35 of the ‘283 patent.

Applicant traverses the Examiner’s assertions. However, as the above-identified claims are not allowed by the Examiner, Terminal Disclaimers are not yet applicable. Applicant respectfully request the Examiner review each claim of the present application and the other applications/patents under disclosure as claims may be amended and claimed subject matter may change.

Drawing Objections

The Examiner objected to the drawings as there is no “stationary computer” in the drawings.

Applicant directs the Examiner’s attention to non-wireless device 1605 that includes the word “computer” in the drawing. Paragraph 81 teaches non-wireless device 1605 and a “non-mobile personal computer.” A non-mobile personal computer is a stationary personal computer. Accordingly, applicant’s stationary computer is in the drawings – albeit there is no requirement to put the entire

specification in the drawings – and is explicitly provided in reference to the non-wireless device 1605.

In light of the foregoing, this response is a complete response and no replacement drawings are due. Furthermore, applicant respectfully requests the drawing objection be withdrawn.

Rejections under 35 U.S.C. 112

The Examiner rejected claim 7 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The Examiner rejected claim 7 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention.

Applicant directs the Examiner's attention to non-wireless device 1605 that includes the word "computer" in the drawing. Paragraph 81 teaches non-wireless device 1605 and a "non-mobile personal computer." A non-mobile personal computer is a stationary personal computer. Accordingly, applicant's stationary computer is in the specification. Furthermore, Jorusch does not show or suggest applicant's claim 3 that includes modifying the list of entities on a portable device via a graphical user interface.

In light of the foregoing, this response is a complete response and no replacement drawings are due. Furthermore, applicant respectfully requests the drawing objection be withdrawn.

Rejections under 35 U.S.C. 102(a)

The Examiner rejected claim 3 under 35 U.S.C. 102(a) as being unpatentable over Jorasch.

The Examiner stated:

> "allowing … transmission of location information … to said multiple entry list … see col 2, lines 12 – 54" (Office Action, page, 9)

Jorash, however, is not related to an allowance of transmission of location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54.

Accordingly, for at least these reasons, application respectfully requests the Examiner's rejection be withdrawn.

Furthemore, Jorash is silent on applicant's claim 3 that includes allowance of transmission of location information where a multiple entry list is operable of being created on said first wireless telephonic device and the multiple entry list is operable to be modified by the first wireless telephonic device. Jorash is also silent on appliant's claim 3 of an allowance operable to be provided to, and stored on, a remote server, from the first wireless telephonic device as well as the allowance being able to be deleted by the first wireless telephonic device. Thus, Jorash does not show a wireless telephonic device creating and modifying a list of entities or a wireless telephonic device for providing and removing an allowance. Jorash merely alleges "programming the parties' telephone numbers into the client's local telephone or be a directory lookup by name." (Jorasch, col. 2). Programming telephone numbers into a local telephone does not show or suggest claim 3 of a multiple entry list is operable of being created on said first wireless telephonic device and the multiple entry

list is operable to be modified by the first wireless telephonic device nor an allowance operable to be provided to, and stored on, a remote server, from the first wireless telephonic device as well as the allowance being able to be deleted by the first wireless telephonic device.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Rejections under 35 U.S.C. 103(a)

Claim 7

The Examiner rejected claim 7 under 35 U.S.C. 103(a) as being unpatentable over Jorasch.

Applicant's claims 7 includes a server located remotely from said first wireless portable telephone and said stationary computer that server receives and stores a first location representative of the location of said first wireless portable telephone, said server receives and stores a first permission from said first wireless portable telephone for said entity profile to receive location information associated with said first location, and said server sends said location information to said stationary computer after verifying said first permission and identifying said entity profile associated with said stationary computer.

Jorash, however, is not related to a permission for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54.

Accordingly, for at least these reasons, application respectfully requests the Examiner's rejection be withdrawn.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 12

The Examiner rejected claim 12 under 35 U.S.C. 103(a) as being unpatentable over Jorasch.

Applicant's claim 12 includes a first wireless telephonic device for providing on a display screen to request the location of a different wireless device, requesting on said different wireless device that said different wireless device provides access information for said first wireless telephonic device, and sending the location information of said different wireless device based on said access information.

Jorash, however, is not related to access information for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 18

The Examiner rejected claim 18 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Sheha.

As shown above, Jorash is not related to a permission for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54.

Accordingly, Jorash does not show or suggest applicant's claim 18 that includes a first wireless portable telephonic device, wherein a list of entities is

provided on said first wireless portable telephonic, highlight window is operable to be provided on said first wireless portable telephonic device for selecting one of said list of entities on said first wireless portable telephonic device, manual input is operable to be received to select, using said highlight window, one of said entities from said list of entities, a display screen is operable to be provided on said first wireless device for selecting location access rights from a plurality of location access rights for said selected entity with respect to the location of said first wireless telephonic device, and providing a location based on the location access rights.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Furthermore, the Examiner stated that:

> "no disclosure in Jorash … with respect to use of a highlight … Sheha … would have been obvious … as a means for selecting a party"
> (Office Action, page 11).

Jorash cannot be conbined with Sheha. Jotash is not capable of providing applicant's claim 18 of manual input is operable to be received to select, using said highlight window, highlight window for manually selecting. As a result of the lack of capability, moving a highlight window into Jorash wouldn't provide the ability for Jorash to have manual input operable to be received to select the highlight window.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 20

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Thomas.

As shown above, Jorash is not related to a permission for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54. Accordingly Jorash does not show or suggest applicant's claim 20 of a first wireless telephonic device operable to utilize a login and a password entered on the first wireless telephonic device, to determine an identity of said first wireless telephonic device and the location of said identity based on the location of said first wireless telephonic, wherein the location of a second wireless telephonic device is operable to be requested by said first device, said identity is operable to be utilized to determine whether said first wireless telephonic device is allowed to access the location of said second wireless telephonic device, said access is operable to be provided by said second device and is stored remotely, a determination is operable to be provided whether to provide the location of said second wireless telephonic device to said first wireless telephonic device based on said access, and the location of said second wireless telephonic device is operable to be provided to said first telephonic wireless device based on said determination.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Furthermore, the Examiner stated that:

> "If this is argued, note that Thomas uses a login and/or password to access location information" (Office Action, page 11).

Access locating information does not show or suggest applicant's claim 20 of operable to utilize a login and a password entered on the first wireless telephonic device to determine an identity of said first wireless telephonic device and the location of said identity based on the location of said first wireless telephonic device. As admitted by the Examiner, codes is not claim 20 to determine an identity of said first wireless telephonic device and the location of said identity based on the location and a reference cannot change fundamental capabilities of Jorasch that are definitively relied upon by other Jorasch discussions without rendering it inoperable.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Conclusion

Applicant respectfully submits that this application, including the pending claims, is in condition for allowance.

Reconsideration and prompt allowance of this application are respectfully requested.

The Director is hereby authorized to charge and fees due in conjunction with this filing, or to credit any overpayment of the same, to Deposit Account No. 50-3855.

Respectfully Submitted,

/Jeffrey D. Mullen/
Jeffrey D. Mullen
Applicant (Reg. No. 52,056)
Customer No. 32733
2212 Hassinger Lane
Glenshaw, PA 15116

Tel.: (914) 837-7741

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/834,674	08/06/2007	Jeffrey D. Mullen	JDM/002 CON4	1117

32733 7590 06/23/2020

JEFFREY D. MULLEN
2212 Hassinger Lane
Glenshaw, PA 15116

EXAMINER	
DEANE JR, WILLIAM J	

ART UNIT	PAPER NUMBER
2652	

MAIL DATE	DELIVERY MODE
06/23/2020	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 11/834,674	Applicant(s) Mullen, Jeffrey D.	
	Examiner WILLIAM J DEANE JR	Art Unit 2652	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 03/25/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 3-20 is/are pending in the application.

5a) Of the above claim(s) 4-6,8-11,13-17 and 19 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 3,7,12 and 18 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Interview Suggested

I believe our last Interview was very helpful. Therefore, it is suggested that an additional Interview be setup to discuss this case. We could also get my Supervisor involved in the Interview about the claim limitations, if Applicant would desire such an Interview. If Applicant would like an Interview with the examiner or with the examiner and the examiner's supervisor, Applicant can contact the examiner at 571 272-7484 or via email at william.deane@uspto.gov and we can setup a mutually agreeable date and time.

Double Patenting

The nonstatutory double patenting rejection will be held in abeyance until allowable subject matter is agreed upon.

With respect to the art rejection below, although Applicant made some amendments, the examiner did not feel they were substantial changes. That is, either

simple word or phrases were incorporated or limitations already discussed were moved around in the claims. Therefore, the examiner is holding the same art rejection as contained in the 09/25/2019 Office Action. Also, see Arguments below.

Claim Rejections - 35 USC §102

The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim(s) 3 is/are rejected under pre-AIA 35 U.S.C. 102(a) as being anticipated by U.S. Patent No. 7, 010,110 (Jorasch) et al.

A method comprising: creating on a first wireless telephonic device a multiple entry list including a plurality of users, wherein each one of said plurality of users is associated to a different one of a plurality of wireless telephonic devices and said plurality of users on said multiple entry list is operable to be modified by said first wireless telephonic device; (see Abstract, Fig. 2, Fig 6, Fig. 7A, Fig. 7B and Fig. 8). In addition, note Col. 2, lines 12-35. Essentially the system can be a one to many or many to one configuration.

allowing on said first wireless telephonic device, transmission of location information associated with said first wireless telephonic device to said multiple entry

list, wherein said allowance is provided to, and stored on, a remote server; (see col. 2, lines 12-54 and note central server 204). Again, essentially the system can be a one to many or many to one configuration

receiving at said remote server said location information and storing said location information; (see Col. 3, lines 40 - 47)

providing said location information, as a result of said allowance, to at least one of said plurality of users on said multiple entry list by providing said location information to said different wireless telephonic device associated to the provided at least one users (see Col. 3, lines 40 - 47 and Col. 4, lines 56 - 65); and

removing on said first wireless telephonic device said allowance of the transmission of location information associated with said first wireless telephonic device to said multiple entry list. Note at least Col. 12, line 40 - Col. 13, line 31. It is noted that location is a status and each party can control what status updates are sent and to which party will
receive such updates (see at least Col. 7, lines 17-31, Col. 9, lines 45 - 49, Col. 11, lines 54 - 58, Col. 16, lines 4-10 and the columns cited above).

Claim Rejections - 35 USC §103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 7 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch) et al.

With respect to claim 7, note the rejection of claim 3 above. With respect to the "stationary computer" aspects, as best as can be determined, note input 502 and processor 504. In addition, note the registration service 314, notification service 316, accounting services 418 and monitoring service 324 could all be standalone services, which receives inputs form user to access user records. For example, note,

"appropriate identifiers" in col. 15, line 25; Col. 16 lines 4 - 21; note Col. 17, lines 16 -26 (note plurality of devices, which are stationary computers in different regions). In addition, note Col. 9, line 1 (DTMF code database), Col. 12, line 43 - line 49 (different level access codes) and Col. 13, lines 3-5 (special access codes). These codes the examiner equates to a password. Obviously, one of ordinary skill in the art would recognizes that the use of a password or pin or code could be used if for nothing else than to keep the information secured. Also note the use of encryption 318 of Fig. 5 and digital signature 336 of Fig. 5. Note also, Col. 5, line 64 - Col. 6, line 15 (note

SPID). If this is argued, note the rejection of claim 20 below with respect to the Thomas reference.

Claim 12 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch) et al.

With respect to claim 12, note Col. 14, lines 56 - 67 and Figs. 6, 7A, 8 and 13. Also note Col. 2, lines 12-17.

Claim 18 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch et al.) in view of U.S. Patent Application No. 2004/0054428 (Sheha et al.).

With respect to claim 18, note the rejection of claims 1 and 12 above. Note the window in Fig. 13. Also note, one can scroll through the numbers in the window 1304. However, there is no disclosure in Jorasch et al. with respect to use of a highlight. With respect to hue of highlighting note paragraph 0010 of Sheha et al. It would have been obvious tone of ordinary skill in the art to incorporate highlighting as a means for selecting a party as taught by Sheha et al. into the Jorasch et al. device and system as an obvious convenience for a user for selecting a party.

Claim 20 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch et al.) in view of U.S. Patent No. 7,366,522 (Thomas).

With respect to claim 20, note the rejection of claim 3 above. In addition, note Col. 4, lines 37 - 41, Col. 4 lines 56 - 63, Col. 13, line 5 of Jorasch et al. Therefore, the inputs can be inputted at either a monitoring telephone or a monitored telephone. Note also, that Jorasch et al. use DTMF codes and access codes as shown above.

Additionally, note in Jorasch et al. one must register to get permissions and give permissions for location information. It would have been obvious to one of ordinary skill in the art to use a login and/or password in this situation in order to have security for accessing the location information.

If this is argued, note that Thomas uses a login and/or password to access location information (see Col. 5, lines 49 - 57 of Thomas and use of user name (identity) and identities used in Figs. 6 and 13 of Jorasch et al.). It would have been obvious to one of ordinary skill in the art to incorporating the teaches of Thomas into the Jorasch et al. system and method in order to offer security and control over whether a monitoring party gets access to the monitored parties location information.

Response to Arguments

Applicant's arguments filed 03/25/2020 have been fully considered but they are not persuasive.

Applicants main argument is found throughout the Remarks section, starting on page 16 is:

"Jorash, however, is not related to an allowance of transmission of location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 - 54."

The examiner respectfully, but strongly disagrees. The users, whether they are monitoring or monitored (in some case a user is both monitoring and being monitored) are doing so for status information and then sending such information to a central server and to the monitoring client (see at least the Abstract of Jorasch). This status information can be location information (see Col. 3, lines 37 – 59, and Col. 3, line 60 – Col. 4, line 16 and Col.4, line56 – Col. 5, line 2, among other places.).

Applicant further argues that Jorasch does not show a multiple entry list being created or modified on a wireless device or stored on a remote server. Note at least Fig. 6 and compare to Fig. 16 (Joe is no longer on the list, the list is modified.). Note also Fig. 9, step 904. The user selects the parties to monitor and can obviously modify the list. Friends change, workers leave and new workers are hired and etc.

Note also Col. 12, lines 40 – 42.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William Deane whose telephone number is 571 -272-7484. The examiner can normally be reached on Monday - FRIDAY from 9:00 A.M. to 5:00 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ahmad Matar, can be reached on 571 -272-7488. The official fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. However, unofficial faxes can be direct to the examiners computer at 571 273 - 7484.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.aov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

20Jun2020

/WILLIAM J DEANE JR/
Primary Examiner, Art Unit 2652

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	**Art Unit**
	WILLIAM J DEANE JR	2652

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant						☐ CPA	☐ T.D.		☐ R.1.47	
CLAIM		**DATE**								
Final	Original	06/06/2009	03/25/2010	12/06/2010	09/12/2011	09/06/2013	06/25/2014	04/05/2015	01/06/2016	06/20/2020
	1	✓	✓	✓	-	-	-	-	-	-
	2	✓	✓	✓	-	-	-	-	-	-
	3	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	N
	5	✓	✓	✓	✓	✓	✓	✓	✓	N
	6	✓	✓	✓	✓	✓	✓	✓	✓	N
	7	✓	✓	✓	✓	✓	✓	✓	✓	✓
	8	✓	✓	✓	✓	✓	✓	✓	✓	N
	9	✓	✓	✓	✓	✓	✓	✓	✓	N
	10	✓	✓	✓	✓	✓	✓	✓	✓	N
	11	✓	✓	✓	✓	✓	✓	✓	✓	N
	12	✓	✓	✓	✓	✓	✓	✓	✓	✓
	13	✓	✓	✓	✓	✓	✓	✓	✓	N
	14	✓	✓	✓	✓	✓	✓	✓	✓	N
	15	✓	✓	✓	✓	✓	✓	✓	✓	N
	16	✓	✓	✓	✓	✓	✓	✓	✓	N
	17	✓	✓	✓	✓	✓	✓	✓	✓	N
	18	✓	✓	✓	✓	✓	✓	✓	✓	✓
	19	✓	✓	✓	✓	✓	✓	✓	✓	N
	20	✓	✓	✓	✓	✓	✓	✓	✓	✓

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	456.1	06May2009	WJD
	415		
	457		
	435		
	404.1		
	Updated the prior search	25Mar2010	WJD
	Updated the prior search	06Dec2010	WJD
	Updated the search above	12Sep2011	WJD
	Updated the search above	06Sep2013	WJD
	Updated the search above	25Jun2014	WJD
	Updated the search above	05Apr2015	WJD
	Updated the search above	06Jan2015	WJD
	Updated the search above	07Aug2015	WJD
	Updated the searches above	14Apr2018	WJD
	Updated the above searches	12/25/2018	WJD
	Updated the searches above	09/08/2019	WJD
	Updated the searches above	06/20/2020	WJD

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (10-08)
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	11834674	Filing Date	2007-08-06	Docket Number (if applicable)	JDM/002 CON4	Art Unit	2652
First Named Inventor	Jeffrey D. Mullen			Examiner Name	William J Deane Jr		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 503855

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Patent Practitioner Signature

X Applicant Signature

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (10-08)
Approved for use through 11/30/2008. OMB 0651-0031
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Applicant Signature			
Applicant 1		Remove	
Signature	/Jeffrey D. Mullen/	Date (YYYY-MM-DD)	2020-12-23
Name	Jeffrey D. Mullen		
Click ADD for additional Applicant Signature		Add	

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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The information provided by you in this form will be subject to the following routine uses:

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

SMALL ENTITY
JDM/002 CON4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Jeffrey D. Mullen
Application No.	:	11/834,674
Confirmation No.	:	1117
Filed	:	August 6, 2007
For	:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
Group Art Unit	:	2614
Examiner	:	William Deane Jr.

Mail Stop: Amendment
Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pittsburgh, PA 15116
December 23, 2020

REPLY TO OFFICE ACTION

Sir:

This is in Reply to the Office Action dated June 23, 2020. A three-month extension of time and a Request for Continued Examination is applicable hereto and submitted herewith. In Reply to the Office Action, applicant amends the application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 10 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-2. (cancelled)

3. (currently amended) A system comprising:

a first wireless portable telephonic device having a location determination device operable to determine a location of said wireless portable telephonic device, wherein a multiple entry list is operable of being created on said first wireless portable telephonic device, said multiple entry list includes a plurality of entities each one of said plurality of entities is associated to a different one of a plurality of wireless telephonic portable devices, and said plurality of entities on said multiple entry list is operable to be manually modified by said first wireless telephonic portable device via a graphical user interface, an allowance is operable to be provided to, and stored on, a remote server, from said first wireless telephonic portable device, said allowance permits transmission of location information associated with said first wireless telephonic portable device to said multiple entry list, said location information includes said location, said location information is operable to be received and stored on said remote server, as a result of said allowance said location information is operable to be provided to at least one of said plurality of entities on said multiple entry list by being operable to provide said location information to said different wireless telephonic

device associated to the provided at least one entities, and
said allowance is operable to be removed by said first wireless portable telephonic device.

4. (withdrawn) A method comprising:

selecting a first location alert listing for a second wireless device from a plurality of location alert listings on a first wireless device, wherein a first one of said plurality of location alert listings is associated with said second wireless device entering a first location area and a second one of said plurality of location alert listings is associated with said second wireless device entering a second location area;

obtaining a location of said second wireless device;

determining whether said location is in said first location area;

determining whether said second wireless device has provided said first wireless device with permission to obtain information associated with said location of said second wireless device; and

providing an alert to said first wireless device if said location is in said first location area and if said second wireless device has provided said first wireless device with permission to obtain information associated with said location of said second wireless device.

5. (withdrawn) The method of claim 4, wherein a positioning system is utilized to provide said location.

6. (withdrawn) A system comprising:

a first wireless telephone;

a second wireless telephone; and

a server located remotely from said first and second wireless telephones, wherein said server receives and stores a first location representative of the location of said first wireless telephone, said server receives and stores a second location representative of the location of said second wireless telephone, said server receives and stores a first permission from said first wireless telephone for said second wireless telephone to receive location information associated with said first location according to a first level of location access from several levels of location access selectable from a first graphical interface on said first wireless telephone after selecting said second wireless telephone on a second graphical interface on said first wireless telephone from a plurality of wireless telephones, and said server sends said location information to said second wireless telephone after verifying said first permission.

7. (currently amended) A system comprising:

a first wireless portable telephone;

a stationary computer, wherein said stationary computer receives manual input login to identify a entity profile and receives a manual input password to access said entity profile; and

a server located remotely from said first wireless portable telephone and said stationary computer, wherein said server receives and stores a first location representative of the location of said first wireless portable telephone, said first location is operable to be determined by a location determination device in said first

wireless portable telephone, said server receives and stores a first permission from said first wireless portable telephone for said entity profile to receive location information associated with said first location, and said server sends said location information to said stationary computer after verifying said first permission and identifying said entity profile associated with said stationary computer.

8. (withdrawn) A method comprising:

providing a first level of location access for information associated with a location of a first wireless device to a second wireless device by said first wireless device on a first graphical interface on said first wireless device after selecting said second wireless device on a second graphical interface from a plurality of wireless devices on said first wireless device, wherein said first graphical interface includes a plurality of selectable levels of location access;

storing said first level of access; and

providing said information to said second wireless device in accordance with said first level of access.

9. (withdrawn) A method comprising:

allowing a device to locate a first wireless device in accordance with access information stored on a remote server, wherein said access information was provided by said first wireless device;

locating said first wireless device a plurality of times and determining a travel speed based on said locating;

utilizing said travel speed and an assumed route to determine an estimated arrival time of said first wireless device to a destination; and

providing said estimated arrival time to said device.

10. (withdrawn) A method comprising:

allowing a device to locate a plurality of wireless devices based on access information for said device provided by each one of said plurality of wireless devices, wherein said access information is stored on a remote server;

determining a travel speed for at least one of said plurality of wireless devices;

utilizing said travel speed and an assumed route to determine an arrival time to a destination; and

displaying on said device the location of said plurality of wireless devices on a map on said device.

11. (withdrawn) A method comprising:

allowing a device to locate a plurality of wireless devices based on access information provided by each one of said plurality of wireless devices, wherein said access information is stored on a remote server; and

providing an option to said device of finding the closest one of said plurality of wireless devices to said device.

12. (currently amended) A system comprising:

a first wireless telephonic device for providing on a display screen to request the location of a different wireless device, wherein a telephone number is operable to

be entered on said display screen, said telephone number is associated with said different wireless device, requesting on said different wireless device that said different wireless device provides access information for said first wireless telephonic device, storing said access information on a remote server, and sending the location ~~locaton~~ information of said different wireless device based on said access information, said location of said different wireless device is operable to be determined by a location determination device in said different wireless device.

13. (withdrawn) A method comprising:

determining whether a looking for profile of a first dating service user matches a profile of a second dating service user;

alerting said first dating service user of said second dating service user, wherein a first location of a first wireless telephonic device of said first dating service user and a second location of said second wireless telephonic device of said second service user are utilized in said determining and said first and second locations are stored on a remote server; and

requesting access to a form of communication between said first and second dating service users from said first dating service user.

14. (withdrawn) A method comprising:

determining the location of a first wireless device by a second wireless device in accordance with location access information stored on a remote server for said second wireless device by said first wireless device; and

utilizing the location of said second wireless device and the location of said first wireless device to determine the distance between said first and second wireless devices, wherein said distance is displayed on a display screen of said second wireless device and a directional indicia is displayed on said display screen_to indicate the location of said first wireless device relative to the location of said second wireless device.

15. (withdrawn) A method comprising:

determining the location of a first wireless device by a second wireless device in accordance with location access information stored on a remote server for said second wireless device by said first wireless device; and

utilizing the location of said second wireless device and said first wireless device to determine the shortest path between said first and second wireless devices, wherein said shortest path is displayed on a display screen of_said second wireless device.

16. (withdrawn) A method comprising:

determining the location of a first wireless device by a second device in accordance with location access information stored on a remote server for said second device by said first wireless device;

determining that the location of a first wireless device is on a type of travel;

determining an assumed route for a destination utilizing said determination that the location of a first wireless device is on said type of travel; and

estimating an arrival time for said destination utilizing said determined assumed route and a travel speed, wherein said estimated arrival time is displayed on said second device.

17. (withdrawn) The method of claim 16, wherein said type of travel is driving.

18. (currently amended) A system comprising:

a first wireless portable telephonic device, wherein a list of entities is provided on said first wireless portable telephonic, a highlight window is operable to be provided on said first wireless portable telephonic device for selecting one of said list of entities on said first wireless portable telephonic device, manual input is operable to be received to select using said highlight window, one of said entities from said list of entities, and a display screen is operable to be provided on said first wireless device for selecting location access rights from a plurality of location access rights for said selected entity with respect to the location of said first wireless telephonic device, and the location is operable to be determined by a location determination device in said first wireless teleponic device, and the location is operable to be sent based on said selected location access rights.

19. (withdrawn) A method comprising:

providing a display screen on a first device for selecting one of a plurality of location alerts for a second wireless device, wherein at least two of said

plurality of location alerts are associated with a different location area; and

alerting said device in accordance with said selected location alert.

20. (currently amended) A system comprising:

a first wireless portable telephonic device operable to utilize a login and a password entered on the first wireless telephonic device, to determine an identity of said first wireless portable telephonic device and the location of said identity based on the location of said first wireless portable telephonic device, wherein the location of said first wireless portable telephonic device is operable to be determined by a location determination device in said first wireless portable telephonic device, the location of a second wireless portable telephonic device is operable to be requested by said first device, said identity is operable to be utilized to determine whether said first wireless telephonic device is allowed to access the location of said second wireless portable telephonic device, said access is operable to be provided by said second device and is stored remotely, a determination is operable to be provided whether to provide the location of said second wireless portable telephonic device to said first wireless telephonic device based on said access, and the location of said second wireless telephonic device is operable to be provided to said first telephonic wireless device based on said determination.

REMARKS/ARGUMENTS

Summary of Office Action

Claims 3-20 are pending.

Claims 2-6, 8-11, 13-17, and 19 are withdrawn.

The Examiner held a double patenting rejection in abeyance.

The Examiner rejected claim 3 under 35 U.S.C. 102(a) as being unpatentable over U.S. Patent No. 7,010,110 (hereinafter "Jorasch").

The Examiner rejected claim 7, 12, and 18 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7,010,110 (hereinafter "Jorasch").

The Examiner rejected claim 18 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Sheha U.S. Patent No. 7,366,522 (hereinafter "Sheha").

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Thomas U.S. Patent No. 7,366,522 (hereinafter "Thomas").

Summary of Applicant's Amendments

Without prejudice and solely in order to expedite prosecution, applicant has amended claims 3, 7, 12, 18, and 20.

Applicant respectfully traverses the Examiner's rejections. Applicant reserves the right to claim any subject matter lost by any amendments or cancellations during the prosecution of this application, or to claim any subject matter included in the present application, in one or more continuation or divisional applications.

Applicant's Response to the Double Patenting Rejections

The Examiner held a double-patenting rejection in abeyance. As the above-identified claims are not allowed by the Examiner, Terminal Disclaimers are not yet applicable. Applicant respectfully request the Examiner review each claim of the present application and the other applications/patents under disclosure as claims may be amended and claimed subject matter may change.

Rejections under 35 U.S.C. 102(a)

The Examiner rejected claim 3 under 35 U.S.C. 102(a) as being unpatentable over Jorasch.

The Examiner stated that Jorasc discusses:

> "allowing … transmission of location information … to said multiple entry list … see col 2, lines 12 – 54" (Office Action, page, 9)

Jorash, however, is not related to an allowance of transmission of location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54.

The Examiner stated:

> "the users, whether they are monitoring or monitored … are doing so for status information and then sending such information to a central server and to the monitoring client …. Information can be location information.." (Office Action, page, 8)

Without prejudice and solely in order to expedite prosecution, applicant has amended claim 3 to include a wireless portable telephonic device having a location determination device operable to determine a location of said wireless portable telephonic device. Furthemore,

Jorash is silent on applicant's claim 3 that includes such features.

Furthermore, Jorash is silent on the allowance of transmission of location information where a multiple entry list is operable of being created on said first wireless telephonic device and the multiple entry list is operable to be modified by the first wireless telephonic device. Jorash is also silent on applicant's claim 3 of an allowance operable to be provided to, and stored on, a remote server, from the first wireless telephonic device as well as the allowance being able to be deleted by the first wireless telephonic device. Thus, Jorash does not show a wireless telephonic device creating and modifying a list of entities or a wireless telephonic device for providing and removing an allowance. Jorash merely alleges "programming the parties' telephone numbers into the client's local telephone or be a directory lookup by name." (Jorasch, col. 2). Programming telephone numbers into a local telephone does not show or suggest claim 3 of a multiple entry list is operable of being created on said first wireless telephonic device and the multiple entry list is operable to be modified by the first wireless telephonic device nor an allowance operable to be provided to, and stored on, a remote server, from the first wireless telephonic device as well as the allowance being able to be deleted by the first wireless telephonic device.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Rejections under 35 U.S.C. 103(a)

Claim 7

The Examiner rejected claim 7 under 35 U.S.C. 103(a) as being unpatentable over Jorasch.

Applicant's claims 7 includes a server located remotely from said first wireless portable telephone and said stationary computer that server receives and stores a first location representative of the location of said first wireless portable telephone, said server receives and stores a first permission from said first wireless portable telephone for said entity profile to receive location information associated with said first location, and said server sends said location information to said stationary computer after verifying said first permission and identifying said entity profile associated with said stationary computer. Jorash, however, is not related to a permission for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54.

Furthermore, solely in order to expedite prosecution, applicant has amended claim 7 to include a first location is operable to be determined by a location determination device in said first wireless portable telephone. None of the references, used either alone or in combination, show or suggest

Accordingly, for at least these reasons, application respectfully requests the Examiner's rejection be withdrawn. In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 12

The Examiner rejected claim 12 under 35 U.S.C. 103(a) as being unpatentable over Jorasch.

Applicant's claim 12 includes a first wireless telephonic device for providing on a display screen to request the location of a different wireless device, requesting on said different wireless device that said different wireless device provides access information for said first wireless telephonic device, and sending the location information of said different wireless device based on said access information.

Jorash, however, is not related to access information for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 - 54.

Furthermore, solely in order to expedite prosecution, applicant has amended claim 12 to include a location of said different wireless device is operable to be determined by a location determination device in said different wireless device.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 18

The Examiner rejected claim 18 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Sheha.

As shown above, Jorash is not related to a permission for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 - 54.

Accordingly, Jorash does not show or suggest applicant's claim 18 that includes a first wireless portable telephonic device, wherein a list of entities is provided on said first wireless portable telephonic, highlight window is operable to be provided on said first

wireless portable telephonic device for selecting one of said list of entities on said first wireless portable telephonic device, manual input is operable to be received to select, using said highlight window, one of said entities from said list of entities, a display screen is operable to be provided on said first wireless device for selecting location access rights from a plurality of location access rights for said selected entity with respect to the location of said first wireless telephonic device, and providing a location based on the location access rights.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Jorash cannot be conbined with Sheha. Jotash is not capable of providing applicant's claim 18 of manual input is operable to be received to select, using said highlight window, highlight window for manually selecting. As a result of the lack of capability, moving a highlight window into Jorash wouldn't provide the ability for Jorash to have manual input operable to be received to select the highlight window.

Furthermore, solely in order to expedite prosecution, applicant has amended claim 18 to include the location is operable to be determined by a location determination device in said first wireless teleponic device.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 20

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Thomas.

As shown above, Jorash is not related to a permission for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54. Accordingly Jorash does not show or suggest applicant's claim 20 of a first wireless telephonic device operable to utilize a login and a password entered on the first wireless telephonic device, to determine an identity of said first wireless telephonic device and the location of said identity based on the location of said first wireless telephonic, wherein the location of a second wireless telephonic device is operable to be requested by said first device, said identity is operable to be utilized to determine whether said first wireless telephonic device is allowed to access the location of said second wireless telephonic device, said access is operable to be provided by said second device and is stored remotely, a determination is operable to be provided whether to provide the location of said second wireless telephonic device to said first wireless telephonic device based on said access, and the location of said second wireless telephonic device is operable to be provided to said first telephonic wireless device based on said determination.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Access locating information does not show or suggest applicant's claim 20 of operable to utilize a login and a password entered on the first wireless telephonic device to determine an identity of said first wireless

telephonic device and the location of said identity based on the location of said first wireless telephonic device. As admitted by the Examiner, codes is not claim 20 to determine an identity of said first wireless telephonic device and the location of said identity based on the location and a reference cannot change fundamental capabilities of Jorasch that are definitively relied upon by other Jorasch discussions without rendering it inoperable.

Furthermore, solely in order to expedite prosecution, applicant has amended claim 12 to include

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Conclusion

Applicant respectfully submits that this application, including the pending claims, is in condition for allowance.

Reconsideration and prompt allowance of this application are respectfully requested.

The Director is hereby authorized to charge and fees due in conjunction with this filing, or to credit any overpayment of the same, to Deposit Account No. 50-3855.

Respectfully Submitted,

/Jeffrey D. Mullen/
Jeffrey D. Mullen
Applicant (Reg. No. 52,056)
Customer No. 32733
2212 Hassinger Lane
Glenshaw, PA 15116
Tel.: (914) 837-7741

Electronic Patent Application Fee Transmittal

Application Number:	11834674
Filing Date:	06-Aug-2007
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Filer:	Jeffrey David Mullen
Attorney Docket Number:	JDM/002 CON4

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	740	740
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	2820	1	1000	1000
		Total in USD ($)		**1740**

Electronic Acknowledgement Receipt	
EFS ID:	41485688
Application Number:	11834674
International Application Number:	
Confirmation Number:	1117
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Customer Number:	32733
Filer:	Jeffrey David Mullen
Filer Authorized By:	
Attorney Docket Number:	JDM/002 CON4
Receipt Date:	23-DEC-2020
Filing Date:	06-AUG-2007
Time Stamp:	20:30:08
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1740
RAM confirmation Number	E2020BMK30325957
Deposit Account	503855
Authorized User	Jeffrey Mullen
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.21 (Miscellaneous fees and charges) 37 CFR 1.20 (Post Issuance fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.16 (National application filing, search, and examination fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	JDM-002CON4--RCE.pdf	697798 f57a924427bd190e67319416360dc4dc09f4fc02	no	3
Warnings:					
Information:					
2		JDM-002CON4--Reply.pdf	135375 89c435fe2c318e54ae4391703f5097faa9cc50bf	yes	18

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment Submitted/Entered with Filing of CPA/RCE	1	1
	Claims	2	10
	Applicant Arguments/Remarks Made in an Amendment	11	18

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32613 1193bb3653b08c1d846a33ddf193365de63c8463	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	865786		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/834,674	08/06/2007	Jeffrey D. Mullen	JDM/002 CON4	1117

32733 7590 03/15/2021

JEFFREY D. MULLEN
2212 Hassinger Lane
Glenshaw, PA 15116

EXAMINER	
DEANE JR, WILLIAM J	

ART UNIT	PAPER NUMBER
2652	

MAIL DATE	DELIVERY MODE
03/15/2021	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 11/834,674	Applicant(s) Mullen, Jeffrey D.	
	Examiner WILLIAM J DEANE JR	Art Unit 2652	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 12/23/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 3-20 is/are pending in the application.

5a) Of the above claim(s) 4-6,8-11,13-17 and 19 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 3,7,12,18 and 20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Double Patenting

The nonstatutory double patenting rejection will be held in abeyance until allowable subject matter is agreed upon.

Claim Rejections - 35 USC §102

The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim 3 is rejected under pre-AIA 35 U.S.C. 102(a) as being anticipated by U.S. Patent No. 7, 010,110 (Jorasch) et al.

A method comprising: creating on a first wireless telephonic device a multiple entry list including a plurality of users, wherein each one of said plurality of users is associated to a different one of a plurality of wireless telephonic devices and said plurality of users on said multiple entry list is operable to be modified by said first wireless telephonic device; (see Abstract, Fig. 2, Fig 6, Fig. 7A, Fig. 7B and Fig. 8). In addition, note Col. 2, lines 12-35. Essentially the system can be a one to many or many to one configuration, allowing on said first wireless telephonic device,

transmission of location information associated with said first wireless telephonic device to said multiple entry list, wherein said allowance is provided to, and stored on, a remote server; (see col. 2, lines 12-54 and note central server 204). Again, essentially the system can be a one to many or many to one configuration receiving at said remote server said location information and storing said location information; (see Col. 3, lines 40 - 47) providing said location information, as a result of said allowance, to at least one of said plurality of users on said multiple entry list by providing said location information to said different wireless telephonic device associated to the provided at least one users (see Col. 3, lines 40 - 47 and Col. 4, lines 56 - 65); and removing on said first wireless telephonic device said allowance of the transmission of location information associated with said first wireless telephonic device to said multiple entry list. Note at least Col. 12, line 40 - Col. 13, line 31. It is noted that location is a status and each party can control what status updates are sent and to which party will receive such updates (see at least Col. 7, lines 17-31, Col. 9, lines 45 - 49, Col. 11, lines 54 - 58, Col. 16, lines 4-10 and the columns cited above).

Applicant's new claim language does not distinguish over Jorasch et al. as shown above and that the system is a one to many or many to one configuration and the location information is obviously provided, depending on access rights, by a location determination device. Note also that all the phones have GPS capability Col. 3, line 42.

Claim Rejections - 35 USC §103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 7 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch) et al.

With respect to claim 7, note the rejection of claim 3 above. With respect to the "stationary computer" aspects, as best as can be determined, note input 502 and processor 504. In addition, note the registration service 314, notification service 316, accounting services 418 and monitoring service 324 could all be standalone services, which receives inputs form user to access user records. For example, note, "appropriate identifiers" in col. 15, line 25; Col. 16 lines 4 - 21; note Col. 17, lines 16 -26 (note plurality of devices, which are stationary computers in different regions).
In addition, note Col. 9, line 1 (DTMF code database), Col. 12, line 43 - line 49 (different level access codes) and Col. 13, lines 3-5 (special access codes). These codes the examiner equates to a password. Obviously, one of ordinary skill in the art would recognizes that the use of a password or pin or code could be used if for nothing else than to keep the information secured. Also note the use of encryption 318 of Fig. 5 and digital signature 336 of Fig. 5. Note also, Col. 5, line 64 - Col. 6, line 15 (note SPID). If this is argued, note the rejection of claim 20 below with respect to the Thomas reference.

Applicant's new claim language does not distinguish over Jorasch et al. as shown above and that the system is a one to many or many to one configuration and the location information is obviously provided, depending on access rights, by a location determination device. Note also that all the phones have GPS capability Col. 3, line 42.

Claim 12 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch) et al.

With respect to claim 12, note Col. 14, lines 56 - 67 and Figs. 6, 7A, 8 and 13. Also note Col. 2, lines 12-17.

Applicant's new claim language does not distinguish over Jorasch et al. as shown above and that the system is a one to many or many to one configuration and the location information is obviously provided, depending on access rights, by a location determination device. Note also that all the phones have GPS capability Col. 3, line 42.

Claim 18 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch et al.) in view of U.S. Patent Application No. 2004/0054428 (Sheha et al.).

With respect to claim 18, note the rejection of claims 1 and 12 above. Note the window in Fig. 13. Also note, one can scroll through the numbers in the window 1304. Flowever, there is no disclosure in Jorasch et al. with respect to use of a highlight. With respect to hue of highlighting note paragraph 0010 of Sheha et al. It would have been obvious tone of ordinary skill in the art to incorporate highlighting as a means for selecting a party as taught by Sheha et al. into the Jorasch et al. device and system as an obvious convenience for a user for selecting a party.

Applicant's new claim language does not distinguish over Jorasch et al. as shown above and that the system is a one to many or many to one configuration and the location information is obviously provided, depending on access rights, by a location determination device. Note also that all the phones have GPS capability Col. 3, line 42.

Claim 20 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7, 010,110 (Jorasch et al.) in view of U.S. Patent No. 7,366,522 (Thomas).

With respect to claim 20, note the rejection of claim 3 above. In addition, note Col. 4, lines 37 - 41, Col. 4 lines 56 - 63, Col. 13, line 5 of Jorasch et al. Therefore, the inputs can be inputted at either a monitoring telephone or a monitored telephone. Note also, that Jorasch et al. use DTMF codes and access codes as shown above.

Additionally, note in Jorasch et al. one must register to get permissions and give permissions for location information. It would have been obvious to one of ordinary skill in the art to use a login and/or password in this situation in order to have security for accessing the location information.

If this is argued, note that Thomas uses a login and/or password to access location information (see Col. 5, lines 49 - 57 of Thomas and use of user name (identity) and identities used in Figs. 6 and 13 of Jorasch et al.). It would have been obvious to one of ordinary skill in the art to incorporating the teaches of Thomas into the Jorasch et al. system and method in order to offer security and control over whether a monitoring party gets access to the monitored parties location information.

In addition, Applicant's new claim language does not distinguish over Jorasch et al. as shown above and that the system is a one to many or many to one configuration

and the location information is obviously provided, depending on access rights, by a location determination device. Note also that all the phones have GPS capability Col. 3, line 42.

Response to Arguments

Applicant's arguments filed 12/23/2020 have been fully considered but they are not persuasive.

Applicant's new claim language does not distinguish over Jorasch et al. as shown above and that the system of Jorasch et al. is a one to many or many to one configuration and the location information is obviously provided, depending on access rights, by a location determination device on each device. Note also that all the phones have GPS capability Col. 3, line 42.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William Deane whose telephone number is 571 -272-7484. The examiner can normally be reached on Monday - FRIDAY from 9:00 A.M. to 5:00 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ahmad Matar, can be reached on 571 -272-7488. The official fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. However, unofficial faxes can be direct to the examiners computer at 571 273 - 7484.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.aov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

12Mar2021

/WILLIAM J DEANE JR/
Primary Examiner, Art Unit 2652

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	**Art Unit**
	WILLIAM J DEANE JR	2652

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant						☐ CPA	☐ T.D.		☐ R.1.47	
CLAIM		**DATE**								
Final	Original	06/06/2009	03/25/2010	12/06/2010	09/12/2011	09/06/2013	06/25/2014	04/05/2015	01/06/2016	03/12/2021
	1	✓	✓	✓	-	-	-	-	-	-
	2	✓	✓	✓	-	-	-	-	-	-
	3	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	N
	5	✓	✓	✓	✓	✓	✓	✓	✓	N
	6	✓	✓	✓	✓	✓	✓	✓	✓	N
	7	✓	✓	✓	✓	✓	✓	✓	✓	✓
	8	✓	✓	✓	✓	✓	✓	✓	✓	N
	9	✓	✓	✓	✓	✓	✓	✓	✓	N
	10	✓	✓	✓	✓	✓	✓	✓	✓	N
	11	✓	✓	✓	✓	✓	✓	✓	✓	N
	12	✓	✓	✓	✓	✓	✓	✓	✓	✓
	13	✓	✓	✓	✓	✓	✓	✓	✓	N
	14	✓	✓	✓	✓	✓	✓	✓	✓	N
	15	✓	✓	✓	✓	✓	✓	✓	✓	N
	16	✓	✓	✓	✓	✓	✓	✓	✓	N
	17	✓	✓	✓	✓	✓	✓	✓	✓	N
	18	✓	✓	✓	✓	✓	✓	✓	✓	✓
	19	✓	✓	✓	✓	✓	✓	✓	✓	N
	20	✓	✓	✓	✓	✓	✓	✓	✓	✓

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
455	456.1	06May2009	WJD
	415		
	457		
	435		
	404.1		
	Updated the prior search	25Mar2010	WJD
	Updated the prior search	06Dec2010	WJD
	Updated the search above	12Sep2011	WJD
	Updated the search above	06Sep2013	WJD
	Updated the search above	25Jun2014	WJD
	Updated the search above	05Apr2015	WJD
	Updated the search above	06Jan2015	WJD
	Updated the search above	07Aug2015	WJD
	Updated the searches above	14Apr2018	WJD
	Updated the above searches	12/25/2018	WJD
	Updated the searches above	09/08/2019	WJD
	Updated the searches above	06/20/2020	WJD
	Updated the searches above	03/12/2021	WJD

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/834,674	Filing Date 08/06/2007	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $25 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $100 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	09/15/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 16	Minus	*** 16	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ANTHONY TYSON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

SMALL ENTITY
JDM/002 CON4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Jeffrey D. Mullen
Application No.	:	11/834,674
Confirmation No.	:	1117
Filed	:	August 6, 2007
For	:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
Group Art Unit	:	2614
Examiner	:	William Deane Jr.

Mail Stop: Amendment
Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pittsburgh, PA 15116
September 15, 2021

REPLY TO OFFICE ACTION

Sir:

This is in Reply to the Office Action dated June 23, 2020. A three-month extension of time is applicable hereto and submitted herewith. In Reply to the Office Action, applicant amends the application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 10 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-2. (cancelled)

3. (previously presented) A system comprising:

a first wireless portable telephonic device having a location determination device operable to determine a location of said wireless portable telephonic device, wherein a multiple entry list is operable of being created on said first wireless portable telephonic device, said multiple entry list includes a plurality of entities each one of said plurality of entities is associated to a different one of a plurality of wireless telephonic portable devices, and said plurality of entities on said multiple entry list is operable to be manually modified by said first wireless telephonic portable device via a graphical user interface, an allowance is operable to be provided to, and stored on, a remote server, from said first wireless telephonic portable device, said allowance permits transmission of location information associated with said first wireless telephonic portable device to said multiple entry list, said location information includes said location, said_location information is operable to be received and stored on said remote server, as a result of said allowance said location information is operable to be provided to at least one of said plurality of entities on said multiple entry list by being operable to provide said location information to said different wireless telephonic

device associated to the provided at least one entities, and
said allowance is operable to be removed by said first wireless portable telephonic device.

4. (withdrawn) A method comprising:

selecting a first location alert listing for a second wireless device from a plurality of location alert listings on a first wireless device, wherein a first one of said plurality of location alert listings is associated with said second wireless device entering a first location area and a second one of said plurality of location alert listings is associated with said second wireless device entering a second location area;

obtaining a location of said second wireless device;

determining whether said location is in said first location area;

determining whether said second wireless device has provided said first wireless device with permission to obtain information associated with said location of said second wireless device; and

providing an alert to said first wireless device if said location is in said first location area and if said second wireless device has provided said first wireless device with permission to obtain information associated with said location of said second wireless device.

5. (withdrawn) The method of claim 4, wherein a positioning system is utilized to provide said location.

6. (withdrawn) A system comprising:

a first wireless telephone;

a second wireless telephone; and

a server located remotely from said first and second wireless telephones, wherein said server receives and stores a first location representative of the location of said first wireless telephone, said server receives and stores a second location representative of the location of said second wireless telephone, said server receives and stores a first permission from said first wireless telephone for said second wireless telephone to receive location information associated with said first location according to a first level of location access from several levels of location access selectable from a first graphical interface on said first wireless telephone after selecting said second wireless telephone on a second graphical interface on said first wireless telephone from a plurality of wireless telephones, and said server sends said location information to said second wireless telephone after verifying said first permission.

7. (previously presented) A system comprising:

a first wireless portable telephone;

a stationary computer, wherein said stationary computer receives manual input login to identify a entity profile and receives a manual input password to access said entity profile; and

a server located remotely from said first wireless portable telephone and said stationary computer, wherein said server receives and stores a first location representative of the location of said first wireless portable telephone, said first location is operable to be determined by a location determination device in said first

wireless portable telephone, said server receives and stores a first permission from said first wireless portable telephone for said entity profile to receive location information associated with said first location, and said server sends said location information to said stationary computer after verifying said first permission and identifying said entity profile associated with said stationary computer.

8. (withdrawn) A method comprising:

providing a first level of location access for information associated with a location of a first wireless device to a second wireless device by said first wireless device on a first graphical interface on said first wireless device after selecting said second wireless device on a second graphical interface from a plurality of wireless devices on said first wireless device, wherein said first graphical interface includes a plurality of selectable levels of location access;

storing said first level of access; and

providing said information to said second wireless device in accordance with said first level of access.

9. (withdrawn) A method comprising:

allowing a device to locate a first wireless device in accordance with access information stored on a remote server, wherein said access information was provided by said first wireless device;

locating said first wireless device a plurality of times and determining a travel speed based on said locating;

utilizing said travel speed and an assumed route to determine an estimated arrival time of said first wireless device to a destination; and

providing said estimated arrival time to said device.

10. (withdrawn) A method comprising:

allowing a device to locate a plurality of wireless devices based on access information for said device provided by each one of said plurality of wireless devices, wherein said access information is stored on a remote server;

determining a travel speed for at least one of said plurality of wireless devices;

utilizing said travel speed and an assumed route to determine an arrival time to a destination; and

displaying on said device the location of said plurality of wireless devices on a map on said device.

11. (withdrawn) A method comprising:

allowing a device to locate a plurality of wireless devices based on access information provided by each one of said plurality of wireless devices, wherein said access information is stored on a remote server; and

providing an option to said device of finding the closest one of said plurality of wireless devices to said device.

12. (previously presented) A system comprising:

a first wireless telephonic device for providing on a display screen to request the location of a different wireless device, wherein a telephone number is operable to

be entered on said display screen, said telephone number is associated with said different wireless device, requesting on said different wireless device that said different wireless device provides access information for said first wireless telephonic device, storing said access information on a remote server, and sending the location information of said different wireless device based on said access information, said location of said different wireless device is operable to be determined by a location determination device in said different wireless device.

13. (withdrawn) A method comprising:

determining whether a looking for profile of a first dating service user matches a profile of a second dating service user;

alerting said first dating service user of said second dating service user, wherein a first location of a first wireless telephonic device of said first dating service user and a second location of said second wireless telephonic device of said second service user are utilized in said determining and said first and second locations are stored on a remote server; and

requesting access to a form of communication between said first and second dating service users from said first dating service user.

14. (withdrawn) A method comprising:

determining the location of a first wireless device by a second wireless device in accordance with location access information stored on a remote server for said second wireless device by said first wireless device; and

utilizing the location of said second wireless device and the location of said first wireless device to determine the distance between said first and second wireless devices, wherein said distance is displayed on a display screen of said second wireless device and a directional indicia is displayed on said display screen_to indicate the location of said first wireless device relative to the location of said second wireless device.

15. (withdrawn) A method comprising:

determining the location of a first wireless device by a second wireless device in accordance with location access information stored on a remote server for said second wireless device by said first wireless device; and

utilizing the location of said second wireless device and said first wireless device to determine the shortest path between said first and second wireless devices, wherein said shortest path is displayed on a display screen of_said second wireless device.

16. (withdrawn) A method comprising:

determining the location of a first wireless device by a second device in accordance with location access information stored on a remote server for said second device by said first wireless device;

determining that the location of a first wireless device is on a type of travel;

determining an assumed route for a destination utilizing said determination that the location of a first wireless device is on said type of travel; and

estimating an arrival time for said destination utilizing said determined assumed route and a travel speed, wherein said estimated arrival time is displayed on said second device.

17. (withdrawn) The method of claim 16, wherein said type of travel is driving.

18. (previously presented) A system comprising:

a first wireless portable telephonic device, wherein a list of entities is provided on said first wireless portable telephonic, a highlight window is operable to be provided on said first wireless portable telephonic device for selecting one of said list of entities on said first wireless portable telephonic device, manual input is operable to be received to select using said highlight window, one of said entities from said list of entities, and a display screen is operable to be provided on said first wireless device for selecting location access rights from a plurality of location access rights for said selected entity with respect to the location of said first wireless telephonic device, and the location is operable to be determined by a location determination device in said first wireless teleponic device, and the location is operable to be sent based on said selected location access rights.

19. (withdrawn) A method comprising:

providing a display screen on a first device for selecting one of a plurality of location alerts for a second wireless device, wherein at least two of said

plurality of location alerts are associated with a different location area; and

alerting said device in accordance with said selected location alert.

20. (previously presented) A system comprising:

a first wireless portable telephonic device operable to utilize a login and a password entered on the first wireless telephonic device, to determine an identity of said first wireless portable telephonic device and the location of said identity based on the location of said first wireless portable telephonic device, wherein the location of said first wireless portable telephonic device is operable to be determined by a location determination device in said first wireless portable telephonic device, the location of a second wireless portable telephonic device is operable to be requested by said first device, said identity is operable to be utilized to determine whether said first wireless telephonic device is allowed to access the location of said second wireless portable telephonic device, said access is operable to be provided by said second device and is stored remotely, a determination is operable to be provided whether to provide the location of said second wireless portable telephonic device to said first wireless telephonic device based on said access, and the location of said second wireless telephonic device is operable to be provided to said first telephonic wireless device based on said determination.

REMARKS/ARGUMENTS

Summary of Office Action

Claims 3-20 are pending.

Claims 2-6, 8-11, 13-17, and 19 are withdrawn.

The Examiner held a double patenting rejection in abeyance.

The Examiner rejected claim 3 under 35 U.S.C. 102(a) as being unpatentable over U.S. Patent No. 7,010,110 (hereinafter "Jorasch").

The Examiner rejected claim 7, 12, and 18 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7,010,110 (hereinafter "Jorasch").

The Examiner rejected claim 18 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Sheha U.S. Patent No. 7,366,522 (hereinafter "Sheha").

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Thomas U.S. Patent No. 7,366,522 (hereinafter "Thomas").

Summary of Applicant's Amendments

Applicant respectfully traverses the Examiner's rejections. Applicant reserves the right to claim any subject matter lost by any amendments or cancellations during the prosecution of this application, or to claim any subject matter included in the present application, in one or more continuation or divisional applications.

Applicant's Response to the Double Patenting Rejections

The Examiner held a double-patenting rejection in abeyance. As the above-identified claims are not allowed by the Examiner, Terminal Disclaimers are not yet applicable. Applicant respectfully request the Examiner review each claim of the present application and the other applications/patents under disclosure as claims may be amended and claimed subject matter may change.

Rejections under 35 U.S.C. 102(a)

The Examiner rejected claim 3 under 35 U.S.C. 102(a) as being unpatentable over Jorasch.

The Examiner stated that Jorasc discusses:

> "allowing … transmission of location information … to said multiple entry list … see col 2, lines 12 – 54" (Office Action, page, 9)

Jorash, however, is not related to an allowance of transmission of location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54.

The Examiner stated:

> "the users, whether they are monitoring or monitored … are doing so for status information and then sending such information to a central server and to the monitoring client …. Information can be location information.." (Office Action, page, 8)

Without prejudice and solely in order to expedite prosecution, applicant has amended claim 3 to include a wireless portable telephonic device having a location determination device operable to determine a location of said wireless portable telephonic device. Furthemore,

Jorash is silent on applicant's claim 3 that includes such features.

Furthermore, Jorash is silent on the allowance of transmission of location information where a multiple entry list is operable of being created on said first wireless telephonic device and the multiple entry list is operable to be modified by the first wireless telephonic device. Jorash is also silent on applicant's claim 3 of an allowance operable to be provided to, and stored on, a remote server, from the first wireless telephonic device as well as the allowance being able to be deleted by the first wireless telephonic device. Thus, Jorash does not show a wireless telephonic device creating and modifying a list of entities or a wireless telephonic device for providing and removing an allowance. Jorash merely alleges "programming the parties' telephone numbers into the client's local telephone or be a directory lookup by name." (Jorasch, col. 2). Programming telephone numbers into a local telephone does not show or suggest claim 3 of a multiple entry list is operable of being created on said first wireless telephonic device and the multiple entry list is operable to be modified by the first wireless telephonic device nor an allowance operable to be provided to, and stored on, a remote server, from the first wireless telephonic device as well as the allowance being able to be deleted by the first wireless telephonic device.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Rejections under 35 U.S.C. 103(a)

Claim 7

The Examiner rejected claim 7 under 35 U.S.C. 103(a) as being unpatentable over Jorasch.

The Examiner stated Jorash includes GPS. *See Office Action.*

Jorash does not do anything with location. Jorash has monitoring parties that monitor the status of monitored parties to for example, monitor if someone is working or not. Jorash discusses letting a party enter "unavailable" as status at certain locations. No further discussion is included in Jorash. *See Jorash*, col 13, lines 10-30.

Applicant's claim 7 includes numerous features regarding location and using location in various ways. Jorash does not use location in any manner.

Applicant's claims 7 includes a server located remotely from said first wireless portable telephone and said stationary computer that server receives and stores a first location representative of the location of said first wireless portable telephone, said server receives and stores a first permission from said first wireless portable telephone for said entity profile to receive location information associated with said first location, and said server sends said location information to said stationary computer after verifying said first permission and identifying said entity profile associated with said stationary computer.

Jorash does not include any such features and is not related to a permission for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54.

Accordingly, for at least these reasons, application respectfully requests the Examiner's rejection be withdrawn. In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 12

The Examiner rejected claim 12 under 35 U.S.C. 103(a) as being unpatentable over Jorasch.

Applicant's claim 12 includes patentable features similar to claim 7. Accordingly, claim 12 is patentable.

Furthermore, applicant's claim 12 includes a first wireless telephonic device for providing on a display screen to request the location of a different wireless device, requesting on said different wireless device that said different wireless device provides access information for said first wireless telephonic device, and sending the location information of said different wireless device based on said access information.

Jorash, however, is not related to access information for sending location information. Jorash merely include entering a code to represent "unavailable" when entering a building. *See Jorash,* col. 13, lines 10-30.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 18

The Examiner rejected claim 18 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Sheha.

Applicant's claim 18 includes patentable features similar to claim 7. Accordingly, claim 18 is patentable

As shown above, Jorash merely include entering a code to represent "unavailable" when entering a building. *See Jorash*, col. 13, lines 10-30.

Accordingly, Jorash does not show or suggest applicant's claim 18 that includes a first wireless portable telephonic device, wherein a list of entities is provided on said first wireless portable telephonic, highlight window is operable to be provided on said first wireless portable telephonic device for selecting one of said list of entities on said first wireless portable telephonic device, manual input is operable to be received to select, using said highlight window, one of said entities from said list of entities, a display screen is operable to be provided on said first wireless device for selecting location access rights from a plurality of location access rights for said selected entity with respect to the location of said first wireless telephonic device, and providing a location based on the location access rights.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Jorash cannot be conbined with Sheha. Jotash is not capable of providing applicant's claim 18 of manual input is operable to be received to select, using said highlight window, highlight window for manually selecting. As a result of the lack of capability, moving a highlight window into Jorash wouldn't provide the ability for Jorash to have manual input operable to be received to select the highlight window.

Furthermore, solely in order to expedite prosecution, applicant has amended claim 18 to include the location is operable to be determined by a location

determination device in said first wireless teleponic device.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Claim 20

The Examiner rejected claim 20 under 35 U.S.C. 103(a) as being unpatentable over Jorasch in view of Thomas.

As shown above, Jorash is not related to a permission for sending location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 – 54. Accordingly Jorash does not show or suggest applicant's claim 20 of a first wireless telephonic device operable to utilize a login and a password entered on the first wireless telephonic device, to determine an identity of said first wireless telephonic device and the location of said identity based on the location of said first wireless telephonic, wherein the location of a second wireless telephonic device is operable to be requested by said first device, said identity is operable to be utilized to determine whether said first wireless telephonic device is allowed to access the location of said second wireless telephonic device, said access is operable to be provided by said second device and is stored remotely, a determination is operable to be provided whether to provide the location of said second wireless telephonic device to said first wireless telephonic device based on said access, and the location of said second wireless telephonic device is operable to be provided to said first telephonic wireless device based on said determination.

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Access locating information does not show or suggest applicant's claim 20 of operable to utilize a login and a password entered on the first wireless telephonic device to determine an identity of said first wireless telephonic device and the location of said identity based on the location of said first wireless telephonic device. As admitted by the Examiner, codes is not claim 20 to determine an identity of said first wireless telephonic device and the location of said identity based on the location and a reference cannot change fundamental capabilities of Jorasch that are definitively relied upon by other Jorasch discussions without rendering it inoperable.

Furthermore, solely in order to expedite prosecution, applicant has amended claim 12 to include

In light of the foregoing, applicant respectfully requests that the Examiner's rejection be withdrawn.

Conclusion

Applicant respectfully submits that this application, including the pending claims, is in condition for allowance.

Reconsideration and prompt allowance of this application are respectfully requested.

The Director is hereby authorized to charge and fees due in conjunction with this filing, or to credit any overpayment of the same, to Deposit Account No. 50-3855.

Respectfully Submitted,

/Jeffrey D. Mullen/

Jeffrey D. Mullen
Applicant (Reg. No. 52,056)
Customer No. 32733
2212 Hassinger Lane
Glenshaw, PA 15116
Tel.: (914) 837-7741

Electronic Patent Application Fee Transmittal

Application Number:	11834674
Filing Date:	06-Aug-2007
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Filer:	Jeffrey David Mullen
Attorney Docket Number:	JDM/002 CON4

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	740	740
Miscellaneous:				
		Total in USD ($)		**740**

Electronic Acknowledgement Receipt	
EFS ID:	43778064
Application Number:	11834674
International Application Number:	
Confirmation Number:	1117
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Customer Number:	32733
Filer:	Jeffrey David Mullen
Filer Authorized By:	
Attorney Docket Number:	JDM/002 CON4
Receipt Date:	15-SEP-2021
Filing Date:	06-AUG-2007
Time Stamp:	19:26:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$740
RAM confirmation Number	E20219EJ26494653
Deposit Account	503855
Authorized User	Jeffrey Mullen
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.21 (Miscellaneous fees and charges) 37 CFR 1.20 (Post Issuance fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.16 (National application filing, search, and examination fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		JDM-002CON4--Reply.pdf	157498 5fe67532abc54b98b61c57cb26aa61de7cf3746d	yes	19

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	10
	Applicant Arguments/Remarks Made in an Amendment	11	19

Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38367 d35778b5e9ae0436ac90d1459094b23ecf5c01a0	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	195865		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/834,674	08/06/2007	Jeffrey D. Mullen	JDM/002 CON4	1117

32733 7590 09/21/2021

JEFFREY D. MULLEN
2212 Hassinger Lane
Glenshaw, PA 15116

EXAMINER	
DEANE JR, WILLIAM J	

ART UNIT	PAPER NUMBER
2652	

MAIL DATE	DELIVERY MODE
09/21/2021	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 11/834,674	Applicant(s) Mullen, Jeffrey D.	
	Examiner WILLIAM J DEANE JR	Art Unit 2652	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 09/15/2021.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 3-20 is/are pending in the application.

5a) Of the above claim(s) 4-6,8-11,13-17 and 19 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 3,7,12,18 and 20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

The 102 and 103 rejections found in the Non-Final rejection dated 03/15/2021 stands.

The Double Patenting rejection also stands, at least until the claims are determined to be unambiguous (see 112 rejection below).

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3, 7, 12, 18 and 20 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

Specifically, page 12, last paragraph states, "…applicant has amended claim 3…".

However, claim 3 does not appear to be amended. There is no underlining and the claim is presented as previously presented.

Response to Arguments

Applicant's arguments filed 09/15/2020 have been fully considered but they are not persuasive.

On page 12 , Applicant argues, "Jorash, however, is not related to an allowance of transmission of location information. Jorash merely monitors if a phone line is busy and how long a phone line is busy. See Jorash col 2, lines 12 - 54.

Applicant is incorrect. Please note at least Col. 3, lines 37 59 of Jorash

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from theexaminer should be directed to William Deane whose telephone number is 571 -272-7484. The examiner can normally be reached on Monday - FRIDAY from 9:00 A.M. to 5:00 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anmad Matar, can be reached on 571 - 272-7488.

The official fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. However, unofficial faxes can be direct to the examiners computer at 571 273 - 7484.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.aov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

20Sep2021

/WILLIAM J DEANE JR/
Primary Examiner, Art Unit 2652

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
455	456.1	06May2009	WJD
	415		
	457		
	435		
	404.1		
	Updated the prior search	25Mar2010	WJD
	Updated the prior search	06Dec2010	WJD
	Updated the search above	12Sep2011	WJD
	Updated the search above	06Sep2013	WJD
	Updated the search above	25Jun2014	WJD
	Updated the search above	05Apr2015	WJD
	Updated the search above	06Jan2015	WJD
	Updated the search above	07Aug2015	WJD
	Updated the searches above	14Apr2018	WJD
	Updated the above searches	12/25/2018	WJD
	Updated the searches above	09/08/2019	WJD
	Updated the searches above	06/20/2020	WJD
	Updated the searches above	03/12/2021	WJD
	Updated the searches above	09/20/2021	WJD

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	Art Unit
	WILLIAM J DEANE JR	2652

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11/834,674	Mullen, Jeffrey D.
	Examiner	**Art Unit**
	WILLIAM J DEANE JR	2652

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant						☐ CPA		☐ T.D.		☐ R.1.47
CLAIM		**DATE**								
Final	Original	06/06/2009	03/25/2010	12/06/2010	09/12/2011	09/06/2013	06/25/2014	04/05/2015	01/06/2016	09/20/2021
	1	✓	✓	✓	-	-	-	-	-	-
	2	✓	✓	✓	-	-	-	-	-	-
	3	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	N
	5	✓	✓	✓	✓	✓	✓	✓	✓	N
	6	✓	✓	✓	✓	✓	✓	✓	✓	N
	7	✓	✓	✓	✓	✓	✓	✓	✓	✓
	8	✓	✓	✓	✓	✓	✓	✓	✓	N
	9	✓	✓	✓	✓	✓	✓	✓	✓	N
	10	✓	✓	✓	✓	✓	✓	✓	✓	N
	11	✓	✓	✓	✓	✓	✓	✓	✓	N
	12	✓	✓	✓	✓	✓	✓	✓	✓	✓
	13	✓	✓	✓	✓	✓	✓	✓	✓	N
	14	✓	✓	✓	✓	✓	✓	✓	✓	N
	15	✓	✓	✓	✓	✓	✓	✓	✓	N
	16	✓	✓	✓	✓	✓	✓	✓	✓	N
	17	✓	✓	✓	✓	✓	✓	✓	✓	N
	18	✓	✓	✓	✓	✓	✓	✓	✓	✓
	19	✓	✓	✓	✓	✓	✓	✓	✓	N
	20	✓	✓	✓	✓	✓	✓	✓	✓	✓

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/834,674	Filing Date 08/06/2007	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $25 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $100 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	10/17/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 45	Minus	** 20	= 25		x $50 =	1250
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 16	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	1250

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ALLYSON PURNELL/
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The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

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Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (10-08)
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	11834674	Filing Date	2007-08-06	Docket Number (if applicable)	JDM/002 CON4	Art Unit	2652
First Named Inventor	Jeffrey D. Mullen			Examiner Name	William J Deane Jr		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 503855

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Applicant Signature			
Applicant 1		Remove	
Signature	/Jeffrey D. Mullen/	Date (YYYY-MM-DD)	2021-10-17
Name	Jeffrey D. Mullen		
Click ADD for additional Applicant Signature		Add	

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 January 2001 (04.01.2001)

PCT

(10) International Publication Number
WO 01/01718 A1

(51) International Patent Classification[7]: H04Q 7/38

(21) International Application Number: PCT/FI00/00357

(22) International Filing Date: 26 April 2000 (26.04.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
991466 28 June 1999 (28.06.1999) FI

(71) Applicant *(for all designated States except US)*: **NOKIA NETWORKS OY** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **RAJANIEMI, Jaakko** [FI/FI]; Lapinrinne 2 A 11, FIN-00180 Helsinki (FI). **AHMAVAARA, Kalle** [FI/FI]; Hakaniemenranta 18 D 62, FIN-00530 Helsinki (FI). **EINOLA, Heikki** [FI/FI]; Kaksoiskiventie 7-9 B 5, FIN-02760 Espoo (FI). **BÄCK, Juha** [FI/FI]; Kulosaarenpuistotie 44 B 22, FIN-00570 Helsinki (FI). **HULKKONEN, Tony** [FI/FI]; Porvoonkatu 1 F 214, FIN-00510 Helsinki (FI). **HAUMONT, Serge** [FR/FI]; Riistavuorenkuja 3 B 10, FIN-00320 Helsinki (FI).

(74) Agent: **KOLSTER OY AB**; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).

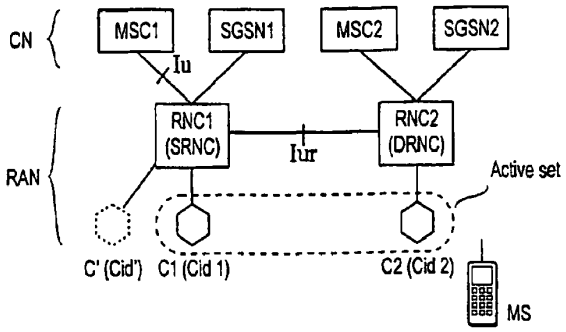
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LOCATION MANAGEMENT FOR CELLULAR SYSTEMS



(57) Abstract: A method for indicating a mobile station's (MS) location. A first radio network controller, RNC, acts as the mobile station's serving RNC (SRNC), for reporting the mobile station's location to the core network (CN). A second RNC acts as the mobile station's drift RNC (DRNC), for maintaining a radio connection with the mobile station. In response to fulfilment of at least one criterion in a first set of criteria, the mobile station (MS) sends location information about its location to the second RNC (DRNC) which forwards the location information to the first RNC (SRNC) for reporting to the core network (CN). There is also a second set of criteria for transforming the location information. In response to fulfilment of at least one criterion in the second set, the first RNC (SRNC) sends falsified information about the mobile station's location to the core network (CN).

WO 01/01718 A1

Location management for cellular systems

Background of the invention

The invention relates to methods and equipment for reporting a mobile terminal's location. The invention can be used e.g. for implementing handover in a mobile communications system. The invention is particularly useful in a system which is at least partly a third generation (3G) mobile communications system. 3G mobile communications systems, such as the UMTS (Universal Mobile Telecommunications System) are being standardised by the UMTS Forum and the European Telecommunication Standard Institute ETSI. The current vision is that 3G systems will include both circuit-switched and packet-switched components.

Fig. 1 is a block diagram of a telecommunications system showing the components which are essential for understanding the invention. A UMTS Mobile Station MS consists of Mobile Equipment ME and a USIM card (User and Services and Identity Module). There is a radio interface Uu between the MS and a Radio Access Network RAN, which comprises Base Stations BS under control of Radio Network Controllers RNC. For circuit-switched services, the RNCs are connected, via an Iu interface, to Mobile services Switching Centres MSC, and for packet-switched services, there is a connection, via a Gb interface, to Serving GPRS Support Nodes SGSN (GPRS = General Packet Radio Service). The MSC and SGSN elements may include separate UMTS addition sections. Subscriber data related to the MS is stored permanently in a Home Location Register HLR and for circuit-switched operation, the data is transferred to the Visitor Location Register VLR of the MSC which currently serves the MS. There may be separate Interworking units IWU for adapting the A and Gb interfaces of GSM/GPRS systems to the Iu interface of the UMTS. For storing equipment-related data, the network comprises an Equipment Identity Register EIR. For entering and updating subscriber-specific data, there is an Operation and Maintenance O&M section having a Man-Machine Interface MMI. For creating and managing supplementary services, there is typically a dedicated Service Control Node SCN which can be seen as an evolved version of a Service Control Point (SCP) of Intelligent Networks.

Only the packet-switched section will be described in more detail, and it is assumed that this section will resemble a GPRS system. The GPRS infrastructure comprises support nodes such as a GPRS gateway support node (GGSN) and a GPRS serving support node (SGSN). The main functions

of the GGSN nodes involve interaction with the external data network. The GGSN updates the location directory using routing information supplied by the SGSNs about an MS's path and routes the external data network protocol packet encapsulated over the GPRS backbone to the SGSN currently serving the MS. It also decapsulates and forwards external data network packets to the appropriate data network and handles the billing of data traffic.

The main functions of the SGSN are to detect new GPRS mobile stations in its service area, handle the process of registering the new MSs along with the GPRS registers, send/receive data packets to/from the GPRS MS, and keep a record of the location of the MSs inside of its service area. The subscription information is stored in a GPRS register (HLR) where the mapping between a mobile's identity (such as MS-ISDN or IMSI) and the PSPDN address is stored. The GPRS register acts as a database from which the SGSNs can ask whether a new MS in its area is allowed to join the GPRS network.

The GPRS gateway support nodes GGSN connect an operator's GPRS network to external systems, such as other operators' GPRS systems, data networks 11, such as an IP network (Internet) or a X.25 network, and service centres. Fixed hosts 14 can be connected to the data network 11 e.g. by means of a local area network LAN and a router 15. A border gateway BG provides access to an inter-operator GPRS backbone network 12. The GGSN may also be connected directly to a private corporate network or a host. The GGSN includes GPRS subscribers' PDP (Packet Data Protocol) addresses and routing information, i.e. SGSN addresses. Routing information is used for tunnelling protocol data units PDU from data network 11 to the current switching point of the MS, i.e. to the serving SGSN. The functionalities of the SGSN and GGSN can be connected to the same physical node.

The home location register HLR of the GSM network contains GPRS subscriber data and routing information and it maps the subscriber's IMSI into an SGSN address and one or more pairs of the PDP type and PDP address. The HLR also maps each PDP type and PDP address pair into a GGSN node. The SGSN has a Gr interface to the HLR (a direct signalling connection or via an internal backbone network 13). The HLR of a roaming MS and its serving SGSN may be in different mobile communication networks.

The intra-operator backbone network 13, which interconnects an operator's SGSN and GGSN equipment, can be implemented, for example, by

means of a local network, such as an IP network. It should be noted that an operator's GPRS network can also be implemented without the intra-operator backbone network, e.g. by providing all features in one computer.

Fig. 2 shows the protocol stacks used at various points in a 3G network.

A mobile station (MS) engaged in GPRS traffic sends a CELL UPDATE (CU) message after detecting that it has changed its cell. A number of cells constitute a routing area (RA), and when the routing area changes, the MS sends a ROUTING AREA UPDATE (RAU) message. In the UMTS the cell update messages are not sent to the SGSN, only to the RNC. Therefore the SGSN is not aware of the exact cell of the MS. For an active MS, the SGSN only knows an identifier of the RNC which handles the MS. For an idle MS, the SGSN only knows the MS's routing area identifier.

A first problem underlying the invention will now be described with reference to Fig. 3. A 3G system may pose certain problems which do not exist in 2G systems, such as the GSM and the GPRS. For example, when the MS is changing its cell, it is possible that a connection-oriented connection is not handled by the RNC controlling the MS's active cells but by another RNC. The former RNC is called a 'drift RNC' and the latter RNC is called a 'serving RNC'. In Fig. 3, RNC1 is the serving RNC (SRNC) and RNC2 is the drift RNC (DRNC). In such a case, the CU and RAU messages are transmitted over the air interface piggybacked to the channel which is reserved for the circuit-switched connection (connection-oriented connection), and they terminate at the serving RNC. In a GPRS core network, if the Radio Access Network (RAN) inserts a cell ID (identifier) into the CU or RAU messages, thereby indicating where the MS is actually located, and if that cell is not controlled by the serving RNC, the SGSN may use another RNC for the packet-switched connections. This is not possible, however, because all simultaneous connections for one user should be handled by one RNC. In other words, there may be an ambiguity concerning the RNC which the SGSN should use. The same holds in a UMTS system if the Radio Access Network (RAN) inserts a cell ID (identifier) into a RAU message or an equivalent.

A second, related problem is that current GPRS or 3G systems do not offer a smooth Inter-SGSN routing area update (RAU) procedure. A lot of signalling is needed between the new SGSN and the old SGSN, the HLR, MSC and the GGSN(s). In particular, the new SGSN must receive the sub-

scriber data from the old SGSN before it can be sure that it can accept the RAU and continue signalling. This signalling causes a delay of up to several seconds, which in some cases could be unacceptable. Moreover, in packet traffic a virtual connection can last for several days. Therefore, the existing concepts of an anchor-MSC and float-MSC are not appropriate.

Disclosure of the invention

It is an object of the invention to provide a method and equipment for eliminating the first problem associated with prior art systems. The object is attained with the method and equipment which are characterized by what is disclosed in the characerizing part of the appended independent claims. Solutions to the second problem and preferred solutions to the first problem are disclosed in the appended dependent claims.

The invention is based on the idea that for a terminal sending information on the basis of which its location can be determined (such as a mobile station having a connection-oriented connection while sending a CU or RAU message), the terminal's location information (e.g. its cell ID) can betransformed, e.g. by using a masked or falsified (faked) location information, such as a fake cell ID. The fake location information is preferably chosen so that the SGSN assumes the location of the MS to be under the serving RNC. A certain pool or group of cell addresses can be used for this purpose. It might be beneficial to choose the addresses so that the SRNC (or SGSN) can detect that the traffic has been forwarded.

According to various preferred embodiments of the invention, the information about the MS's location indicates one or more of the following:

a location (e.g. a cell) which is controlled by the SRNC and which is part of the MS's active set, if such a cell exists;

a virtual location (e.g. cell), which is not controlled by either RNC, in case the MS's active set does not comprise a cell which is controlled by the SRNC;

the last location (e.g. a cell) which is controlled by the SRNC and which has been part of the MS's active set in case the MS's active set does not comprise a cell which is controlled by the SRNC;

a location (e.g. a cell) controlled by the DRNC in case the MS's active set does not comprise a cell controlled by the SRNC; and/or

a location (e.g. a cell) whose location information the MS received last.

The fact that the MS's location information indicates one of these cells has two possible interpretations. The MS's location information may indicate such a cell either explicitly or implicitly. An explicit indication means that the location information contains actual cell identifiers. An implicit indication means that the location information contains some information (e.g. one or more routing or location area identifiers) on the basis of which a cell can be identified (if so desired). It is also feasible to transfer only some location-related data and use it for calculating the MS's location.

The criteria for sending location information preferably comprises a change of the MS's location, activation of a PDP context for the MS and expiry of a recurring period of time.

As briefly noted above, the information about the MS's location may indicate a location, such as a cell, whose location information the MS received last. When a mobile station has at least one active connection, it receives system information only via its dedicated signalling connection. This system information comprises e.g. current location (such as routing area, location area and cell identity) of the mobile station. The system information is similar in nature to the information which the MS receives via a broadcast control channel BCCH when it does not have any active connections. The SRNC only sends system information about the cells controlled by it. In other words, it does not send system information about cells controlled by the DRNC. Based on the system information, the MS can determine whether or not it has moved into a new routing or location area. The SRNC sends this information as necessary. One suitable criterion for sending it is that the MS has moved and its active set does not contain the cell whose system information the SRNC has sent last, or after an SRNC handover (relocation).

Use of the transformed location, such as a fake cell ID, causes another problem, however. When the MS's last connection-oriented connection is terminated and the serving RNC deleted from the MS-URAN connection, the SGSN must be informed about the new (correct) RNC. This holds also for cases where the serving RNC is changed. This problem can be solved as follows. If the MS's last connection-oriented connection is terminated or if the serving RNC is changed, an additional CU or RAU must be performed for the MS, even if the MS's location information has not changed.

The location reporting functionality performed by a serving RNC can be summarised as follows:

1. Check if RNC handover should be performed. If not, then:

2. Select a location, such as a cell which is controlled by the serving RNC and which is part of the MS's active set, if such a cell exists. (N.B. The active set must also comprise at least one cell controlled by the drift RNC, otherwise the concept of drift RNC would not exist.)

If no handover was performed in step 1 or no cell was found in step 2, then do one of the following:

3A. Select a virtual location, such as a cell. A virtual cell is not a real cell (i.e. it is not covered by radio transceivers); or

3B. Select, among the cells controlled by the serving RNC, the last one used by the MS.

If step 3A is taken, i.e. a virtual location is selected, the core network elements (the MSC and/or the SGSN) must determine that the location information does not refer to reallocation. Such a determination can be made on the basis of a suitable cell ID numbering plan or a translation table.

Brief description of the drawings

The invention will now be described in connection with its preferred embodiments, with reference to the accompanying drawings, in which:

Fig. 1 is a block diagram of a telecommunications system showing the components which are essential for understanding the invention;

Fig. 2 shows the protocol stacks used at various points in a 3G network;

Fig. 3 is a simplified block diagram for pointing out the problem more clearly;

Fig. 4 shows a routing area update (RAU) procedure for a GPRS network; and

Fig. 5 shows an alternative Inter-SGSN routing area update procedure according to a preferred embodiment of the invention.

Detailed description of the invention

Fig. 4 shows a routing area update (RAU) procedure for a GPRS network. In step 4-1 the MS sends a ROUTING AREA UPDATE REQUEST via RNC2 (drift RNC) to RNC1 (serving RNC). In step 4-2 RNC1 adds the MS's location information and forwards the RAU Request to SGSN1. In step 4-3 SGSN2 requests the MS's PDP context from SGSN1 which responds in step 4-4. In step 4-5 SGSN1 begins to forward MS-terminated (MT) packets to

SGSN2. Security functions have been shown as step 4-6. In step 4-7 SGSN2 sends an UPDATE PDP CONTEXT REQUEST to the GGSN node which responds in step 4-8. In step 4-9 the MS's location is updated in the HLR. In step 4-10 the HLR cancels the MS's location in SGSN1 which acknowledges this in step 4-11. In step 4-12 the HLR sends an INSERT SUBSCRIBER DATA to SGSN2 which acknowledges in step 4-13. In step 4-14 the HLR sends to SGSN2 an acknowledgement to the message sent in step 4-9. In step 4-15, if the MS is IMSI-attached and does not have a circuit-switched connection, the SGSN-VLR association must be updated. SGSN2 updates the MS's location and SGSN number in the VLR, which acknowledges these in step 4-16. In steps 4-17 and 4-18 the RAU process is completed.

Fig. 5 shows an alternative Inter-SGSN routing area update procedure according to a preferred embodiment of the invention. This embodiment and its alternative modifications solve the second problem underlying the invention.

Due to macrodiversity, the triggering of a RAU is less clear than in 2G systems. A RAU could be triggered e.g. if all cells in the MS's active set belong to the new RA, or if more than half of the cells belong to it. In step 5-1 the MS sends a ROUTING AREA UPDATE REQUEST via RNC2 (drift RNC) to RNC1 (serving RNC). The MS sends the RAU request via its uplink connection, if one exists. Because of the coexistence of the drift RNC and the serving RNC, the update is received by the SRNC which does not control the MS's new routing area. The MS should suspend its session management procedures. In step 5-2 RNC1 adds the MS's location information and forwards the RAU REQUEST to SGSN1. This is in contrast to prior art GPRS systems where the RAU REQUEST is sent to SGSN2. In step 5-3 security functions may be performed, as usual. A benefit of sending the RAU REQUEST to SGSN1 is that SGSN1 already knows the MS's digital signature (PTMSI signature in GPRS terms), and it is likely to have authentication triplets for it. Thus there is no need to fetch these separately, whereby the delays due to the inter-SGSN handover can be shortened.

In step 5-4, if the security functions are completed successfully, the SGSN1 sends a FORWARD RAU REQUEST to SGSN2. This message includes parameters for resuming the connection(s) after the RAU. Such parameters include session management data and eventually Iu information (address of

RNC2). SGSN1 may start a timing period during which it will keep the MS's data in its memory.

In step 5-5 SGSN2 updates the MS's location (IMSI, SGSN address) in the HLR. In step 5-6 the HLR inserts the subscriber data (IMSI, subscription details) into SGSN2 which validates the MS's presence in the new RA. If all regional and other checks are passed, SGSN2 establishes an MM (Mobility Management) context for the MS and returns an acknowledgement to the HLR in step 5-7.

In step 5-8 SGSN2 may establish an Iu link to RNC2 which may send some radio parameters to resume quickly a connection with the MS. This feature is especially useful if the MS has a delay-sensitive application (this can be determined by checking the MS's session management context).

In step 5-9 SGSN2 returns an accept message to the message sent in step 5-4. The accept message includes the new RA index, the MS's new temporary identity (P-TMSI in GPRS terms) and/or its new digital signature. Additionally, some radio parameters or codes obtained from RNC2 may be sent. SGSN1 should immediately acknowledge this message to facilitate error handling. In step 5-10 SGSN1 sends to the MS an RAU ACCEPT message which preferably contains the same parameters as the message of step 5-9. Additionally, if an acknowledgement transmission is active, it may contain some protocol state information known by SGSN1 (this corresponds to LLC acknowledgement in GPRS).

In step 5-11 SGSN1 suspends downlink data transmission for acknowledged mode, in order to keep the protocol state intact. Depending on the QoS, SGSN1 may continue data transmission for unacknowledged mode.

In step 5-12 the MS acknowledges with a RAU COMPLETE message which contains the new temporary identity (P-TMSI) and some protocol state information known by the MS, such as an LLC acknowledgement for each LLC connection used by the MS (which confirms all MT N-PDUs transferred succesfully before the start of the update procedure. If the packet acknowledgement (equivalent to LLC acknowledgement in GPRS) confirms reception of certain N-PDUs, these N-PDUs will be discarded by SGSN1. This message will trigger RNC relocation (which in this embodiment is triggered by the MS).

In step 5-13 the MS establishes a radio connection with RNC2. If radio parameters were sent in step 5-10 (RAU ACCEPT), the MS could set up a radio connection immediately with these parameters. Otherwise, the MS

should re-establish the radio connection by accessing the common channel, which causes a longer break in the connection. This is why sending the radio parameters in step 5-10 may be QoS-dependent. The MS should send an uplink packet (not shown) to SGSN2 in case the RAU COMPLETE message was lost because of error handling. An alternative embodiment, omitting step 5-13, will be described later.

In step 5-14 SGSN1 sends a FORWARD RAU COMPLETE message to SGSN2. In step 5-15 SGSN1 cancels the Iu links towards RNC1 and begins to forward downlink packets to SGSN2. It may keep the MS's context and forward MT packets until the expiry of the optional timing period which was started in step 5-4. In step 5-16, when SGSN2 receives the FORWARD RAU COMPLETE message, it resumes data transmission towards the MS.

In step 5-17 SGSN2 sends to the relevant GGSN(s) an UPDATE PDP CONTEXT REQUEST (SGSN2 address, Tunnel Identifier, QoS Negotiated). The GGSNs update their PDP context fields and return a response in step 5-18. N.B: Steps 5-17 and 5-18 may take place any time after step 5-5.

In step 5-19 the HLR cancels the MS's location in SGSN1. This message contains the MS's IMSI, and the cancellation type is set to Update procedure. If the optional timer was not set in step 5-4, SGSN1 deletes the MS's MM and PDP contexts. Otherwise it waits until the timer expires. The timing period allows SGSN1 to complete forwarding of N-PDUs. It also ensures that the MS's MM and PDP contexts are kept in case the MS initiates another Inter-SGSN RAU before completing the ongoing RAU. In step 5-20 SGSN1 acknowledges with a CANCEL LOCATION ACK.

According to an alternative embodiment step 5-13 is omitted. Instead, during step 5-15 RNC1 receives an indication from SGSN1 that the RNC could now be relocated. RNC1 will inform RNC2 which will start handling the MS directly.

In general, the invention is equally applicable if the SGSN is replaced by a 3G MSC (or an MSC/SGSN combination). For this embodiment, the MSC and/or SGSN could be called 'switching elements' since they route packets and/or establish circuit-switched connections.

In GSM systems no location area updates are performed during connection, in order not to confuse the relay and anchor MSCs. With macro diversity the LAU could reach the old MSC directly, whereby it is possible to have a LAU during a call. However, in a hard inter-MSC handover, a special

message (LAU with an active call indication) may be needed. Such a message could trigger the new MSC to establish a connection with the old MSC and try to resume the call. A problem is that this would happen especially between the GSM and the UMTS, which means that a GSM MSC would need to interpret this special LAU message.

It should be noted that figures 4 and 5 illustrate worst-case scenarios in the sense that both RNCs are under different SGSN nodes or MSCs. If the SGSNs or the MSCs are the same, these scenarios could be simplified accordingly.

Claims

1. A method for indicating a terminal's (MS) location in a telecommunications system comprising:

a core network (CN); and

an access network (RAN) comprising a first network controller, which at least temporarily acts as the terminal's serving network controller (SRNC), for reporting the terminal's location to the core network, and a second network controller, which at least temporarily acts as the terminal's drift network controller (DRNC), for maintaining a connection with the terminal; wherein

there is a first set of predetermined criteria for sending information about the terminal's (MS) location to the core network (CN); and

in response to fulfilment of at least one criterion in the first set, the terminal (MS) sends to the second network controller (DRNC) location information (4-1, 5-1) on the basis of which the terminal's location can be determined; and the second network controller (DRNC) forwards the location information to the first network controller (SRNC) for reporting to the core network (CN);

characterized in that

there is a second set of at least one predetermined criterion for transforming the location information;

the first network controller (SRNC) checks whether at least one criterion in the second set is fulfilled; and

in response to fulfilment of at least one criterion in the second set, the first network controller (SRNC) sends transformed information (4-2, 5-2) about the terminal's location to the core network (CN).

2. A method according to claim 1, characterized in that in response to terminating the last connection-oriented connection with the terminal, the first network controller (SRNC) reports the terminal's correct location to the core network (CN).

3. A method according to claim 1 or 2, characterized in that the information about the terminal's (MS) location indicates a location which is controlled by the first network controller (SRNC) and which is part of the terminal's active set, if such a location exists.

4. A method according to claim 3, characterized in that if the terminal's active set does not comprise a location which is controlled by the first network controller (SRNC), the information about the terminal's (MS) location indicates a virtual location, which is not controlled by either of said network controllers.

5. A method according to claim 3, characterized in that if the terminal's active set does not comprise a location which is controlled by the first network controller (SRNC), the information about the terminal's (MS) location indicates the last location which is controlled by the first network controller and which has been part of the terminal's active set.

6. A method according to claim 3, characterized in that if the terminal's active set does not comprise a location which is controlled by the first network controller (SRNC), said information about the terminal's (MS) location indicates a location which is at least partially controlled by the first network controller.

7. A method according to any one of the preceding claims, characterized in that the information about the terminal's (MS) location indicates a location the location information of which the terminal received last.

8. A method according to any one of the preceding claims, characterized in that if the terminal's (MS) active set does not comprise a location controlled by the first network controller (SRNC), the information about the terminal's (MS) location indicates a location controlled by the second network controller (DRNC).

9. A method according to any one of the preceding claims, characterized in that said information about the terminal's (MS) location indicates at least one cell identifier, routing area identifier or location area identifier.

10. A method according to any one of the preceding claims, characterized in that said first set of criteria comprises a change of the terminal's location, activation of a PDP context for the terminal and expiry of a recurring period of time.

11. A method according to any one of the preceding claims, characterized in that

the first and the second network controller (RNC1, RNC2) are associated, respectively, with a first and a second switching element (SGSN1, SGSN2) for maintaining subscription information related to the terminal (MS); and

information about the terminal's location is received by the first switching element (SGSN1) sends (5-4) information about the terminal's location to the second switching element (SGSN2) without a separate request.

12. A method according to claim 11, characterized in that said information about the terminal's location comprises the terminal's Packet Data Protocol and/or Mobility Management context.

13. A method according to claim 11 or 12, characterized in that each of the first and the second switching element (SGSN1, SGSN2) is substantially an SGSN node, a Mobile services Switching Centre or a combination of both.

14. A method according to any one of the preceding claims, characterized in that said terminal is a mobile station, said access network is a radio access network and said network controller is a radio network controller.

15. A first network controller for supporting a terminal (MS) in a telecommunications system which comprises a core network (CN) and an access network (RAN);

wherein said first network controller is adapted to act, at least temporarily, as the terminal's serving network controller (SRNC) in said access network (RAN), for reporting the terminal's location to the core network (CN); and

the first network controller (SRNC) is adapted to receive location information from a drift network controller (DRNC) and to report it to the core network (CN) for determining the terminal's (MS) location;

characterized in that

the first network controller (SRNC) is adapted to transform said information about the terminal's location before reporting it to the core network (CN).

Fig. 1

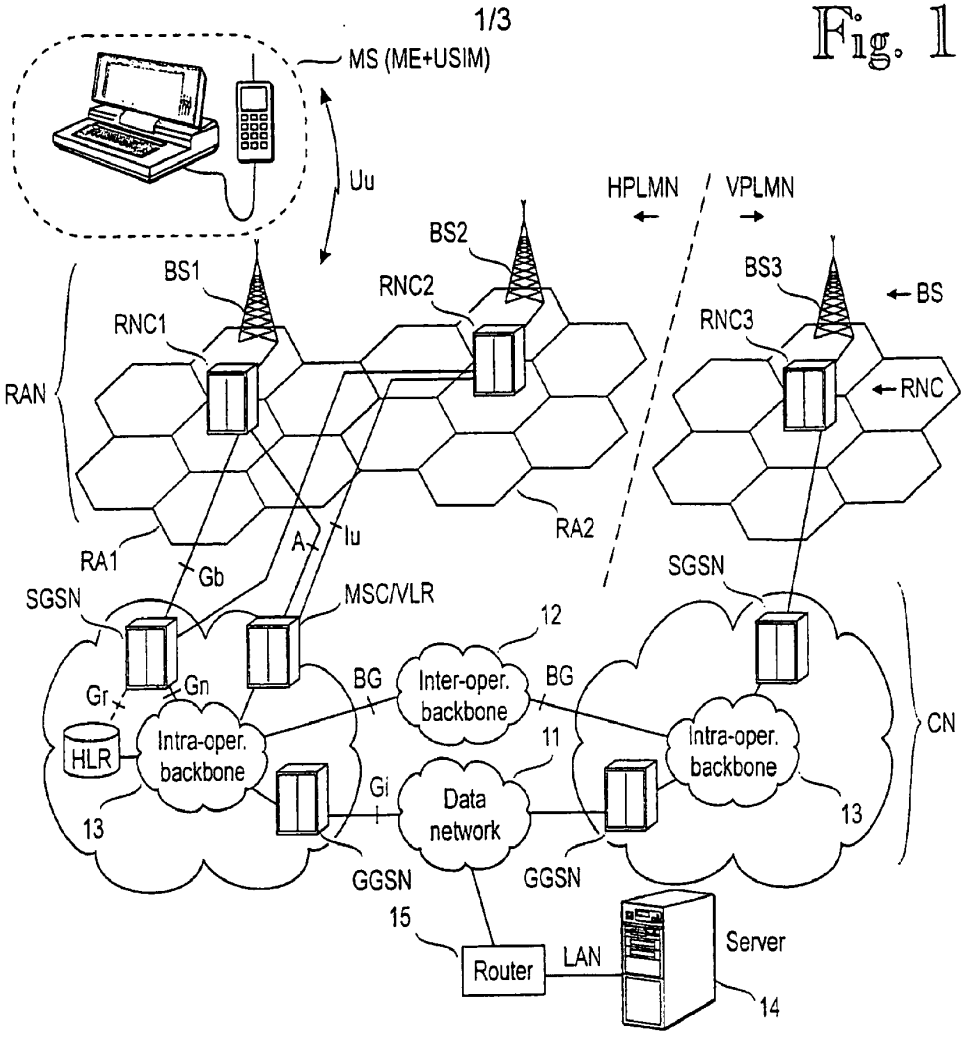
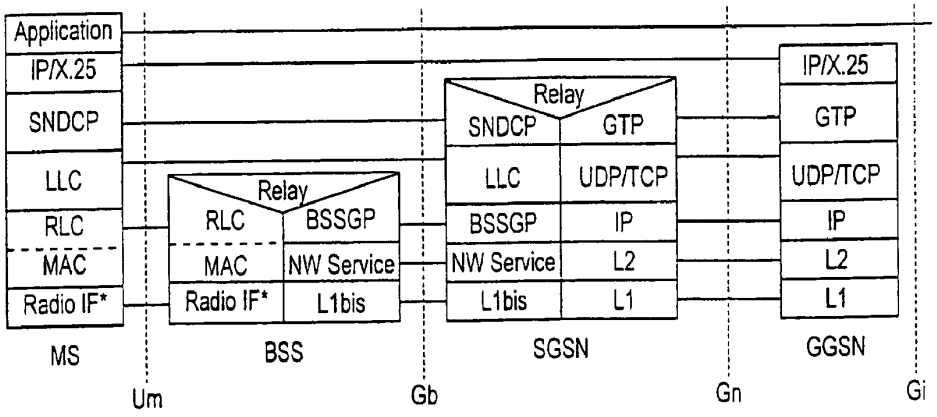


Fig. 2



*WCDMA in 3G

Fig. 3

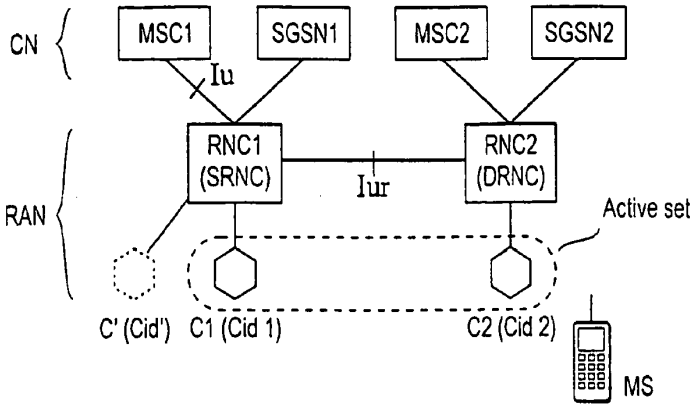

CN
MSC1
SGSN1
MSC2
SGSN2
Iu
RNC1
(SRNC)
Iur
RNC2
(DRNC)
RAN
Active set
C' (Cid')
C1 (Cid 1)
C2 (Cid 2)
MS

Fig. 4

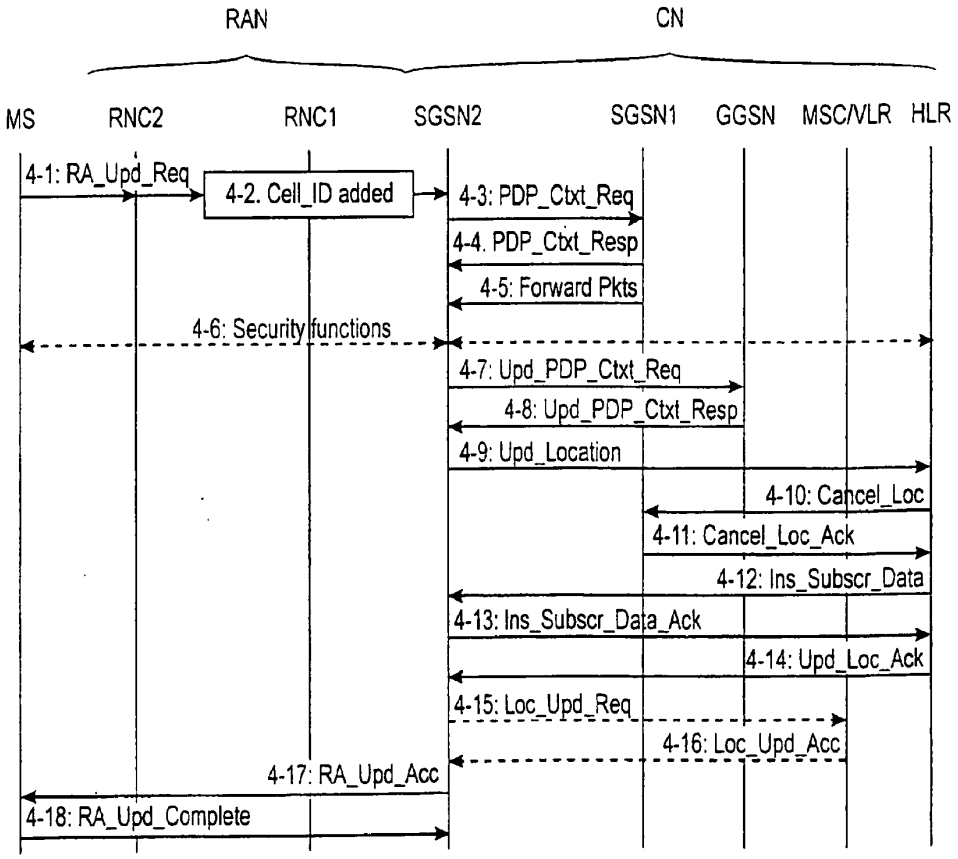
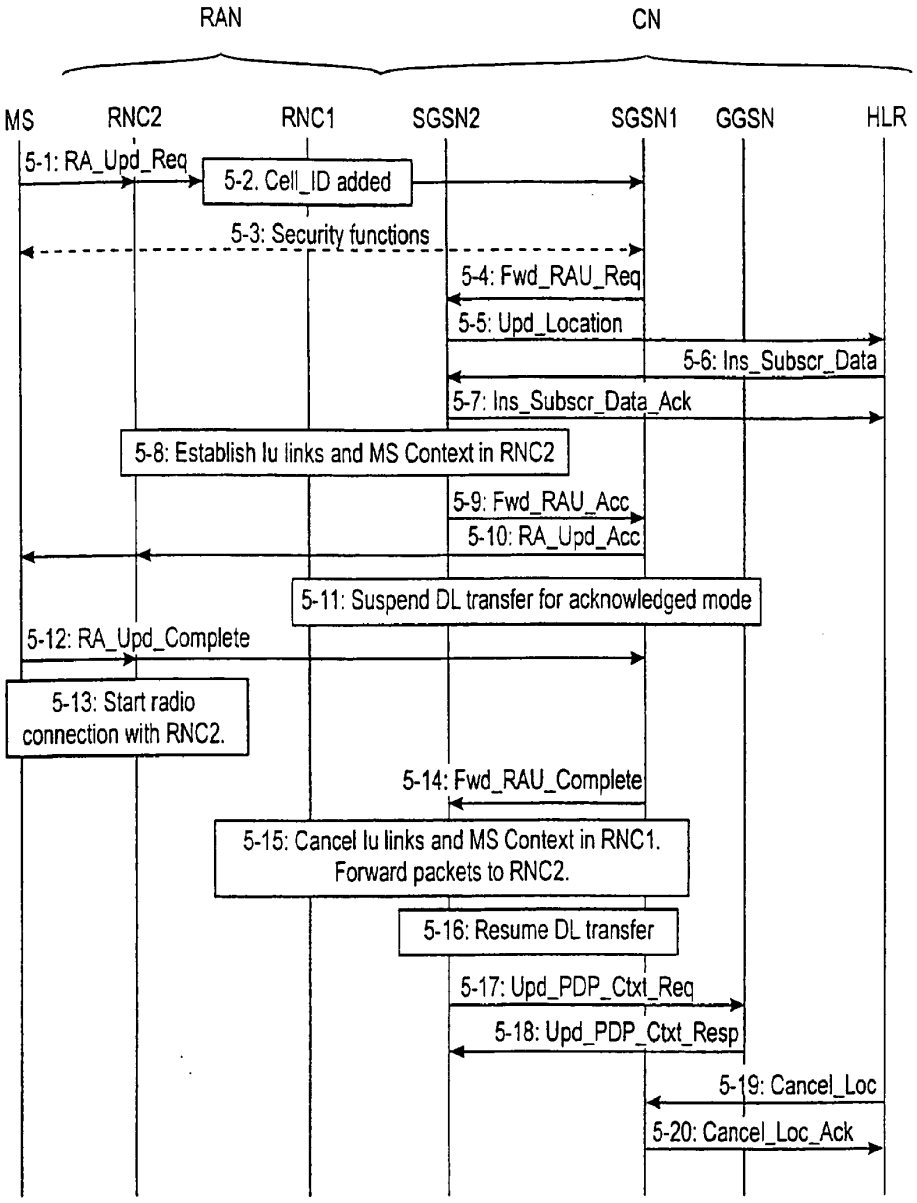

RAN
CN
MS
RNC2
RNC1
SGSN2
SGSN1
GGSN
MSC/VLR
HLR
4-1: RA_Upd_Req
4-2. Cell_ID added
4-3: PDP_Ctxt_Req
4-4. PDP_Ctxt_Resp
4-5: Forward Pkts
4-6: Security functions
4-7: Upd_PDP_Ctxt_Req
4-8: Upd_PDP_Ctxt_Resp
4-9: Upd_Location
4-10: Cancel_Loc
4-11: Cancel_Loc_Ack
4-12: Ins_Subscr_Data
4-13: Ins_Subscr_Data_Ack
4-14: Upd_Loc_Ack
4-15: Loc_Upd_Req
4-16: Loc_Upd_Acc
4-17: RA_Upd_Acc
4-18: RA_Upd_Complete

Fig. 5


RAN
CN
MS
RNC2
RNC1
SGSN2
SGSN1
GGSN
HLR
5-1: RA_Upd_Req
5-2. Cell_ID added
5-3: Security functions
5-4: Fwd_RAU_Req
5-5: Upd_Location
5-6: Ins_Subscr_Data
5-7: Ins_Subscr_Data_Ack
5-8: Establish Iu links and MS Context in RNC2
5-9: Fwd_RAU_Acc
5-10: RA_Upd_Acc
5-11: Suspend DL transfer for acknowledged mode
5-12: RA_Upd_Complete
5-13: Start radio connection with RNC2.
5-14: Fwd_RAU_Complete
5-15: Cancel Iu links and MS Context in RNC1. Forward packets to RNC2.
5-16: Resume DL transfer
5-17: Upd_PDP_Ctxt_Req
5-18: Upd_PDP_Ctxt_Resp
5-19: Cancel_Loc
5-20: Cancel_Loc_Ack

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 00/00357

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: 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)

IPC7: H04Q

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 9966740 A2 (EINOLA), 23 December 1999 (23.12.99), page 3, line 7 - page 7, line 24	15
P,A	--	1-14
P,A	WO 0011878 A2 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 2 March 2000 (02.03.00), page 6, line 18 - page 8, line 13	1-15
	--	
A	WO 9920071 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 22 April 1999 (22.04.99), page 5, line 6 - page 7, line 3, abstract	1-15
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" 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
"T" 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
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"Y" 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	Date of mailing of the international search report
13 October 2000	17 -10- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jaana Raivio/mj Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT
Information on patent family members

01/08/00

International application No.
PCT/FI 00/00357

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9966740 A2	23/12/99	AU 4554499 A	05/01/00
		AU 5900699 A	21/03/00
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WO 9920071 A1	22/04/99	AU 9468798 A	03/05/99
		SE 9703697 A	11/04/99

Form PCT/ISA/210 (patent family annex) (July 1992)

Electronic Patent Application Fee Transmittal

Application Number:	11834674
Filing Date:	06-Aug-2007
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Filer:	Jeffrey David Mullen
Attorney Docket Number:	JDM/002 CON4

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	25	50	1250
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	2820	1	1000	1000
STATUTORY OR TERMINAL DISCLAIMER	2814	5	170	850
		Total in USD ($)		**3100**

Electronic Acknowledgement Receipt	
EFS ID:	44048206
Application Number:	11834674
International Application Number:	
Confirmation Number:	1117
Title of Invention:	SYSTEMS AND METHODS FOR LOCATING CELLULAR PHONES AND SECURITY MEASURES FOR THE SAME
First Named Inventor/Applicant Name:	Jeffrey D. Mullen
Customer Number:	32733
Filer:	Jeffrey David Mullen
Filer Authorized By:	
Attorney Docket Number:	JDM/002 CON4
Receipt Date:	17-OCT-2021
Filing Date:	06-AUG-2007
Time Stamp:	21:27:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$3100
RAM confirmation Number	E20210GL28301036
Deposit Account	503855
Authorized User	Jeffrey Mullen
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.21 (Miscellaneous fees and charges) 37 CFR 1.20 (Post Issuance fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.16 (National application filing, search, and examination fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer Filed	JDM-002CON4--TD--039.pdf	91731 bbd7776684e6754213d12d04478735a27cee4b06	no	2
Warnings:					
Information:					
2	Terminal Disclaimer Filed	JDM-002CON4--TD--283.pdf	91739 645d535f46266eb53ea490ed768c9907c2f84da9	no	2
Warnings:					
Information:					
3	Terminal Disclaimer Filed	JDM-002CON4--TD--418.pdf	91740 54d58fc39c55d163fce3c8d135b3e999c097ef6c	no	2
Warnings:					
Information:					
4	Terminal Disclaimer Filed	JDM-002CON4--TD--540.pdf	91708 bdf822635f2226d1cb5500f1c107f8eac0412f25	no	2
Warnings:					
Information:					
5	Terminal Disclaimer Filed	JDM-002CON4--TD--575.pdf	91732 7e9a6612154d75437333bf510c3bfdc44c07f5a0	no	2
Warnings:					
Information:					
6	Transmittal Letter	JDM-002CON4--IDS.pdf	135604 1af0c72748b7b101b7699e16974b74f2f18618a5	no	15
Warnings:					
Information:					

7	Information Disclosure Statement (IDS) Form (SB08)	JDM-002CON4--PTOSB08A.pdf	294370 93d7a8d2783d2e3f3d2b545d800638c749c34da9	no	12
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Information:					
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8		JDM-002CON4--Reply.pdf	119807 238795c96ef0296d9467592f384bddf809be4add	yes	14
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment Submitted/Entered with Filing of CPA/RCE		1	1	
	Claims		2	12	
	Applicant Arguments/Remarks Made in an Amendment		13	14	
Warnings:					
Information:					
9	Request for Continued Examination (RCE)	JDM-002CON4--RCE.pdf	697798 ff1619e02dff59363afb2f6624f31d0c2c6da386	no	3
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Information:					
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12	Foreign Reference	JDM-002C4--ref--3of4.pdf	796627 343c1b52477c59510b87f68d81e10ac30f10f5e3	no	19

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Information:					
13	Foreign Reference	JDM-002C4--ref--4a.pdf	23736879 6cb9dbd8963a82605b4a97551728d20de850c3f9	no	666
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Information:					
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Warnings:					
Information:					
			Total Files Size (in bytes):	60518608	

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04Q 7/38 — A2

(11) International Publication Number: **WO 00/28760**

(43) International Publication Date: 18 May 2000 (18.05.00)

(21) International Application Number: PCT/FI99/00925

(22) International Filing Date: 5 November 1999 (05.11.99)

(30) Priority Data:
982417 6 November 1998 (06.11.98) FI

(71) Applicant *(for all designated States except US)*: NOKIA NETWORKS OY [FI/FI]; P.O. Box 300, FIN-00045 Nokia Group (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: SALONEN, Janne [FI/FI]; Rantakoskelantie 3 A 2, FIN-90570 Oulu (FI). RINNE, Mikko [FI/FI]; Tallbergin puistotie 1 C 25, FIN-00200 Helsinki (FI). HONKASALO, Harri [FI/FI]; Haravakuja 12, FIN-01660 Vantaa (FI). RAJANIEMI, Jaakko [FI/FI]; Lapinrinne 2 A 11, FIN-00180 Helsinki (FI). AHMAVAARA, Kalle [FI/FI]; Ruostekuja 3 D 24, FIN-01610 Vantaa (FI).

(74) Agent: BERGGREN OY AB; P.O. Box 16, FIN-00101 Helsinki (FI).

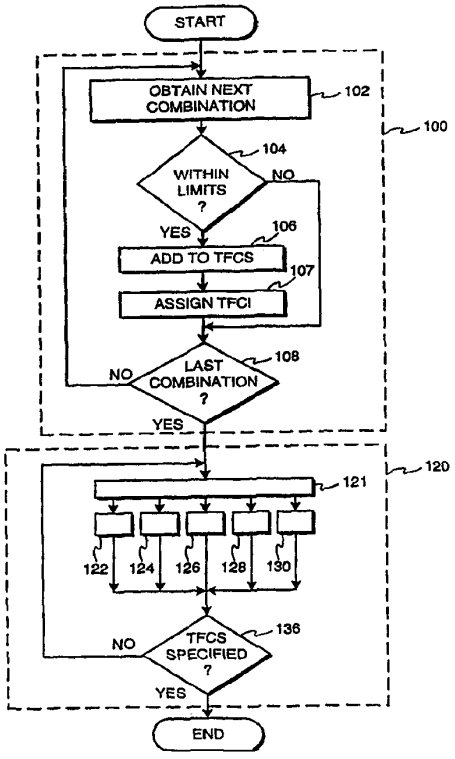
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: METHOD FOR CONTROLLING BEARER PROPERTIES

(57) Abstract

The invention concerns the control of connections in cellular telecommunication systems. According to the invention, the available radio resources are controlled by allowing only certain conbinations of transport formats to be used by a single user. The inventive method restricts the combinations of bearer bit rates which can be used, without strictly limiting some bearers from using highest bit rates. This inventive approach allows flexible overall control of radio resources, while retaining the possibility of bearers to select between different bit rates.



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Method for controlling bearer properties

TECHNICAL FIELD OF THE INVENTION

The invention concerns the control of connections in cellular telecommunication systems.

BACKGROUND OF THE INVENTION

In cellular telecommunication systems a single speech connection or data connection through the cellular telecommunication network is called a bearer. Generally, a bearer is associated with a set of parameters pertaining to data communication between a certain terminal equipment and a network element, such as a base station or an interworking unit (IWU) connecting the cellular network to another telecommunications network. The set of parameters associated with a bearer comprises typically for example data transmission speed, allowed delays, allowed bit error rate (BER), and the minimum and maximum values for these parameters. A bearer may further be a packet transmission bearer or a circuit switched bearer and support for example transparent or non-transparent connections. A bearer can be thought of as a data transmission path having the specified parameters connecting a certain mobile terminal and a certain network element for transmission of payload information. One bearer always connects only one mobile terminal to one network element. However, a bearer can pass through a number of network elements. One mobile communication means (ME, Mobile Equipment) may in some cellular telecommunication systems support one bearer only, in some other systems also more than one simultaneous bearers.

In the new cellular telecommunication systems such as the UMTS system (Universal Mobile Telecommunication System) under development, variable bit rate bearers will be in much more widespread use than in the present systems. Multiple simultaneous bearers with multiple bit rate options will result in high amount of combinations to be supported. It is desirable that also the air interface part of the communications system supports this kind of bearer combinations efficiently, i.e. without excessive use of radio resources. Since the bit rates of bearers may change from frame to frame, the bit rates need to be indicated in the frames. Assuming that all possible combinations of instantaneous bit rates of different bearers shall be supported, the amount of bits required for identification of the transmission rate of a

radio frame may become excessive. On the other hand, fixed allocation of radio resources according to the maximum possible total bit rate is not feasible. Maximum bit rates of the bearers may be rarely used and if the resources allocated for a user are dimensioned based on the worst case combination i.e. all bearers using the highest possible bit rate, scarce radio resources will be wasted.

SUMMARY OF THE INVENTION

An object of the invention is to realize a method for controlling the bearers, which allows the control of maximum total bit rate of all bearers of a user, while aiming to avoid as much as possible restrictions of use of the highest data rates by a bearer. A further object of the invention is to realize a method, which reduces the amount of data transmission needed for communicating the bit rates of bearers from a transmitting entity to a receiving entity.

The objects are reached by restricting the allowed bit rate combinations, associating an identifier with each allowed combination, and identifying the instantaneous transmission rate using the identifier associated with the particular combination.

The method according to the invention is characterized by that, which is specified in the characterizing part of the independent method claim. The system for controlling bearers in a cellular telecommunication system according to the invention is characterized by that, which is specified in the characterizing part of the independent claim directed to a system for controlling bearers in a cellular telecommunication system. The dependent claims describe further advantageous embodiments of the invention.

According to the invention, the available radio resources are controlled by allowing only certain combinations of transport formats to be used by a single user. The inventive method restricts the combinations of bearer bit rates which can be used, without strictly limiting some bearers from using highest bit rates. Consequently, depending on the available resources, one bearer may well use its highest data rate, possibly even more bearers than one, although the total resource usage of all bearers of the user may be restricted. This inventive approach allows flexible overall control of radio resources, while retaining the possibility for bearers to select between different bit rates.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described in more detail in the following with reference to the accompanying drawings, of which

Figure 1 illustrates a method according to an advantageous embodiment of the invention,

Figure 2 illustrates another method according to an advantageous embodiment of the invention,

Figure 3 illustrates a system according to an advantageous embodiment of the invention, and

Figure 4 illustrates a further method according to an advantageous embodiment of the invention.

Same reference numerals are used for similar entities in the figures.

DETAILED DESCRIPTION

In the following discussion, the term bit rate refers to the bit rate after channel coding, i.e. the bit rate actually transmitted over the air interface, and not the payload data bit rate unless otherwise specified.

According to the present invention, transmission of a single mobile communication means is controlled by controlling the allowed bit rate combinations of the bearers of the mobile communication means. The allowed combinations of bearer bit rates are restricted in such a way, which does not refuse the possibility of using the highest bit rates for some bearers.

To aid in the description of the invention, certain terms are defined in the following.

A transport format (TF) is a set of parameters, which correspond to a single way of preparing a payload data stream for transmission over the air interface. The set of parameters indicate for example payload data rate, the error control coding method used, interleaving method used, and other processing methods used in the particular cellular telecommunications network, i.e. describe the physical layer processing

applied to the data to be transmitted. Consequently, each TF corresponds to a specific instantaneous bearer bit rate. Further, each bearer has at least one transport format. In the case of a bearer supporting for example multiple bit rates, a bearer can have more than one corresponding TF.

Each transport format has a corresponding transport format identifier (TFID). The TFIDs can be assigned to TFs in many ways, for example in ascending order starting from the lowest bit rate, or according to some other predefined rule.

The combination of transport formats of the active bearers is a Transport Format Combination (TFC). The set of all possible transport format combinations form a Transport Format Combination Set (TFCS). Each TFC has a corresponding transport format combination identifier (TFCI), i.e. each TFCI corresponds to a definite group of transport formats. The TFCI is used to inform the current combination of transport formats to the receiver. The TFCI:s are preferably integer numbers.

A. Determination of allowed combinations

The determination about which combinations can be used and which cannot can be made on the basis of many different requirements according to the needs of the particular embodiment of the invention. Some examples of such requirements are given in the following.

A.1. An example of a limit: size of TFCI word

In order to further reduce the amount of data transmission needed for transmission of transport format information over the air interface to the receiver, the size of the TFCI word can be changed. If the TFCI word has m bits, the maximum number N of combinations that can be represented is $N = 2^m$. Consequently, the length of the TFCI word simply limits the number of allowed combinations. The length of the TFCI word can be adjusted to give a suitable compromise between use of transmission resources for transmitting the TFCI word and the variety of transport format combinations available. In an advantageous embodiment of the invention, the length of the TFCI word can be changed during a connection.

A.2. An example of a limit: maximum bit rate for the user

In a further advantageous embodiment of the invention, maximum allowed bit rate of a user is used in the determination of allowed transport format combinations. In such an embodiment, the allowed combinations include all transport combinations, whose total bit rate is less than or equal to the maximum bit rate for a user.

In various embodiments of the invention, the maximum bit rate may be user-dependent, some users having a different maximum limit from that of others. This provides one way of priorization of users, for example to provide high-paying users and otherwise prioritized users such as rescue workers a better service than to the rest of users.

A.3. Other grounds for combination decisions

In addition to the previously mentioned limits, other information can be used in making decisions about allowed transport format combinations. This kind of information may for example comprise priorities of the bearers, measured throughputs for each bearer as well as the aggregate throughput for the user in question, current load in the cell and interference levels.

B. Construction of TFCS

The construction of the transport format combination set and the assigning of transport format combination identifiers to the various combinations can be performed in many different ways. Some examples of these ways are presented in the following.

B.1 A first example

Preferably, a table of the allowed transport format combinations is constructed, whereby the table index can be used as the TFCI. Thereafter, only the table index i.e. the TFCI needs to be communicated between the transmitter and the receiver. However, the invention is not limited to using tables, since other means such as linked lists or other data structures can be used for associating a transport format combination and a TFCI.

B.2 A second example

Further, a predefined algorithm or rule can be used to generate the TFCI corresponding to a TFC, whereafter the TFCI found in this way can be used as the index to a table for storing the different allowed combinations. The TFCI of a TFC can be determined for example according to the following algorithm:

1. $factor = L(K)$
2. $TFCI = TFID(K)$
3. step through all values of j from K-1 to 1, repeating 3a and 3b:
   - 3a. $TFCI = TFCI + TFID(j) * factor$
   - 3b. $factor = factor * L(j)$

where

factor	is a temporary variable used in the algorithm,
L(j)	is number of TF:s for bearer *j*,
TFID(j)	is TFID of the TF of bearer *j*, and
K	is the number of active bearers.

This algorithm assumes that TFIDs are assigned to TFs in ascending order starting from the lowest bit rate, the first TFID being zero.

B.3 A third example

In a further advantageous embodiment of the invention, the TFCI values are assigned simply by iterating through all combinations of all transport formats of the bearers, checking for each combination whether the combination is allowed or not. If the combination is allowed, the next free TFCI value is assigned to the combination. For example, the allowed combination can be entered into the next free position in a table containing the TFCS, the index of the position then being the assigned TFCI.

B.4 A fourth example

In a still further advantageous embodiment of the invention, TFCI values are classified into two categories: active and inactive values. Active values are those values which are in use, and inactive values those that are not in use. In such an embodiment, new services can be taken into use by specifying the corresponding TFCI values to be active. If some transport format combinations are removed from use, the corresponding TFCI values are simply specified to be inactive. Such an embodiment has the advantage, that the timing of the changes in the TFCS and TFCI values is not very critical, since other active TFCI values remain unchanged. It is enough from the viewpoint of timing, that any new TFCI values are not used before the receiver has had enough time to receive the message specifying the new values and to change the TFCS and TFCI configuration. In such an embodiment, the message specifying that a TFCI value is now active may for example comprise also the specification of the TFC corresponding to the TFCI. In further embodiments of the invention, the TFC corresponding to a TFCI specified to be active may be previously known by the receiver, or may be deduced from the TFCI by the receiver according to a predefined rule. For example, all possible combinations of transport formats of the bearers can be stored in a table whose index values correspond to the TFCI values, and only those TFCI values are used, which are specified to be active.

B.5 A fifth example

In a further advantageous embodiment, the transport format combinations and the corresponding TFCI values are ordered according to the total bit rate of the TFC or some other desired criteria. In such an embodiment, the allowed transport format combinations are indicated simply by indicating the highest allowed TFCI. In such an embodiment, when a new TFC is allowed, the new TFC is inserted in the corresponding location in the ordered sequence of transport format combinations and given the TFCI value corresponding to that position in the sequence. The TFCI values are updated accordingly, i.e. the higher TFCI values are incremented by one. In a similar way, when a TFC is removed from use, it is removed from the ordered sequence, and the TFCI values are updated accordingly.

Preferably, the TFCI of the TFC with lowest bit rate is 0, the TFCI of the TFC with the next lowest bit rate is 1, and so on. However, this numbering scheme is not the only possible method that can be used in various embodiments according to the

section B.5 of this specification. Preferably, the TFCI values form a sequence of consecutive integer numbers.

The ordering of transport format combinations and the corresponding TFCI values may take into account also other parameters than the total bit rate of a TFC. For example, if more than one transport format combination has the same total bit rate, these combinations can be ordered according to their relative priority.

In this embodiment, a mobile station can request more resources simply by indicating a new desired highest allowed TFCI in the resource request, to which the network can reply by allocating more resources if possible, and returning a possibly new highest allowed TFCI limit.

C. Changing of the set of allowed transport formats

The transport format combination set (TFCS) needs to be known both to transmitter and receiver. Each time new variable rate bearer requires establishment of a connection or an old connection is released the TFCS is changed. Further, it may be desirable to restrict the use of certain combinations for some other reasons. To ensure that the transport format combination sets in the transmitter and in the receiver correspond to each other, the set or any changes to the set may need to be signalled from the transmitter to the receiver. Some ways to signal the TFCS according to various advantageous embodiments of the invention are described in the following.

C.1 Signalling of TFCS by explicit recitation

In an advantageous embodiment of the invention, the TFCS is signalled from a first end of a connection to a second end of the connection by explicitly reciting all allowed combinations. This embodiment is advantageous, if the number of allowed combinations is relatively small compared to the total number of combinations. In this embodiment, the first end sends one or more messages to the second end, which messages specify at least all allowed combinations, and for each combination specify one TFID at least for each bearer having more than one transport format.

In a further advantageous embodiment of the invention, the TFCS is signalled from a first end of a connection to a second end of the connection by explicitly reciting all those combinations, which are not allowed. This embodiment is advantageous, if

the number of non-allowed combinations is smaller than the number of allowed combinations. In this embodiment, the first end sends one or more messages to the second end, which messages specify at least all non-allowed combinations, and for each combination specify one TFID at least for each bearer having more than one transport format.

In a further advantageous embodiment of the invention, the message or messages specifying the allowed or non-allowed combinations, also specify whether the recited combinations are allowed or not. This allows the use of the same message type for specifying allowed and non-allowed combinations.

C.2 Signalling of the TFCS by indicating construction limits

In another advantageous embodiment of the invention, the end of the connection deciding about the allowed combinations informs the other end of the connection only about which limits and other information are to be used in construction of the TFCS. Such a limit may be for example the maximum total bit rate of a single user, and such other information may be for example the priorities of the bearers. Thereafter, the other end constructs the TFCS independently following the specified limits. Since the same limits are used at both ends, the resulting TFCS will be the same. The construction of the TFCS may proceed for example by going through all possible transport format combinations, and checking for each one whether the combination is allowed or not.

C.3 Signalling of the TFCS by indicating specific transport formats

If the restriction of the combinations is to be done in such a way that some transport formats of some bearers are not used in any of the allowed combinations, the TFCS can be specified with bearer specific messages restricting the use of one or more transport formats of a specific bearer.

In a further advantageous embodiment of the invention, the TFCS is specified with bearer specific messages indicating, which transport formats can be used.

C.4 Further methods

The previous methods have given examples of methods, in which the TFCS is constructed from scratch by indicating allowed or non-allowed transport formats or

combinations of transport formats. However, a new TFCS may also be defined by specifying the changes in the allowed transport format combinations and transport formats relative to the previous TFCS. The messages may specify whether the item being specified is to be allowed or restricted. The item being specified in a message may be for example a TFC, a bearer, or a single transport format of a bearer. For example, the new TFCS may be specified by a message, which restricts the use of one or more transport formats of a specific bearer.

After specifying the changes in the allowed combinations, transport formats and/or bearers, the TFCS is preferably reconstructed so that the TFCS contains only allowed combinations, and the TFCI values updated to correspond to the new TFCS.

The previously described ways of specifying the TFCS to a receiver are examples only and do not limit the invention in any way. Many other ways of specifying a set of combinations or for example different combinations of the previously described ways can as well be used in various embodiments of the invention.

D. Time of validity

In the previous examples of specifying the TFCS, the message or messages carrying the specifying information of TFCS may also comprise an indication of the starting time, after which the new TFCS is valid. However, the starting time of validity may also be defined implicitly, e.g. the new TFCS may be valid from the time the specifying message arrives or in the case of more than one message being used to specify the TFCS, from the receiving time of the last of these messages.

E. Examples of admission control methods according to the invention

The cellular telecommunications network can use for example the previously described TFCS construction limits at least partly as the admission condition in an admission control method. For example, the system can determine how many TFCI bits would be required to represent all combinations in the TFCS based on the size of the TFCS and the transport formats of all the bearers. If the amount of TFCI bits is less than equal to a maximum TFCI word length, the network can then refuse the bearer request, or for example in the case of a high priority request, refuse the service from other already established bearers. As another example, the maximum

bit rate limit may be considered. In such an example, the bearer is advantageously admitted, if at least some of its transport formats result in an allowed combination. Consequently, a multi-bit-rate bearer may be only partially admitted, i.e. admitted with a restricted selection of bit rates.

If the requested bearer has higher priority than some other bearers, the cellular network preferably allocates resources for the higher priority bearer first and restricts the bit rates of the other bearers to such values, that the resulting TF combination is an allowed combination. This may result in the adjustment of transport format for a bearer having a lower priority, or even refusing the service for a bearer having a lower priority.

Each bearer requiring establishment of a connection preferably indicates the variability of the user bit rate in a predefined way, e.g. using a predefined signalling procedure. The network then determines transport formats for the requested bearer and updates the TFCS accordingly, if the network can provide service for the bearer or for at least some of its transport formats.

Figure 1 shows the flow diagram of an advantageous embodiment of the invention. Figure 1 illustrates one example of the use of the inventive method in admission control. In step 135, a bearer request is received. As a response to the request, a TFCS is constructed in step 100. The step 100 of construction of a TFCS may also take into account the priority of the requested bearer as described previously. After the TFCS is constructed, it is checked in the following step 140 if the bearer belongs to any allowed combination. If the bearer is not a part of any allowed combination, the bearer is refused at step 150, after which the method is ended without taking the newly constructed TFCS into use. If the bearer is found to be a part of at least one TFC, the bearer is admitted in step 145. At the next step 120, the new TFCS is communicated to the receiver, after which the communicated TFCS is taken into use at step 155, after which the method is ended.

In further advantageous embodiments of the invention, the admission requirement may be different from the example of step 140 of Figure 1. For example, the bearer may be allowed only, if at least one transport format of the bearer is allowed in all combinations. Further, the bearer may also be allowed, if at least one transport format of the bearer is allowed in at least a predefined part of all combinations. In a further advantageous embodiment of the invention, a real time bearer is allowed only, if the highest transport format of the bearer is allowed in at least one TFC.

F. An example of a method

In the following, an example of a method according to an advantageous embodiment of the invention is presented. The method is described with reference to Figure 2, which illustrates as a flow diagram the construction 100 of a transport format combination set and the communication 120 of information to the receiver for construction of the same set at the receiver.

In this example, the step of construction 100 of a TFCS comprises the following steps 102, 104, 106, 107, and 108. All combinations are examined one by one, starting with step 102, in which the next, or at the first time after start of the method, the first combination is taken into consideration. In step 104 it is checked, whether the combination is within the predefined limits, such as within a predefined maximum total bit rate limit. If the combination is within the limits, the combination is added to the TFCS at step 106, and a TFCI is assigned to the combination in step 107. If the combination is not within the limits, the method is continued directly at step 108. In either case, in step 108 it is checked if the combination is the last one to be considered. If the combination is not the last one, it is returned back to step 102. If the combination is the last one, the method is continued at step 120.

In this example, the step of communication 120 of information to the receiver for construction of the set at the receiver comprises the following steps 121, 122, 124, 126, 128, 130, and 136. At step 121, the way of communicating the TFCS to the receiver is chosen. In this example, the steps 122, 124, 126, 128, 130, and 136 represent different ways of communicating the TFCS. At step 122, each allowed transport format combination is communicated to the receiver. At step 124, each non-allowed transport format combination is communicated to the receiver. At step 126, predefined limits for construction of the TFCS are communicated to the receiver. At step 128, information specifying at least one transport format of at least one bearer, which at least one transport format of at least one bearer is not a part of any allowed transport format combination is communicated to the receiver. At step 130, differences between the TFCS being communicated and a previous TFCS are communicated to the receiver.

The steps 122, 124, 126, 128, and 130 may comprise communication of all necessary information at one method step, or communication of only part of all necessary information. Therefore, at step 136 it is checked if the whole TFCS has been specified. If the whole TFCS has not been specified, it is returned back to step

121 for continuing the communication of the TFCS to the receiver. If the whole TFCS has been specified, the method is ended.

In the step 107 of assigning a TFCI to a combination, the assignment may be performed simply by assigning the next free TFCI value for the combination. Any other method or predefined rule of assigning TFCI values can be used, for example any of those described in the previous section B in this specification.

G. An example of a system

Figure 3 illustrates an example of a system according to an advantageous embodiment of the invention. Figure 3 shows mobile communication means 505, base stations 510, a network element 520 and the rest of a cellular telecommunications network 550. The network element 520 may be for example a radio network controller (RNC) of the UMTS cellular telecommunications network. The network element further comprises a processing unit 521 such as a microprocessor and a memory element 522 for storing programs for the processing unit and one or more transport format combination sets.

Further, according to this example the system comprises means 521 for construction of a set of allowed transport format combinations in a network element of the cellular telecommunication system, and means 521, 510 for communication of a constructed set of allowed transport format combinations to a mobile communication means 505.

During construction of a TFCS, the processor unit 521 performs the previously described checking whether a single transport format combination is within the predetermined limits. The processor unit 521 can perform this task by executing a program 523 stored in the memory means 522, which program directs the processor unit to perform the task. If a transport format combination is found to be within the limits, the processor unit 521 adds the combination to the set of allowed transport format combinations 529 stored in the memory means 522. Preferably, the processor unit also assigns a transport format combination identifier (TFCI) to each transport format combination. The transport format combination identifiers can also be stored in the memory means 522.

The processor unit 521 can also take care of the communication of the constructed TFCS to the receiver, in this case the mobile communication means 505 with the

help of other components of the cellular telecommunications network such as base stations 510. The previously described method steps, such as for example determining non-allowed transport format combinations or searching the differences between a transport format combination set and said previously stored second set of allowed transport format combinations can be realized using a program 524 stored in the memory means 522, which program directs the processing unit 521 to perform the method step. Further, the system may store more than one TFCS in the memory means, such as a previously constructed TFCS 529b, which can be used for example in determining the differences between a newly created TFCS and a previously created and communicated TFCS, after which a new TFCS can be communicated to the receiver simply by communicating the differences between the old and new TFCS. The receivers 505 store the communicated TFCS 506 in a memory means in the receiver, whereafter they are able to determine the current transport format combination on the basis of a received TFCI.

Preferably, the system also comprises means for assigning a transport format combination identifier to each transport format combination stored in said memory element. These means may comprise for example the processing unit 521, which can assign TFCI values to transport format combinations for example according to any of the embodiments of the invention described previously.

Preferably, the system also comprises means for sending a transport format combination identifier for identifying the transport formats used in a transmission. These means may comprise for example the processing unit 521, which can add the TFCI of the currently used TFC into the data transmitted to a receiver.

In an advantageous embodiment of the invnetion, also a mobile communication means 505 can comprise the means 521, 522, 523, 524, 525, 529, and 529b, or other means providing similar functionality. Although conventionally it is the network which decides about radio resource usage, the mobile communication means preferably has the capability and functionality needed for construction of a TFCS for example, according to the embodiments of the invention described in section C.2 in this specification, or according to other rules and limits set by the network.

H. A further example of a method

The TFCI values can be used to indicate, which transport formats are used in a transmission. For example, a TFCI value can be transmitted in each transmission

frame to describe the transmission format or transmission formats used in the frame. In another exemplary embodiment, a TFCI value can be transmitted each time, when the transport format combination is changed. Figure 4 illustrates one example of signalling according to an advantageous embodiment of the invention. Figure 4 illustrates events during communication between a transmitting party and a receiving party, such as, respectively, a mobile communication means and a base station of a cellular telecommunications network. First, a TFCI is sent from the transmitter to the receiver in step 610 for indicating, which transport formats are used in the next unit of transmission. In the next step 615, data is transmitted from the transmitter to the receiver, using the transport formats specified by the TFCI value transmitted in the previous step. In various embodiments of the invention, the order of sending of the TFCI value and the data which the TFCI value refers to, does not necessarily need to be that shown in figure 4. For example, in such systems in which data is transmitted in frames, such as in the GSM system, the TFCI value can be sent in the same transmission frame as the data which the TFCI value refers to, in which case the exact order of the data and the TFCI value is not important and can be set according to the requirements of the particular application.

I. Further considerations

In some advantageous embodiments of the invention, the TFCS used for transmission by a party and the TFCS used for reception by the same party do not need to be the same. This is advantageous for example when the amount of radio resources reserved for uplink communication is different from the amount of radio resources reserved for downlink communication. Such a situation is possible for example in the HSCSD (High Speed Circuit Switched Data) mode in GSM networks. Such an arrangement is advantageous for example in data terminal use when browsing information databases or the Internet, where only short requests are transmitted from the mobile communication means, but large amounts of information are returned from the data networks. In such embodiments of the invention, a communicating party preferably has at least two transport format control sets, one of which is used for reception and one for transmission.

In a further advantageous embodiment of the invention, multiple transport format combination sets are used to further reduce transport format signalling between a receiver and a transmitter. In such an embodiment, a plurality of transport format combination sets is constructed and communicated to the receiver, after which the current TFCS to be used is selected simply by sending a TFCS identifier to the

receiver. Such an embodiment reduces signalling over the air interface in such a case, in which some transport format combination sets are used relatively often. The plurality of transport format combination sets preferably comprises such sets, which are constructed as a result of most common bearer sets and limits, such as the maximum total bit rate for a user.

In such a case, when the allowed transport format combinations are limited by certain limits, which allow straightforward determination of allowability for a TFC, and the TFCI values are constructed according to a certain rule, explicit construction of a TFCS is not necessary for both parties of the connection. For example, the transmitting party may simply check if a new TFC is allowable according to the limits, and if the TFC is allowed, use the TFC in transmission, generating the TFCI on the fly. The receiving party can then use the TFCI as an index to a table containing the TFCS or, if the transport formats can be deduced from the specified TFCI using an inverse of the rule used for generating the TFCI, determine the used transport formats directly from the TFCI. Therefore, the existence of an explicit TFCS is not necessary in all embodiments of the invention.

In some circumstances, as a result of some kind of an error situation, it may be possible that the receiver and the transmitter have assigned the same TFCI to different transport format combinations. If such an error situation occurs, data transmission does not succeed, since the receiver attempts to interpret the received data stream in a different way than the data stream was constructed. Recovery from such an error situation can proceed in many ways in various embodiments of the invention. For example, according to one advantageous embodiment of the invention, the party which detects the error, informs the other end about the error, whereafter both ends reconstruct their TFCI values for example according to some of the previously described examples, such as those described in sections B.2 or B.3, after which the meaning TFCI values should be the same at both ends. According to another embodiment, the party detecting the error communicates its TFCS and TFCI values to the other party, which takes the communicated values into use. According to a third embodiment, if a mobile communication means detects the error, it requests the network to send the TFCS and the TFCI values used by the network and if the network detects the error, it sends the TFCS and the TFCI values used by the network preferably without waiting for the mobile communication means to request for the information.

In various examples of embodiments described in this specification, the transport formats have been classified as allowed or non-allowed. However, in some embodiments of the invention, a bearer having no allowed transport formats in a TFC can be assigned a null transport format, i.e. a transport format having a zero bit rate. Therefore, a null transport format corresponds to a non-allowed transport format. Therefore, in this specification and the accompanied claims the term allowed transport format refers to a non-null transport format, i.e. a transport format with an essentially nonzero bit rate, which can be used in the TFCS.

The present invention reduces the use of radio resources, while retaining flexibility in the use of different transport formats. The present invention allows restriction of the use of radio resources without making it impossible for some bearers to use high data rates. The flexibility of the inventive method allows such overall control of radio resources, while providing a way to specifically restrict certain specific services as well.

In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the invention. While a preferred embodiment of the invention has been described in detail, it should be apparent that many modifications and variations thereto are possible, all of which fall within the true spirit and scope of the invention.

Claims

1. Method for controlling bearers in a cellular telecommunication system, **characterized** in that the method comprises steps, in which
- a set of allowed transport format combinations is constructed, and
- information for construction of said set at a receiver is communicated to the receiver.

2. A method according to claim 1, **characterized** in that said set of allowed transport format combinations is constructed by checking for each transport format combination, whether the combination is within predefined limits.

3. A method according to claim 1, **characterized** in that a transport format combination identifier is assigned to each combination of said set of allowed transport format combinations.

4. A method according to claim 3, **characterized** in that said assigning of transport format combination identifiers is performed according to a predefined rule.

5. A method according to claim 4, **characterized** in that said set of allowed transport format combinations is ordered according to at least the total bit rate of the transport format combinations, and said transport format combination identifiers are assigned so that the identifiers form a sequence of consecutive integer numbers.

6. A method according to claim 1, **characterized** in that said step of communicating information for construction of said set comprises the step of communicating of each allowed transport format combination to said receiver.

7. A method according to claim 1, **characterized** in that said step of communicating information for construction of said set comprises the step of communicating of each non-allowed transport format combination to said receiver.

8. A method according to claim 1, **characterized** in that
said step of communicating information for construction of said set comprises the step of communicating at least one limit for construction of said set to said receiver.

9. A method according to claim 1, **characterized** in that
said step of communicating information for construction of said set comprises the step of communicating information specifying at least one transport format of at least one bearer, which at least one transport format of at least one bearer is not a part of any allowed transport format combination.

10. A method according to claim 1, **characterized** in that
said step of communicating information for construction of said set comprises the step of specifying the differences between said set to a previous set of transport format combinations.

11. A method according to claim 1, **characterized** in that
a bearer request is admitted, if at least one of the transport formats of the requested bearer is a part of an allowed transport format combination.

12. A method according to claim 3, **characterized** in that
transport formats used in a transmission between a receiver and a transmitter are identified by sending a transport format combination identifier from the transmitter to the receiver.

13. A method according to claim 3, **characterized** in that
if either party of the connection detects that the transport format combination identifiers of the receiver do not correspond to the transport format combination identifiers of the transmitter, the transport format combination identifiers are reconstructed at at least one party of the connection.

14. A method according to claim 13, **characterized** in that
said step of reconstruction comprises the reconstruction of transport format combination identifiers at both parties of the connection according to a predefined rule.

15. A method according to claim 13, **characterized** in that
in said step of reconstruction, one of the parties of the connection communicates its

transport format combination identifiers to the other party, which takes the communicated identifiers into use.

16. System for controlling bearers in a cellular telecommunication system **characterized** in that the system comprises
- means for construction of a set of allowed transport format combinations in a network element of the cellular telecommunication system, and
- means for communication of a constructed set of allowed transport format combinations to a mobile communication means.

17. A system according to claim 16, **characterized** in that
said means for construction of a set of allowed transport format combinations comprises
- a memory element for storing a set of allowed transport format combinations,
- means for checking whether a single transport format combination is within predetermined limits, and
- means for adding a single transport format combination to said set of allowed transport format combinations stored in said memory element.

18. A system according to claim 16, **characterized** in that
said means for communication of a constructed set of allowed transport format combinations to a mobile communication means comprises
means for determining non-allowed transport format combinations.

19. A system according to claim 16, **characterized** in that the system further comprises means for storing a previously constructed second set of allowed transport format combinations,
and said means for communication of a constructed set of allowed transport format combinations to a mobile communication means comprises
means for searching the differences between a transport format combination set and said previously stored second set of allowed transport format combinations.

20. A system according to claim 16, **characterized** in that the system further comprises means for assigning a transport format combination identifier to each transport format combination stored in said memory element.

21. A system according to claim 16, **characterized** in that the system further comprises means for sending a transport format combination identifier for identifying the transport formats used in a transmission.

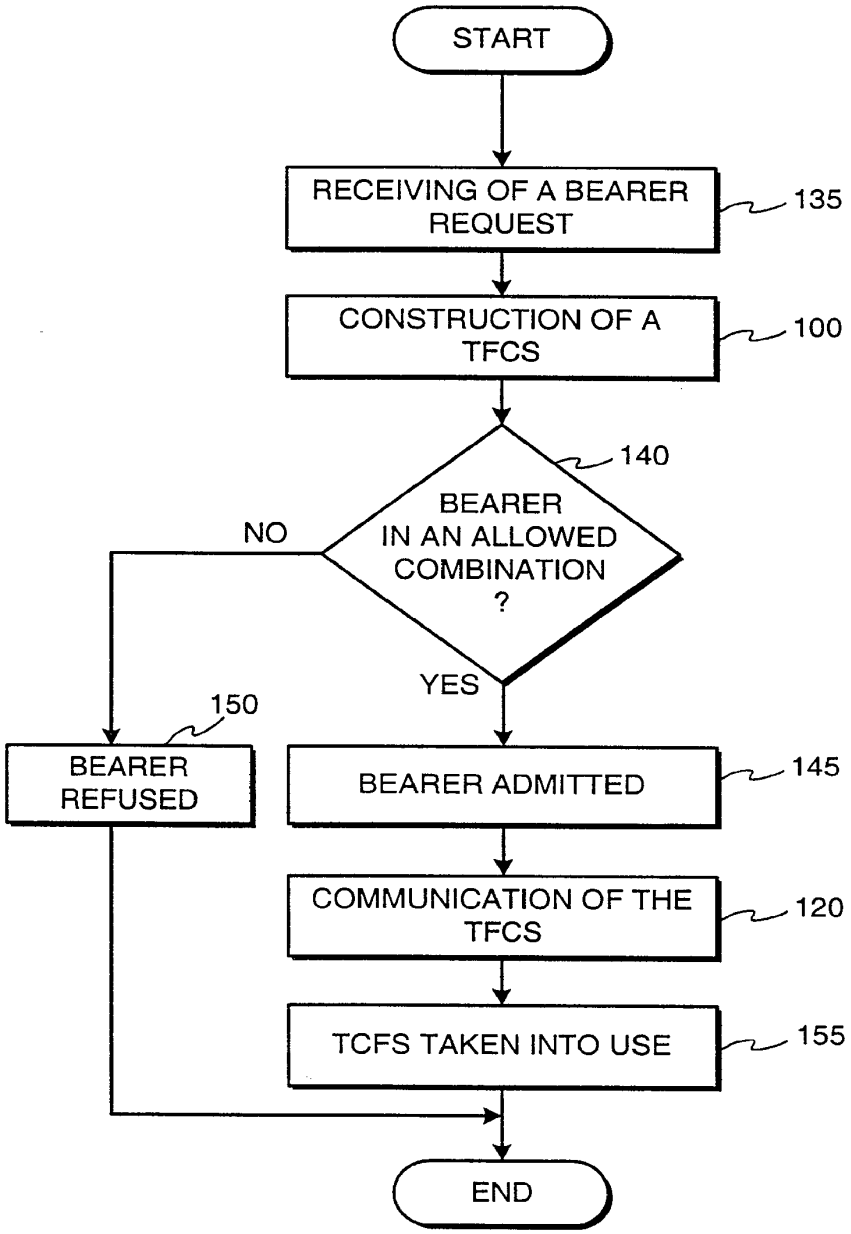

START
RECEIVING OF A BEARER REQUEST
135
CONSTRUCTION OF A TFCS
100
140
BEARER IN AN ALLOWED COMBINATION ?
NO
YES
150
BEARER REFUSED
BEARER ADMITTED
145
COMMUNICATION OF THE TFCS
120
TCFS TAKEN INTO USE
155
END

Fig. 1

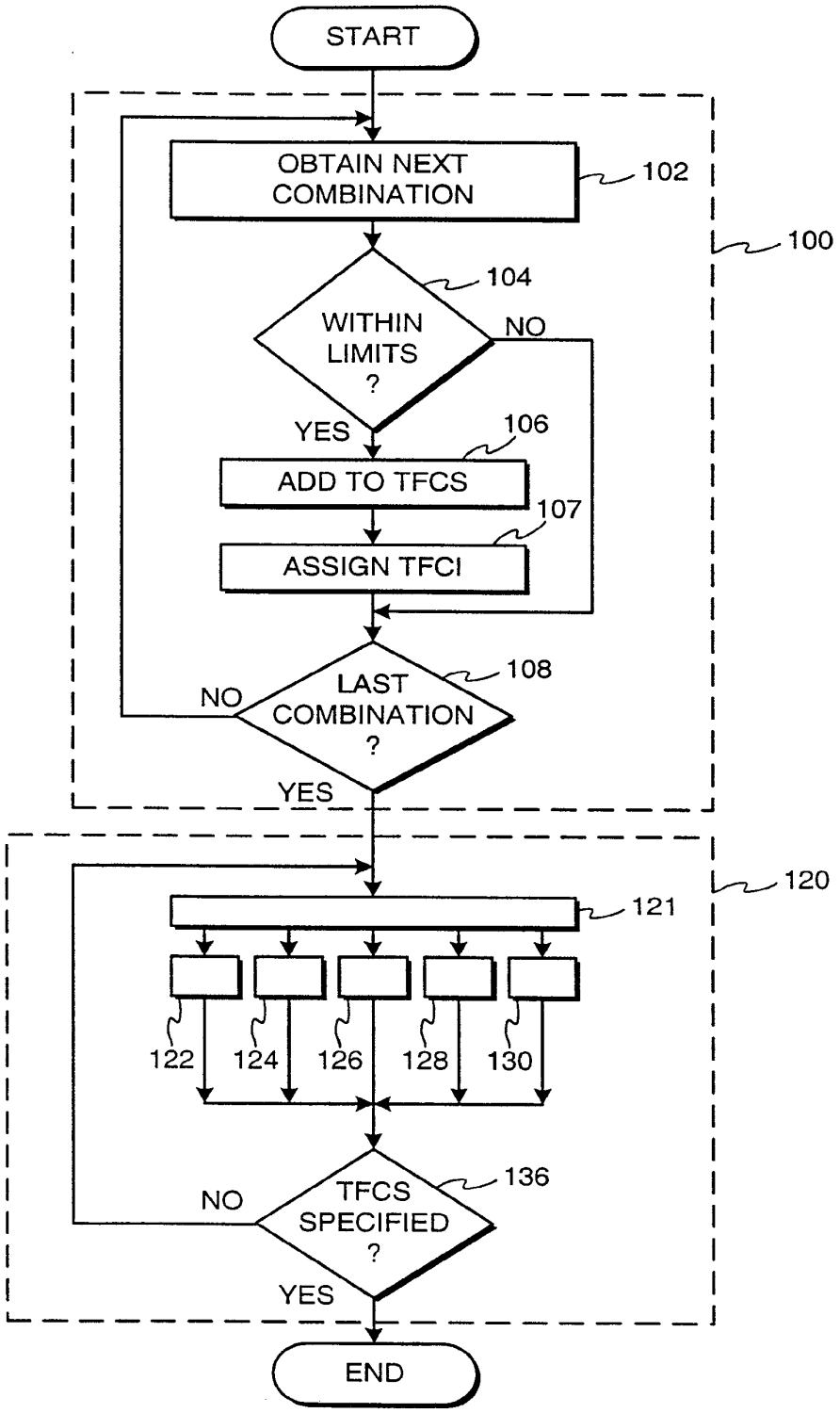

START
OBTAIN NEXT COMBINATION
102
100
104
WITHIN LIMITS ?
NO
YES
106
ADD TO TFCS
107
ASSIGN TFCI
108
LAST COMBINATION ?
NO
YES
120
121
122
124
126
128
130
136
TFCS SPECIFIED ?
NO
YES
END

Fig. 2

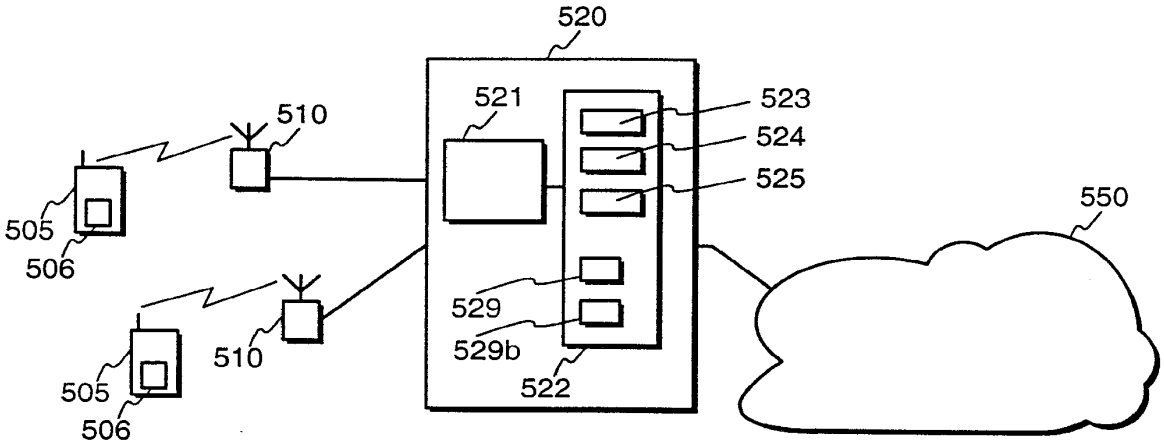

520
521
523
524
525
510
505
506
550
529
529b
522
510
505
506

Fig. 3

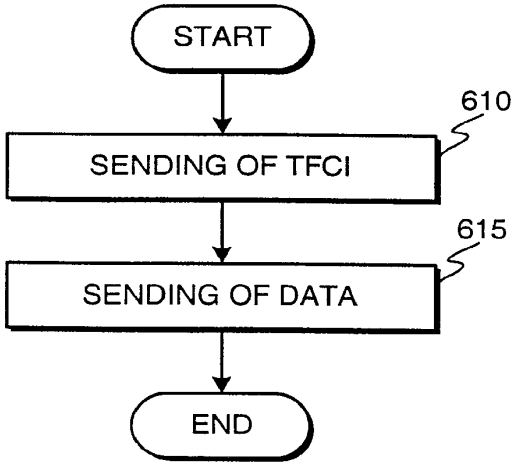

START
610
SENDING OF TFCI
615
SENDING OF DATA
END

Fig. 4

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04Q 7/38

A1

(11) International Publication Number: **WO 00/35228**

(43) International Publication Date: 15 June 2000 (15.06.00)

(21) International Application Number: PCT/EP98/08065

(22) International Filing Date: 10 December 1998 (10.12.98)

(71) Applicant *(for all designated States except US)*: NOKIA NETWORKS OY [FI/FI]; P.O. Box 300, FIN-00045 Nokia Group (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: VIALEN, Jukka [FI/FI]; Tyrskykuja 3 b 13, FIN-02320 Espoo (FI). AHMAVAARA, Kalle [FI/FI]; Nokia Telecommunications OY, P.O. Box 300, FIN-00045 Nokia Group (FI).

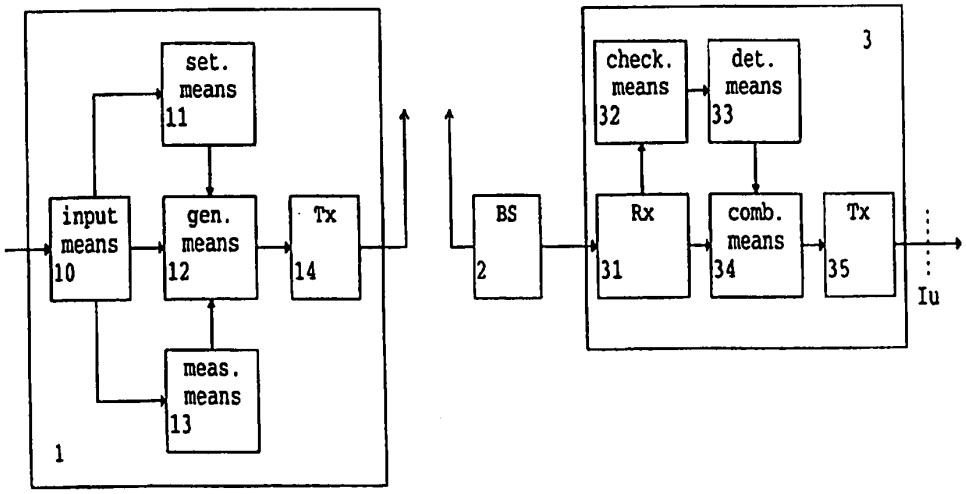
(74) Agent: PELLMANN, Hans-Bernd; Tiedtke-Bühling-Kinne, Bavariaring 4, D-80336 München (DE).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.

(54) Title: METHOD AND SYSTEM FOR TRANSMITTING A POSITION INFORMATION



(57) Abstract

A method and system for transmitting a position information from a mobile terminal of a mobile communication network via a network element (3) to a network node, wherein a control information indicating the requirement of a position information of the mobile terminal (1) at the network node is set in the radio interface message. This control information is checked at the network element as to whether a position information has to be forwarded or not. The position information is determined at the network element (3) and may be combined with a higher layer information so as to generate a complete higher layer information to be forwarded to the network node. Thereby, a position information can be supplied to the network node without substantially increasing overhead and processing power required for the radio interface message.

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Method and system for transmitting a position information

FIELD OF THE INVENTION

The present invention relates to a method and system for transmitting a position information from a mobile terminal of a mobile communication network such as a UTRAN (UMTS Radio Access Network) via a network element to a network node such as an SGSN (Serving GPRS Support Node) of the GPRS (General Packet Radio Service) or an MSC (Mobile Switching Center) of the GSM (Global System for Mobile Communications) or their equivalents in the UMTS (Universal Mobile Telecommunications System).

BACKGROUND OF THE INVENTION

Third generation mobile telecommunications systems aim at providing end-users, apart from terminal and personal mobility, with enhanced services. Compared to second generation systems, enhancement that will cover features all the way between the end-user and core network elements are required, i.e. from mobile terminals to radio access and fixed networks.

Fig. 1 shows a mobile communication system such as a UMTS system, wherein a UTRAN system is connected to a GPRS-based core network and to a GSM-based core network. According to Fig. 1, a mobile station (MS) 1 is radio-connected to at least one base station (BS) 2 which is connected to a Radio Network Controller (RNC) 3 of the UTRAN. In Code Division Multiple Access (CDMA) based systems, the MS 1 can be

connected to several BS 2 simultaneously due to macrodiversity.

The RNC 3 is connected to a mobile switching center (MSC) 5 of the UMTS or GSM core network which provides access to a circuit-switched network such as a Public Switched Telephone Network (PSTN) 8 or to a packet-switched network such as the Internet 9.

Additionally, the RNC 3 is connected to an SGSN 6 of the UMTS or GPRS core network. The SGSN 6 is connected to a Gateway GPRS Support Node (GGSN) which provides access to the Internet 9.

Thus, the RNC 3 is connected to two non-coordinated core network nodes which may both establish an active connection with the MS 1.

In the GSM system, a cell information field in the A-interface between a Mobile Switching Center (MSC) and a Base Station Controller (BSC) is bound to certain radio interface messages, called initial layer 3 messages. However, these radio interface messages do not comprise any position information relating to the position of the MS 1.

In the UMTS, the MS 1 may be connected via the RNC 3 of the UTRAN 4 to an independent core network node (CN node) such as the MSC 5 or the SGSN 6. In this case, new services of the CN node may require a position information of the MS 1 for an individual setup of the service.

Moreover, it is possible to use one RRC (Radio Resource Control) connection to two independent higher layer connections (connections at Mobility Management (MM) level or connections at Connection Management (CM) level) of

corresponding CN nodes. However, if another service is already provided to the MS 1, the UTRAN 4 does not automatically insert a position information when forwarding the service setup to the CN node, when existing GSM methods are used.

Thus, a mechanism is required to indicate to the RNC 3 that a higher layer protocol data unit (PDU) received from the MS 1 is an initial layer 3 message that should be sent as a complete layer 3 message including an additionally required MS position information to the CN node even if an active connection to the other CN node exists. In addition, the same mechanism can be used for non-initial layer 3 messages if the MS position information needs to be included therein, e.g. in case of a setup of an additional service.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a method and system for transmitting a position information from a mobile terminal of a mobile communication network via a network element to a network node requiring the position information of the mobile terminal.

This object is achieved by a method for transmitting a position information of a mobile terminal of a mobile communication network to a network node using an intermediate network element, comprising the steps of:
setting a control information in a radio interface message, which indicates the requirement of the position information of the mobile station at the network node,
transmitting the radio interface message to the network element,
checking the control information at the network element, and

determining and forwarding the position information to the network node in response to the result of the checking step.

Furthermore the above object is achieved by a system for transmitting a position information of a mobile terminal of a mobile communication network to a network node using an intermediate network element,
wherein said mobile terminal comprises:
setting means for setting a control information in a radio interface message, which indicates the requirement of a position information of the mobile station at the network node, and
transmitting means for transmitting the radio interface message to the network element, and
wherein the network element comprises:
checking means for checking the control information; and
determining means for determining the position information in response to the checking result of the checking means.

Accordingly, since a control information is added to the radio interface message, this parameter can be used at the RNC 3 to determine whether a position information should be forwarded to the core network through the corresponding Iu interface.

Thereby, the protocol amendments and additionally required information at the RRC level can be kept short so as to minimize message overhead transmitted via the radio interface.

An additional advantage arises when the position of the MS 1 can be detected more accurately than the cell level at the RNC 3 and new services need such an accurate position information. Then, only a short control information has to be transmitted via the radio interface to the RMC 3 in order to

indicate that the position information must be added before forwarding the message to the CN.

A higher layer information may be incorporated into the radio interface message at the mobile terminal, wherein the position information is combined with the higher layer information at the network element in response to the checking result. Thereby, a complete higher layer message including an additionally required MS position information can be forwarded to the network node.

Preferably the control information is provided in a control field used for signaling the requirement of the position information. This control field may have a length of one bit. Accordingly, the required additional overhead of a radio interface message can be restricted to only one bit.

Alternatively, the length of this control field may be more than one bit, if e.g. several accuracy levels of the MS position are possible.

Furthermore, a position measurement information can be incorporated at the MS1 into the radio interface message before transmission, wherein the position information may be determined at the RNC 3 on the basis of the position measurement information.

The position measurement information may also be sent from the MS to the network element, i.e. UTRAN, if no higher layer message is included. This position measurement reporting can be started either by an explicit request from the network element or it can be part of a default measurement started without explicit request from the network element.

In case no position information is required, the higher layer information can be transmitted in a transparent mode to the network node. Thus, the determination of the MS position at the RNC 3 is restricted to those cases, where it is actually required. Thereby, processing capacity is saved and unnecessary delay can be prevented.

Preferably, the network element is a radio network controller of the mobile communication network such as a radio access network of the UMTS, and the network node is a mobile switching center or a serving GPRS support node.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the present invention will be described in greater detail on the basis of a preferred embodiment with reference to the accompanying drawings, in which:

Fig. 1 shows a principle block diagram of a mobile communication network connected to two independent core networks,

Fig. 2 shows an RRC Direct Transfer message according to the preferred embodiment of the present invention,

Fig. 3 shows a block diagram of a radio access network according to the preferred embodiment of the present invention, and

Fig. 4 shows a flow diagram of a transmission control procedure according to the preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the following, the preferred embodiment of the method and system according to the present invention will be described on the basis of a mobile communication system such as the UMTS system shown in Fig. 1.

In case a connection is established between the MS 1 and one of the CN nodes MSC 5 or SGSN 6, an RRC connection is used to send a corresponding higher layer PDU via the UTRAN 4. Such a higher layer message could be an MM (Mobility Management) layer message or a CM (Connection Management) layer message and is carried over the radio interface piggypacked into a radio interface message, i.e. an RRC message such as RRC Direct Transfer. Since the MS 1 knows based on the MM layer or the RRC layer, whether the present higher layer message is to be carried to the CN with a position information or not, a position information control field may be provided in the RRC message.

Fig. 2 shows an RRC Direct Transfer message according to the preferred embodiment, which is transmitted by the MS 1 to the RNC 3. The position information control field may consist of one bit which notifies whether a position information is required at the CN, or not. Alternatively, the position information control field may consist of more than one bit, if e.g. several accuracy levels are provided for the position information. In case the MS 1 derives from the MM or RRC layer information that the CN supplying the requested service requires a position information, it sets the position information control bit in the RRC Direct Transfer message to "0". If no position information is required, the position information control bit remains "1". Of course, an opposite setting control of the position information control bit is possible as well.

In addition thereto, a position measurement report can be added to the RRC Direct Transfer message so as to be used by the RNC 3 to calculate the MS position. Alternatively, the position measurement report can be a separate procedure between the MS 1 and the UTRAN 4, independent from the transmitting of the RRC Direct Transfer message.

Other contents of the RRC Direct Transfer message are a message type information used to indicate the type of the RRC message, a CN identifier used as a routing information for routing the higher layer information from the MS 1 to the correct Iu interface connection, and the higher layer information, i.e. higher layer PDU, to be transmitted to the CN.

Thus, upon receiving the above described RRC Direct Transfer message, the RNC 3 can calculate the MS position and generate a corresponding Iu interface message as a complete layer 3 information.

In case the one bit position information control field is set to "1", the RNC 3 detects that no position information is needed at the CN and transmits the higher layer information in a transparent manner over the Iu interface. In this case, a Direct Transfer Application Part (DTAP) of the layer 3 protocol at the RNC 3 is used.

Fig. 3 shows a block diagram of a radio access network such as the UTRAN 4 according to the preferred embodiment of the present invention.

According to Fig. 3, the MS 1 comprises an input means 10 for inputting a higher layer message to be transmitted via the radio interface of the UTRAN 4 and the Iu interface to an

independent CN node such as the MSC 5. Such a higher layer message could be a setup request for a service provided by the MSC 5.

Furthermore, a setting means 11 is provided to which an information derived from the higher layer message is supplied from the input means 10 as to whether the connected CN node requires a position information, or not. In response to this information, the setting means 11 supplies an instruction to a message generating means 12 so as to correspondingly set the position information control field of the RRC message generated by the message generating means 12 on the basis of the higher layer message or PDU supplied from the input means 10.

Optionally, a measurement means 13 may be provided for supplying a position measurement report to a generating means 12, wherein the position measurement report is incorporated at a corresponding field in the RRC message, if the position information is required.

Finally a transmitter Tx 14 is connected to the message generating means 12 so as to transmit the generated RRC message via the radio interface.

The transmitted RRC message is received by the BS 2 of the UTRAN 4 and supplied to the RNC 3, as previously described in connection with Fig. 1.

In the following, the operation of the RNC 3 shown in Fig. 3 is described with reference to the flow diagram shown in Fig. 4, wherein an RRC Direct Transfer message including a higher layer PDU is transmitted to the RNC 3.

The RRC Direct Transfer message including the higher layer PDU for the CN node is received by a receiver Rx 31 of the RNC 3 (step S101). Thereafter, the position information control field of the RRC message is checked by a checking means 32 connected to the Rx 31 (S102). Then, the received RRC message is supplied to a combining means 34. If the checking performed in the checking means 32 reveals in step S103 that no position information is required, the higher layer message (higher layer PDU) is supplied to a transmitter Tx 35 and sent to the desired CN node via the Iu interface in a transparent manner using the DTAP protocol (S104).

Otherwise, if the checking means 32 determines that a position information is required at the CN node, a corresponding information is supplied by the checking means 32 to a determining means 33 which is arranged to determine the position information.

Subsequently, the determining means 33 calculates the position of the transmitting MS 1 using the position measurement report included in the RRC message (step S105). Alternatively, the position information may be calculated or determined based on a corresponding position information of the MS 1 provided in the RNC 3.

Thereafter, the determining means 33 supplies the determined position information to the combining means 34, where the position information is combined with or added to the higher layer message so as to generate a Iu interface message (step S106). Thus, the Iu interface message corresponds to a complete layer 3 information.

Finally, the generated Iu interface message is sent by the Tx 35 to the desired CN node (S107).

Accordingly, a position information can be transmitted via the UTRAN 4 of the UMTS without requiring major changes of the radio interface messages, i.e. the RRC messages. Essentially, only one bit has to be added as a new parameter to each RRC message carrying a higher layer PDU on the radio interface. Alternatively, the position information control field may consist of more than one bit, if e.g. several accuracy levels are provided for the position information.

It is to be pointed out, that the transmission method and system described in the preferred embodiment is not restricted to the UTRAN of a UMTS, but can be used in connection with any mobile communication network where a higher layer message is to be carried on a radio interface message which does not include any position information. The above description of the preferred embodiment and the accompanying drawings are only intended to illustrate the present invention. The preferred embodiment of the invention may vary within the scope of the attached claims.

In summary, a method and system for transmitting a position information from a mobile terminal of a mobile communication network via a network element to a network node is described, wherein a control information indicating the requirement of a position information of the mobile terminal at the network node is set in the radio interface message. This control information is checked at the network element as to whether a position information has to be forwarded or not. The position information is determined at the network element and may be combined with a higher layer information so as to generate a complete higher layer information to be forwarded to the network node. Thereby, the position information can be supplied to the network node without substantially increasing overhead and processing power required for the radio interface message.

Claims

1. A method for transmitting a position information of a mobile terminal **(1)** of a mobile communication network to a network node **(5, 6)** using an intermediate network element **(3)**, comprising the steps of:
a) setting a control information in a radio interface message, which indicates the requirement of said position information of said mobile terminal at said network node;
b) transmitting said radio interface message to said network element;
c) checking said control information at said network element; and
d) determining and forwarding said position information to said network node in response to the result of said checking step.

2. A method according to claim 1, further comprising the step of incorporating a higher layer information into said radio interface massage, and forwarding said position information together with said higher layer information to said network node.

3. A method according to claim 1 or 2, wherein said control information is provided in a control field used for signaling the requirement of said position information.

4. A method according to claim 3, wherein said control field has a length of one bit.

5. A method according to claim 3, wherein said control field has a length of more than one bit, each value of said control field referring to an accuracy level of said position information.

6. A method according to any one of claims 1 to 5, further comprising the steps of incorporating a position measurement information into said radio interface message before said transmission step, and determining said position information on the basis of said position measurement information.

7. A method according to any one of claims 2 to 6, wherein said higher layer information is transmitted in a transparent mode to said network node, when said checking step reveals that no position information is required.

8. A method according to any one of the preceding claims, wherein said network element is a radio network controller **(3)** of said mobile communication network, and wherein said setting step is performed in said mobile terminal.

9. A method according to any one of the preceding claims, wherein said mobile communication network is a radio access network of the UMTS, and wherein said network node is a mobile switching center **(5)** or a serving GPRS support node **(6)**.

10. A system for transmitting a position information of a mobile terminal **(1)** of a mobile communication network to a network node **(5, 6)** using an intermediate network element **(3)**,

a) wherein said mobile terminal **(1)** comprises:

setting means **(11)** for setting a control information in a radio interface message, which indicates the requirement of said position information of said mobile terminal **(1)** at said network node **(5, 6)**; and

transmitting means **(14)** for transmitting said radio interface message to said network element **(3)**; and

b) wherein said network element **(3)** comprises:
checking means **(32)** for checking said control information;
determining means **(33)** for determining said position information in response to the checking result of said checking means **(32)**.

11. A system according to claim 10, wherein said mobile terminal **(1)** comprises a message generating means **(12)** for incorporating a higher layer information into said radio interface message; and wherein said network element **(3)** comprises combining means **(34)** for combining said position information with said higher layer information in response to said checking result.

12. A system according to claim 11, wherein said message generating means **(12)** is arranged to incorporate a position measurement information into said radio interface message, and wherein said determining means **(33)** is arranged to determine said position information on the basis of said position measurement information.

13. A system according to any one of claims 10 or 12, wherein said network element is a radio network controller **(3)** of said mobile communication network **(4)**.

14. A system according to any one of claims 10 to 13, wherein said mobile communication network is a radio access network **(4)** of the UMTS, and wherein said network node is a mobile switching center **(5)** or a serving GPRS support node **(6)**.

15. A mobile terminal for transmitting a radio interface message via a network element **(3)** to a network node **(5, 6)**, comprising:

a) setting means **(11)** for setting a control information in said radio interface message, which indicates the requirement of a position information of said mobile terminal **(1)** at said network node **(5, 6)**; and

b) a transmitting means **(14)** for transmitting said radio interface message to said network element **(3)**.

16. A mobile terminal according to claim 15, further comprising message generating means **(12)** for incorporating a higher layer information into said radio interface message.

17. A mobile terminal according to claim 16, wherein said message generating means **(12)** is arranged to incorporate a position measurement information into said radio interface message.

18. A network element for forwarding a position information of a mobile terminal **(1)** to a network node **(5, 6)**, comprising:

a) checking means **(32)** for checking a control information provided in a radio interface message received from said mobile terminal **(1)**; and

b) determining means **(33)** for determining said position information in response to the checking result of said checking means **(32)**.

19. A network element according to claim 18, further comprising combining means **(34)** for combining said position information of said mobile terminal **(1)** with a higher layer information, to be forwarded to said network node **(5, 6)**, in response to said checking result.

20. A network element according to claim 18 or 19, wherein said determining means **(33)** determines said position

information on the basis of a position measurement information included in said received radio interface message.

21. A network element according to any one of claims 18 to 20, wherein said network element is a radio network controller **(3)** of a radio access network of the UMTS, and wherein said network node is a mobile switching center **(5)** or a serving GPRS support node **(6)**.

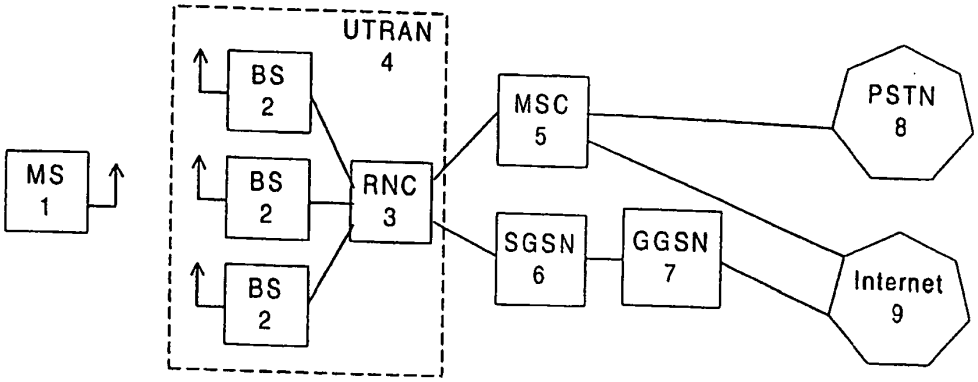

UTRAN
4
BS
2
BS
2
BS
2
MS
1
RNC
3
MSC
5
SGSN
6
GGSN
7
PSTN
8
Internet
9

Fig. 1

RRC Direct Transfer message

Message type	CN id	Pos. info control field	Position measurement report	PDU

Fig. 2

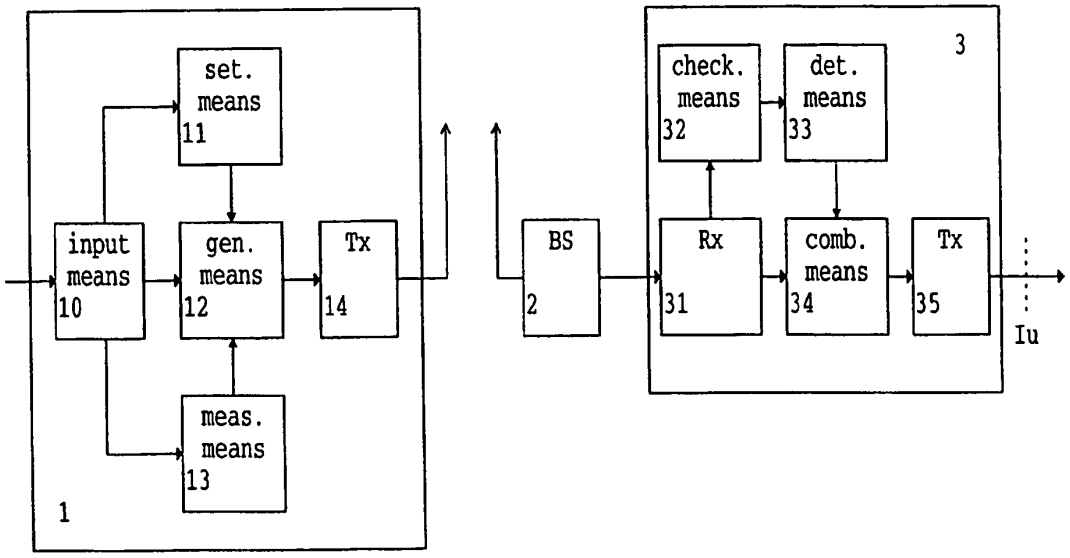


Fig. 3

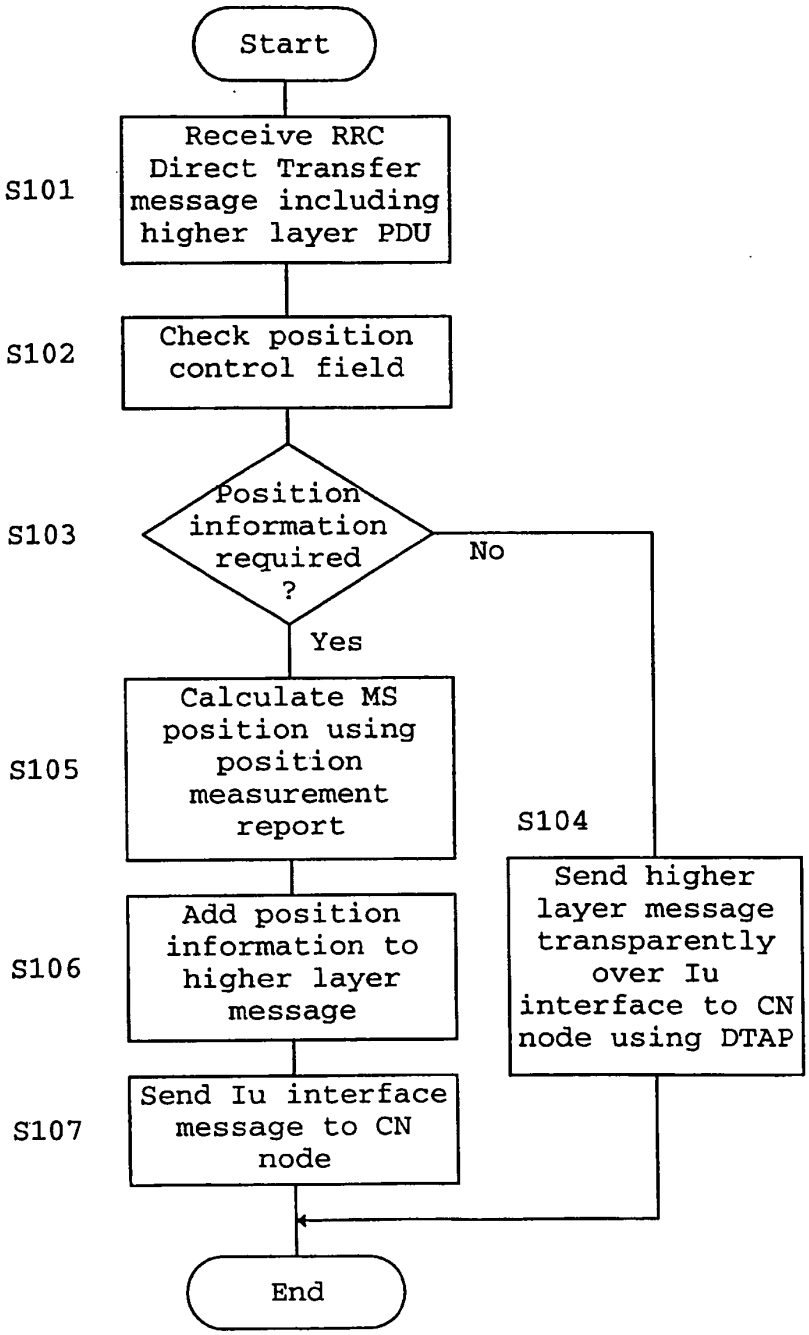

Start
Receive RRC Direct Transfer message including higher layer PDU
S101
Check position control field
S102
Position information required ?
S103
No
Yes
Calculate MS position using position measurement report
S105
S104
Send higher layer message transparently over Iu interface to CN node using DTAP
Add position information to higher layer message
S106
Send Iu interface message to CN node
S107
End

Fig. 4

INTERNATIONAL SEARCH REPORT

Int ional Application No
PCT/EP 98/08065

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38

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

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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 data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 754 955 A (EKBATANI MEHRDAD) 19 May 1998 (1998-05-19) column 6, line 42 - line 54; claim 4	1,10,15, 18
A	EP 0 805 609 A (HEWLETT PACKARD CO) 5 November 1997 (1997-11-05) column 13, line 19 - column 15, line 4	1,10,15, 18
A	EP 0 546 758 A (MOTOROLA INC) 16 June 1993 (1993-06-16) column 4, line 16 - line 31 column 7, line 33 - line 44 column 9, line 6 - line 24; figure 7	1,10,15, 18

☐ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
10 August 1999	18/08/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Schut, G

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Int ional Application No
PCT/EP 98/08065

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		CN 1202297 A	16-12-1998
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		WO 9711569 A	27-03-1997
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		US 5365451 A	15-11-1994

Form PCT/ISA/210 (patent family annex) (July 1992)

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 :		(11) International Publication Number:	WO 00/38350
H04B 7/005	A2	(43) International Publication Date:	29 June 2000 (29.06.00)

(21) International Application Number: PCT/FI99/01064

(22) International Filing Date: 21 December 1999 (21.12.99)

(30) Priority Data:
982781 22 December 1998 (22.12.98) FI

(71) Applicant *(for all designated States except US)*: NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

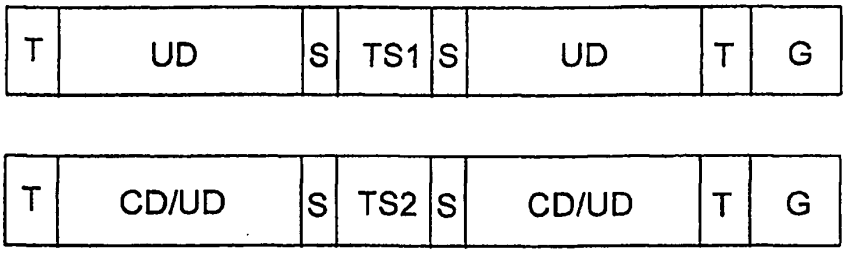
(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: RINNE, Mikko [FI/FI]; Tallbergin puistotie 1 C 25, FIN-00200 Helsinki (FI). AHMAVAARA, Kalle [FI/FI]; Hakaniemenranta 18 D 62, FIN-00530 Helsinki (FI).

(74) Agent: KOLSTER OY AB; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).

(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (Utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: SIGNALLING METHOD AND TELECOMMUNICATION SYSTEM



(57) Abstract

A signaling method in a wireless digital telecommunication system between a base station and a terminal, where the signals between the base station and the terminal are generated from bursts comprising symbols, the bursts comprising a known training sequence. The symbols are used for generating a second training sequence of the same length as the known training sequence and a burst comprising said training sequence to be used for transmitting signalling messages. The number of training sequences used can be restricted to two, whereby conventional user data is sent in the burst comprising the known training sequence and information deviating from the conventional user data is sent by the burst comprising the second training sequence, and the stealing symbols in the burst can be used for specifying a signalling message to be transmitted.

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SIGNALLING METHOD AND TELECOMMUNICATION SYSTEM

The invention relates to a signalling method in a wireless digital telecommunication system between a base station and a terminal, where the signals between the base station and the terminal are generated from bursts comprising symbols, the bursts comprising a known training sequence.

The invention further relates to a wireless digital telecommunication system for signalling between a base station and a terminal, where the signals to be transmitted over a radio connection between the base station and the terminal comprise bursts generated from symbols, the bursts comprising a known training sequence, and the system comprising at least one transmitter and at least one receiver, whereof the transmitter comprises means for generating said training sequence and the receiver comprises means for identifying said training sequence.

In digital radio systems, call-related signalling between a base station and a terminal occurs simultaneously with a call to be transferred on a traffic channel. The GSM system, for example, employs two signalling channels for conducting call-related signalling, a SACCH (Slow Associated Control Channel) and a FACCH (Fast Associated Control Channel). The SACCH is a separate low-rate signalling channel associated with each traffic channel. Due to its low rate the channel can be used for non-urgent signalling only. The FACCH is fast signalling within the traffic channel, and can be used for time-critical signalling. However, a part of the traffic channel capacity is then lost.

In digital radio systems, such as the GSM system, data transmission occurs in bursts, and a specific burst structure is determined for each purpose, like data and signalling transmission, synchronization or equalization. A normal burst used for data and signalling transmission comprises in the middle a training sequence including a set of predetermined symbols that the receiver identifies. When comparing the received training sequence with a known training sequence the receiver may create information on the distortion caused by an un-ideal radio path to the received signal. On the basis of this information the receiver can demodulate the received signal more efficiently. The applicant's previous patent application PCT/FI97/00465 describes a signalling method, in which a training sequence is used for signalling, that speeds up the signalling and leaves the entire traffic channel to be used by the payload.

The problem with the above system is the number of different training sequences required for transmitting versatile signals. One training sequence can describe one signalling message only, and if, for example, power control signalling including eight steps is to be performed, eight different training sequences are required. If the aim is to perform several signalling events with the above method, the number of training sequences easily increases significantly. This increases the receiver load and complicates the implementation of the receiver, since the received training sequence must be separately compared with each known training sequence. Particularly distinguishing training sequences from one another becomes more difficult when the reception conditions are poor. Furthermore, when higher data transmission rates are aimed at, the use of a training sequence no longer necessarily guarantees fast enough signalling owing to the above and since the duration of the training sequence is relatively long bearing in mind that the training sequence is capable of transmitting one message only. Due to these drawbacks said method has not been widely employed and the GSM system, for example, still uses signalling channels.

A significant drawback with prior art signalling is that it matches poorly with packet-switched data transmission. In present packet-switched wireless telecommunication systems, such as the GPRS system (General Packet Radio Service) designed on the basis of the GSM system, data transmission from a terminal to a base station (uplink) and vice versa (downlink) takes place irrespective of one another. In said systems a channel is formed between the terminal and the base station only, when either party has data packets to send. In other words, there is no need to maintain a continuous return channel for transmitting signalling or acknowledgement messages in said systems. To utilize such asymmetrical data transmission optimally would require transmission of signalling and acknowledgement messages when the channel capacity is used for other purposes as well.

It is thus an object of the invention to provide a method and an apparatus implementing the method so as to solve the above problems. The objects of the invention are achieved with a method, characterized by

generating from symbols a second training sequence of the same length as the known training sequence,

generating a burst comprising said second training sequence and by

using the burst comprising said second training sequence for transmitting various signalling messages.

The wireless digital telecommunication system of the invention is characterized in that

the transmitter comprises means for generating a second training sequence of the same length as the known training sequence and means for generating a burst comprising said second training sequence and for coding a signalling message into said burst and in that

the receiver comprises means for receiving the burst comprising said second training sequence, means for identifying said second training sequence and means for decoding the coded signalling message in said burst.

According to a preferred embodiment of the invention the number of training sequences to be used is restricted to two. According to another preferred embodiment of the invention the stealing symbols in the burst comprising said second training sequence are used for specifying the signalling message to be transmitted.

The invention is based on the idea that various training sequences are used in the burst structure to indicate the contents of the burst. The recipient then interprets the received burst on the basis of the training sequence. A particular training sequence can preferably be employed in the burst structure to indicate that signalling data in particular is transmitted using the burst. The type of the signalling data to be transmitted can also be indicated in more detail by means of the stealing symbols in the burst. Stealing symbols have typically been used in a normal burst to indicate whether the data bits in a burst are allocated to be used on a traffic channel or stolen to be used on the FACCH. However, in the method of the invention the stealing symbols in the normal burst to be utilized for transmitting user data can also be allocated to transmit user data.

The method and system of the invention provide an advantage that enables transmission of signalling and acknowledgement messages particularly when the channel between the terminal and the base station is also employed for transferring user data. This is particularly advantageous in packet-switched wireless data transmission, as in this case the channel between the terminal and the base station does not have to be separately opened for signalling. Another advantage of the invention is that the data transmission capacity of a normal burst to be used for transmitting user data is not used for

the signalling of the invention. A further advantage of the invention is that it alleviates the implementation of the detection in the receiver, as the received training sequence is compared with the two known training sequences only, thus reducing the receiver load. Still another advantage of the invention is that the data transmission capacity of a normal burst increases, since the stealing symbols in the normal burst can also be utilized for transmitting user data.

In the following the invention will be described in greater detail in connection with the preferred embodiments, with reference to the accompanying drawings, in which

Figure 1 schematically shows a normal burst according to the GSM system;

Figure 2 schematically shows a known normal burst and a burst according to a preferred embodiment of the invention;

Figure 3a shows a burst structure according to a preferred embodiment of the invention;

Figure 3b shows a burst structure according to a second preferred embodiment of the invention;

Figure 3c shows a burst structure according to a third preferred embodiment of the invention;

Figure 3d shows a burst structure according to a fourth preferred embodiment of the invention;

Figure 4 is a block diagram showing a transmitter according to a preferred embodiment of the invention;

Figure 5 is a block diagram showing a receiver according to a preferred embodiment of the invention, and

Figure 6 is a flow chart showing parameter adjustment according to a preferred embodiment of the invention.

In the following the invention will be described by way of example on the basis of a TDMA-based (Time Division Multiple Access) GSM system and the further improvement thereof. It is obvious for those skilled in the art that the invention can be used in any corresponding telecommunication system.

Figure 1 shows the structure of a normal burst according to the GSM system, the length of the normal burst being 156,25 and the duration 0,577 ms. The normal burst comprises one time slot of a TDMA frame comprising eight time slots. The normal burst comprises in the middle a training

sequence (TS) that includes 26 symbols and that is used for correcting the received signal as described above. Stealing symbols (S), which are one symbol in length and located on both sides of the training sequence TS, are used for indicating the possible use of even and/or odd data symbols (DS) for FACCH signalling. The data symbols DS intended to transfer user and signalling data are divided into two sequences of 57 symbols which are located before the first stealing symbol and after the second stealing symbol. Tail symbol sequences (T), which are three symbols in length, are located at the beginning and in the end of a burst, and within the duration of the tail symbols the transmitter is correspondingly switched on and off between the bursts. After the burst, there is a guard period (G) of 8,25 symbols that prevents adjacent time slots from overlapping in base station reception.

According to a preferred embodiment of the invention a new burst type is introduced that deviates from the burst structure described above only in that the training sequence of the burst is different. Here the known training sequence in a normal burst is referred to as TS1 and the training sequence of the invention is referred to as TS2 in accordance with Figure 2. According to a preferred embodiment of the invention the burst according to the invention is employed in particular for transmitting control data (CD), whereby the known normal burst can, if necessary, be allocated to transfer user data (UD) only. User data can also be transmitted using the burst of the invention in situations where the transfer of user data also requires exceptional signalling. Then, in the reception the type of information in the burst can be deduced on the basis of the training sequence. Particularly when a burst comprising the training sequence TS2 is received, the receiver knows that the burst may comprise specific signalling data.

According to another preferred embodiment of the invention the number of various training sequences is restricted to said two training sequences TS1 and TS2. This alleviates the implementation of the detection in the receiver, as the received training sequence is compared with the two known training sequences only, thus reducing the receiver load. Particularly distinguishing training sequences from one another becomes easier in poor reception conditions compared with prior art, since the symbol constellations of the two training sequences can easily be determined to differ greatly from one another, and a large number of symbol errors in the received training sequences cannot either prevent the detection of the training sequence.

According to a preferred embodiment of the invention the stealing symbols in the burst of the invention are used to specify the information in the burst. Then, the stealing symbols of the known normal burst can also, if needed, be utilized when transferring user data. The use of the stealing symbols of the invention is explained in the following in greater detail with reference to the examples in Figures 3a-3d. In order to simplify the description, it is assumed in the following examples that the stealing symbols of the burst structure both comprise one bit. The invention can naturally also be implemented in systems where several bits are modulated into one symbol, in which case the amount of information to be specified using the stealing symbols is multiplied.

Figure 3a shows the burst structure of the invention, where the data symbols DS are allocated to the user data UD, the training sequence is the training sequence TS2 of the invention and both the stealing symbols are 0-bits. On the basis of the indicated training sequence TS2 the receiver knows that the burst comprises some signalling data and checks the specified information indicated by the stealing symbols. This burst may indicate, for example, the last time slot from the user data flow to be transferred on a particular channel. The transmission of a specific end sign is thus avoided in an additional burst.

Figure 3b describes the burst structure of the invention intended for fast signalling in particular. In this burst the data symbols DS are entirely or partly allocated to the signalling data, the training sequence is the training sequence TS2 of the invention and the first of the stealing symbols is preferably a 0-bit and the second a 1-bit. The spreading figure shown in Figure 3b describes in greater detail the signalling and user data fields CD/UD in the data symbols DS. There is a field in the beginning of the data symbols determining the field length of the signalling data (ctrl field length). A signalling discriminator (ctrl discriminator) defines the signalling message in question which is added after the signalling discriminator. Several signalling messages (ctrl field) can preferably also be transferred in the same burst. When the receiver knows, on the basis of the signalling discriminator, which signalling fields are concerned, it can distinguish the transmitted messages from the burst. If all messages to be transmitted and the lengths thereof are predetermined, i.e. standardized messages are concerned, then the field determining the total length of the signalling data is not needed, as the receiver is aware of the

length of the messages. However, it is preferable to keep the field determining the total length of the signalling data as an optional alternative and thereby alleviate the introduction of new signalling messages. If all data symbols are not needed for the signalling message, the unused symbols can be employed for transmitting user data. The burst according to Figure 3b can preferably be used to replace the FACCH signalling according to the GSM system.

Figure 3c describes the burst structure of the invention intended for slow signalling in particular, that is for replacing the SACCH signalling according to the GSM system, for example. A field of a specific length is allocated in the beginning of the data symbol field to the signalling data CD, and the rest of the data symbols can be employed for transmitting user data UD. The training sequence is the training sequence TS2 of the invention and the first of the stealing symbols is preferably a 1-bit and the second a 0-bit. This burst structure provides the advantage that if a known short signalling message is to be transmitted in one burst or if a longer, non-urgent signalling message is interleaved into several bursts, it is not necessary to attach the field determining the total length of the signalling data to the signalling data field.

Figure 3d describes the burst structure of the invention that can be used in applications that enable restricted retransmission of a burst. Such cases include real time speech or video image transmission, in which a sensible use of the application enables retransmission of a burst that is poorly received in the following TDMA frame only. In the burst the data symbols DS are allocated to the user data UD, the training sequence is the training sequence TS2 of the invention and both stealing symbols are 1-bits. Said burst can be employed in situations where the received normal burst is of poor quality and it is requested to be resent in the following time slot allocated to the channel. If the transmitter is able to receive the retransmission request in time, the data symbols of the previous burst are sent in the burst according to Figure 3d. Then, on the basis of the training sequence TS2 and the 1-bit stealing symbols the receiver can deduce that retransmission is concerned. If stealing symbols have been used for transmitting user data in the original normal burst, these have to be punctured before connecting the original burst to the retransmitted burst and attached to the original position in the burst structure when connecting the bursts. If the transmitter cannot receive a retransmission request, then the bursts are continued to be normally transmitted.

The burst of the invention can therefore, if needed, also be used for

transmitting user data. However, the training sequence TS2 in the burst indicates that the information in the burst is somehow exceptional as regards the normal burst.

The following describes the essential parts of the transmitter in the telecommunication system of the invention by means of the block diagram in Figure 4. The transmitter comprises means 100 that include the information to be sent, for example, the information about the last burst in the data flow according to Figure 3a. This information is coded in accordance with the invention into a combination of a determined training sequence and a stealing symbol combination in coding means 101, from where the coded information is applied to means 102 to be connected with the signal to be transmitted and the stealing symbols thereof. Next, the signal is modulated by processing means 103 and applied to conversion means 104 where the signal is converted from digital to analogue mode. The analogue signal is transferred to radio frequency parts 105 where the signal is converted to the transmission frequency. Then the signal is sent by an antenna 106 through the radio path to the receiver.

The essential parts of the receiver in the telecommunication system of the invention are described in the block diagram according to Figure 5. The receiver comprises an antenna 200 for receiving the signal sent through the radio path and wherefrom the signal is applied to radio frequency parts 201 in which the signal is converted to an intermediate frequency. The signal is then transferred to conversion means 202 where the signal is reconverted from analogue to digital mode. The digital signal propagates to processing means 203 where the signal may be filtered and demodulated, the channel impulse response and the energy thereof can be estimated, and the signal distorted on the channel can be restored into its original form. The restored signal is applied to separation means 204 where the identified training sequence and the stealing symbols are separated from the signal. Decoding means 205 decode the received training sequence and the stealing symbols in accordance with the method presented in the invention, and means 206 start the operations according to the preferred embodiments that correspond with the message in the transmitted signalling data.

The above operations in the transmitter and the receiver can be implemented, for example, using general or signal processors or separate logic. To implement single operations is known for those skilled in the art and the

description thereof is not needed in this context.

In the following the application of the invention is explained in greater detail by means of an example describing on-demand adjustment of a parameter to be performed in packet-switched wireless data transmission. Such an adjustment is based on the idea that only those parameters are adjusted that need to be adjusted at a particular time, in which case a separate signalling channel, for example, does not have to be maintained for this purpose.

The uplink and downlik data transmission can be totally independent of one another in packet-switched wireless data transmission. In short-delay real time data transmission, the uplink and downlink traffic channels are maintained only for the time the data packets are sent in either direction. Sending signalling messages and acknowledgement messages becomes more difficult in the opposite direction, as a continuously maintained channel for this purpose does not exist. It is therefore preferable if any maintained channel can be used for transmitting acknowledgement messages. The terminal may simultaneously comprise several active data transmission connections which are determined and restricted in different ways. A terminal may for instance comprise, in addition to a normal telephone connection, a simultaneous packet-switched connection with an outside telephone number service. Then, the signalling between the terminal and the network or the acknowledgement thereof can be selected to be performed through the best available data transmission connection. If, for example, the counterpart speaks on the telephone connection of the terminal, when the uplink speech connection of the terminal is not in use, the signalling messages can be multiplexed to said packet-switched data connection. If, in turn, the downlink signalling takes place through an active call connection and the call is disconnected midst signalling, then the signalling can be transferred to a possible data connection. If no data connections exist, the downlink signalling can preferably be arranged as a broadcast message to all terminals within the cell area. Naturally only the terminals for whom the message is indicated tend to operate as the message requires. However, in this way the frequency band is used more efficiently as compared with opening a separate channel for signalling.

Figure 6 is a flow chart describing the adjustment of an on-demand adaptive parameter where the signalling of the invention can be utilized. The adjustable parameter concerned can, for example, be the transmission power

of a terminal. The adjustment process is started by checking if the time t_{last} that has elapsed from the previous adjustment is sufficient for providing a new adjustment which is determined on the basis of the adjustment frequency *afr*. Next a parameter value *par* is measured and the value is compared with the optimal value par_t of the parameter. If the difference between the parameter value *par* and the optimal value par_t of the parameter exceeds the error threshold e_{th}, then the parameter is adjusted and the value of the adjustment frequency *afr* is increased by a predetermined change afr_{step}. If the error threshold is not exceeded, the parameter does not need to be adjusted either, but the value of the adjustment frequency *afr* is reduced by a predetermined change afr_{step}. In both cases it is confirmed that the value of the adjustment frequency *afr* remain between the predetermined maximum value afr_{max} and minimum value afr_{min}.

Even though the invention has above been described by way of example in connection with power control signalling, the invention is not restricted thereto but the signalling of the invention can be used for any similar purposes, particularly in packet-switched data transmission. One example is the change of the used coding method in connection with link adaptation. However, it should be noted that digital wireless telecommunication systems, particularly TDMA systems, also comprise other types of bursts than the normal burst described in this context and the embodiment of the invention thereof. The burst structure of the invention cannot necessarily be used for sending the signalling data transmitted by these bursts.

Furthermore, even though the invention has above been described by way of example according to the preferred embodiment of the invention in which two training sequences are used, the number of training sequences is not restricted to two, but the invention can also be implemented using several training sequences. Then, the implementation of the receiver becomes more complicated, but the number of signalling messages to be indicated increases when the possible combinations of training sequences and stealing symbols increase.

It is obvious for those skilled in the art that as technology progresses the basic idea of the invention can be implemented in a number of ways. The invention and the embodiments thereof are thus not restricted to the above examples but may vary within the scope of the claims.

CLAIMS

1. A signalling method in a wireless digital telecommunication system between a base station and a terminal, where the signals between the base station and the terminal are generated from bursts comprising symbols, the bursts comprising a known training sequence, **characterized** by

generating from symbols a second training sequence of the same length as the known training sequence,

generating a burst comprising said second training sequence and by

using the burst comprising said second training sequence for transmitting at least one signalling message.

2. A method as claimed in claim 1, **characterized** by indicating the existence of said signalling message, in response to the received burst comprising said second training sequence.

3. A method as claimed in claim 2, **characterized** by restricting the number of the training sequences to be used to two.

4. A method as claimed in claim 3, **characterized** by

sending user data in the burst comprising said known training sequence and

sending signalling data and/or user data in the burst comprising said second training sequence.

5. A method as claimed in any one of the preceding claims, **characterized** by using the stealing symbols in the burst comprising said second training sequence for specifying the signalling message to be transmitted.

6. A method as claimed in any one of the preceding claims, **characterized** by using the burst comprising said second training sequence for transmitting FACCH signalling according to the GSM system.

7. A method as claimed in any one of the preceding claims, **characterized** by using the burst comprising said second training sequence for transmitting SACCH signalling according to the GSM system.

8. A method as claimed in any one of claims 1 to 5, **characterized** by using the method in a packet-switched wireless telecommunication system.

9. A method as claimed in any one of the preceding claims, **characterized** by using the method for adjusting the transmission

power of the mobile station and the base station.

10. A wireless digital telecommunication system for signalling between a base station and a terminal, where the signals to be transmitted over a radio connection between the base station and the terminal comprise bursts generated from symbols, the bursts comprising a known training sequence, the system comprising at least one transmitter and at least one receiver, whereof the transmitter comprises means for generating said training sequence and the receiver comprises means for identifying said training sequence, **characterized** in that

the transmitter comprises means for generating a second training sequence of the same length as the known training sequence and means for generating a burst comprising said second training sequence and for coding a signalling message into said burst and in that

the receiver comprises means for receiving the burst comprising said second training sequence, means for identifying said second training sequence and means for decoding the coded signalling message in said burst.

11. A telecommunication system as claimed in claim 10, **characterized** in that the receiver is arranged to indicate the existence of said signalling message, in response to the received burst comprising said second training sequence.

12. A telecommunication system as claimed in claim 11, **characterized** in that the number of the training sequences to be used in the system is restricted to two.

13. A telecommunication system as claimed in claim 12, **characterized** in that

said burst comprising the known training sequence is arranged to transmit user data and

said burst comprising the second training sequence is arranged to transmit signalling data and/or user data.

14. A telecommunication system as claimed in any one of claims 10 to 13, **characterized** in that at least one stealing symbol in the burst comprising said second training sequence is arranged to specify the contents in the signalling message to be transmitted.

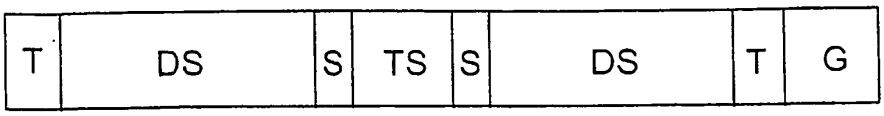


FIG. 1

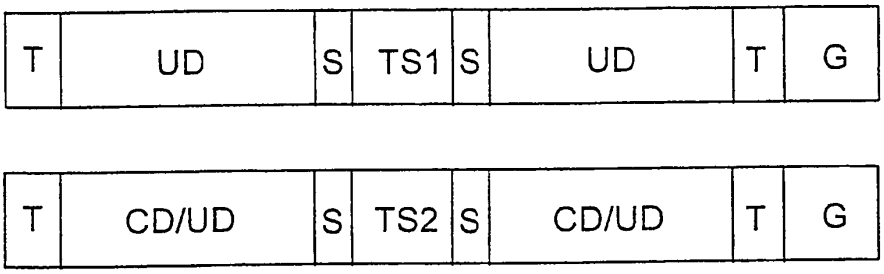


FIG. 2

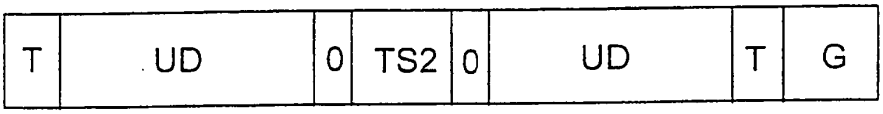


FIG. 3a

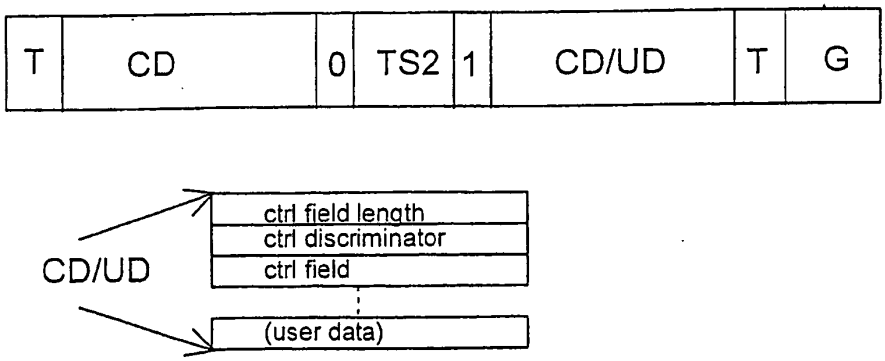


FIG. 3b

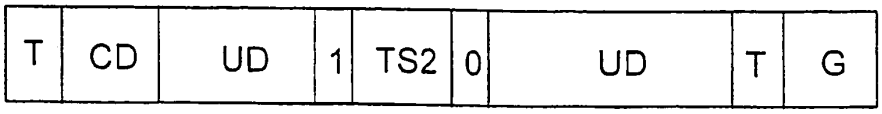


FIG. 3c

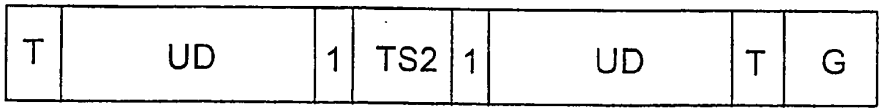


FIG. 3d

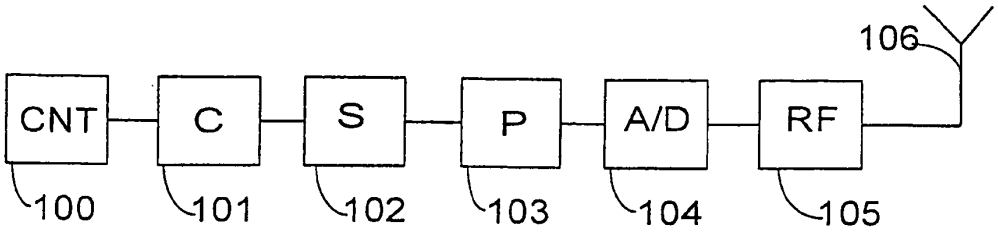


FIG. 4

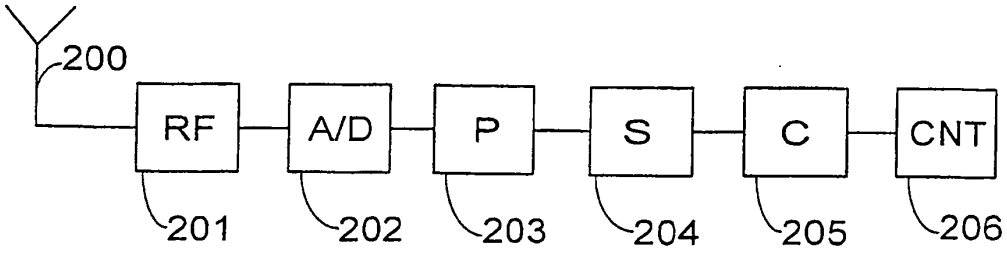


FIG. 5

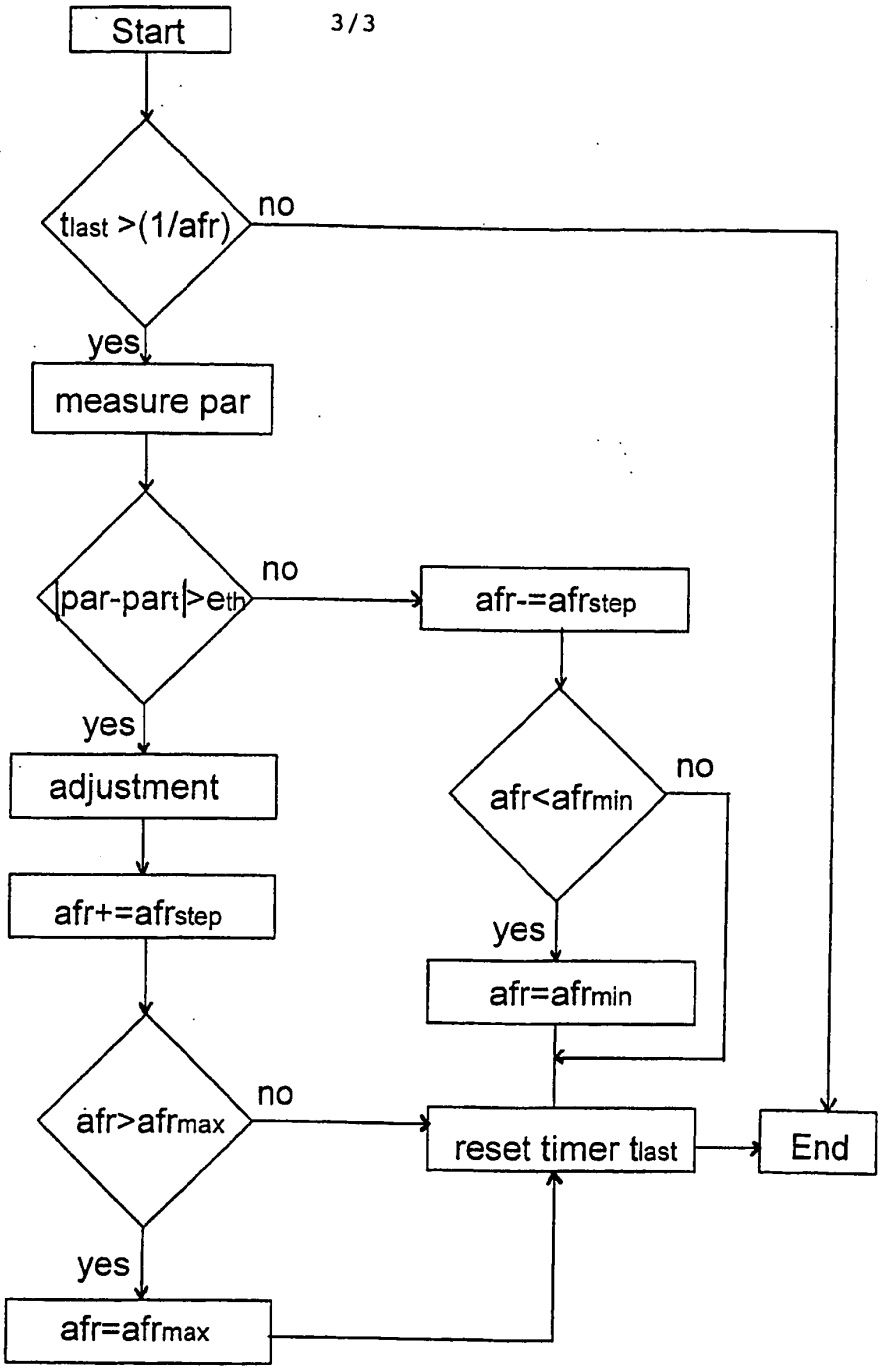

Start
tlast >(1/afr)
no
yes
measure par
par-part>eth
no
afr-=afrstep
yes
adjustment
afr<afrmin
no
afr+=afrstep
yes
afr=afrmin
afr>afrmax
no
reset timer tlast
End
yes
afr=afrmax

FIG. 6

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04B 7/26

A1

(11) International Publication Number: **WO 00/64075**

(43) International Publication Date: 26 October 2000 (26.10.00)

(21) International Application Number: PCT/EP00/03453

(22) International Filing Date: 17 April 2000 (17.04.00)

(30) Priority Data:

9908805.6	16 April 1999 (16.04.99)	GB
9909689.3	27 April 1999 (27.04.99)	GB

(71) Applicant *(for all designated States except US)*: NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN–02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: LONGONI, Fabio [IT/FI]; Visamaki 5 E 38, FIN–02130 Espoo (FI). AHMAVAARA, Kalle [FI/FI]; Hakaniemenranta 18 D 62, FIN–00530 Helsinki (FI).

(74) Agents: STYLE, Kelda, Camilla, Karen et al.; Page White & Farrer, 54 Doughty Street, London WC1N 2LS (GB).

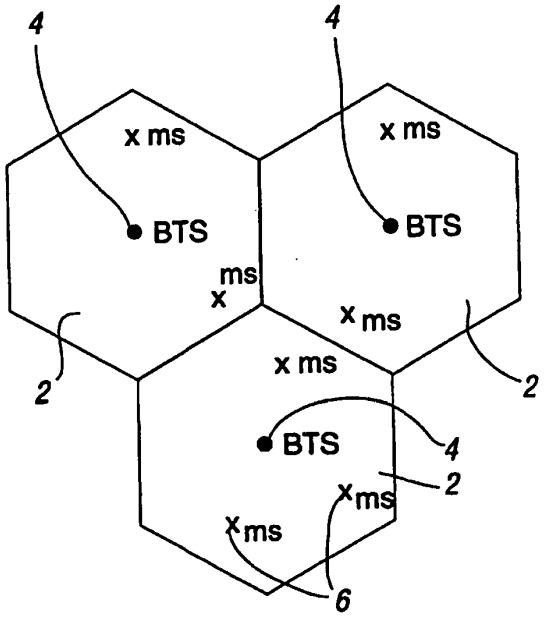
(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: DISCONTINUOUS TRANSMISSION CDMA SYSTEM

(57) Abstract

A method of transmitting from a first node to a second node, said method comprising the steps of transmitting in a first mode at least one data frame from said first node to said second node; and determining if there is no data to be transmitted and if there is no data to be transmitted transmitting at least one empty frame in the first mode; and switching to a second mode in which no transmission is made in the absence of data to be transmitted at least some of the time.



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DISCONTINUOUS TRANSMISSION CDMA SYSTEM

Field of the invention

The present invention relates to a method of transmitting and in particular but not exclusively to a method of transmitting in a wireless telecommunications network.

Background of the invention

The use of code division multiple access (CDMA) is being proposed for the next generation of cellular telecommunication networks. Additionally, code division multiple access is also being used in the IS-95 Standard in the USA. CDMA is a direct sequence spread spectrum technique. In a wireless cellular network using CDMA, the mobile terminals in one cell associated with a first base station will use the same frequency as mobile stations in an adjacent cell associated with a second base station. The different mobile stations can be distinguished by the respective base stations as each mobile station will be using a different spreading code.

In US-A-5101501 a CDMA system is described which uses "soft" handoff. With soft handoff, a mobile station is capable of communicating with more than one base station at the same time. This will typically occur when the mobile station is close to the boundary defined between two cells. The signals sent by the mobile stations will be received and processed by both of the base stations. Likewise, the mobile station will receive the same signal from the two base stations. The signals from the two base stations may be combined. The combined signal may provide better quality than the any of the individual signals received by the mobile station.

Thus, one mobile station can listen to two or more base stations simultaneously. It is therefore important that the information received by the mobile stations from the different base station

be identical. If different information is received from the different base stations, the mobile station will have no way of determining which is the correct information and which information can be ignored. Additionally it will not be possible to combine the signals from the different base stations to provide a meaningful combined signal.

Generally, different information will be received by the mobile station because an error in transmission has occurred and one of the expected transmissions from one or more of the base stations is not transmitted by the base station. The base station may not receive any information to be transmitted to the mobile station for two reasons. Firstly there has been an error in the information received by the base station. Secondly, there is in fact no information to be received. The lack of information may be due to, for example a pause in conversation or because the transmission is a discontinuous transmission. It is therefore necessary to determine whether the lack of received information is intentional or whether it is due to an error.

It has been suggested by the inventor that empty frames of data can be sent to the base station in two different ways. These two ways do not constitute prior art. Firstly, the transmission is suspended. In other words, the base station will be sent nothing. This has the advantage that the processing resources at the base station are saved as well as in other network elements. The load at the interface between the base station and the network controller, which is sending the information to the base station, is reduced. However this method has the disadvantage that it is not possible to distinguish between a transmission error and the fact that there is no data. This leads to two problems.

Firstly, failures in the interface between the base station and the network controller are not detected by the base station in the case of information being sent from the network controller to the base station or by the network controller in the case of information being sent from the base station to the network

controller.

Secondly, if a data frame is not received, due to an error, by a base station, that data frame cannot be transmitted by the base station to the mobile station. If the mobile station is in soft handoff, that is communicating with more than one base station at a time, the mobile station will receive different data streams from the base stations due to the error. This may lead to errors in the mobile station when it attempts to combine the different data streams.

The second method for dealing with empty frames of data is for the base station to be sent empty frames of data. This makes it possible to distinguish between errors and the fact that there is no information. However, this method does have the disadvantage that additional processing capacity is required at the base station and other network elements. Additionally, the load at the interface between the base station and the network controller is increased.

Similar problems can also occur in the uplink directions.

Summary of the invention

It is an aim of embodiments of the present invention to provide a method of dealing with the absence of information or data which addresses the disadvantages of the known methods.

According to one aspect of the present invention, there is provided a method of transmitting from a first node to a second node, said method comprising the steps of transmitting in a first mode at least one data frame from said first node to said second node; and determining if there is no data to be transmitted and if there is no data to be transmitted transmitting at least one empty frame in the first mode; and switching to a second mode in which no transmission is made in the absence of data to be transmitted at least some of the time.

The first and second nodes may be any suitable elements in a telecommunications network.

According to a second aspect of the present invention there is provided a method of receiving transmissions from a first node at a second node, said transmission have a first mode in which if there is no data to be transmitted, empty frames are transmitted and a second mode in which if there is no data to be transmitted nothing is transmitted, said method comprising the steps of: receiving transmissions from said first node, wherein if the transmissions have a first mode and a frame is not received and error is determined to have occurred.

According to a third aspect of the present invention there is provided a first node for transmitting data to a second node, wherein said first node comprises transmitting means for transmitting data to said second node, said transmitting means have a first mode of operation in which data is transmitted in data frames and if there is no data to be transmitted empty frames are transmitted and a second mode of operation in which if there is no data no frames are transmitted.

According to a fourth aspect of the present invention, there is provided a second node for receiving transmissions from a first node at a second node, said transmissions have a first mode in which if there is no data to be transmitted, empty frames are transmitted and a second mode in which if there is no data to be transmitted nothing is transmitted, said second node comprising means for receiving transmissions from said first node, and determining means for determining that if the transmissions have a first mode and a frame is not received, an error has occurred

Brief description of the drawings

For a better understanding of the present invention and as to how the same may be carried into effect, reference will now be made

by way of example to the accompanying drawings in which:
Figure 1 shows a schematic diagram of part of a cellular telecommunications network incorporating base transceiver stations and mobile stations;
Figure 2 shows part of the network of Figure 1 in more detail; and
Figure 3 illustrates the normal and silent modes used by the base stations of Figure 1.

Detailed description of embodiments of the invention

Reference will first be made to Figure 1 in which three cells 2 of a cellular telecommunications network are shown. Each cell 2 is served by a respective base transceiver station (BTS) 4. Each base transceiver station 4 is arranged to transmit signals to and receive signals from the mobile stations 6 located in the cell associated with the given base transceiver station 4. Likewise, each mobile station 6 is able to transmit signals to and receive signals from the respective base transceiver station 4.

The cellular telecommunications network shown in Figure 1 uses a code division multiple access technique. Accordingly, at least some of the mobile stations will be in communication with more than one base station at the same time. This, however, will be described in more detail hereinafter.

Reference is now made to Figure 2. As can be seen from this figure, the base stations are connected to a SRNC (serving radio network controller) 20. Data blocks are transmitted between the SRNC 20 and the base stations 28 and 30 using a frame protocol FP. A data frame contains data which is to be transmitted in one interleaving period and a transport format indicator TFI. The interleaving period is the period over which data is interleaved. The transport format indicator TFI provides information as to the format of the data frame such as the size of the data block, the interleaving period and the like.

Each UE (user equipment for example mobile stations or the like) has an independent transport connection which means that each frame contains the data and current transport format indicator TFI of one bearer only. Typically a call will have more than one bearer, for example a signalling bearer and a data or voice bearer. For downlink communications (from the SRNC 20 to the base station direction), all the data blocks of users having the same user equipment are multiplexed onto a single radio link. The manner in which the multiplexing is done will depend on the transport format indicator TFI of each frame which indicates the amount of data in each frame for the bearers. A transport format combination information TFCI field of the radio frame provided in a dedicated physical control channel DPCCH will indicate the manner in which the multiplexing is carried out. The transport format combination information TFCI field will indicate the transport format indicator TFI for each of the bearers whose data is multiplexed in the radio frame or frames in the dedicated physical data channel DPDCH. In the case of soft handoff where a mobile station is in communication with more than one mobile station at a time, the dedicated physical data channels DPDCH from each of the bases stations communicating with the mobile station in question will be the same as will the rate information RI fields in all the radio links.

The format described hereinbefore is part of the currently proposed UMTS (universal mobile telephone service) standard. It should be appreciated that any other standard can alternatively be used.

In the following, it is assumed for simplicity that there is only one bearer per transport channel and the SRNC does not carry out any multiplexing. The transport format information can have a particular value which indicates that the frame does not contain any data. For simplicity it is assumed that the particular value is zero although the particular value can be any other value.

The SRNC 20 shown in Figure 2 has first and second medium access

controllers MAC 24 which receive the data from respective bearers. For simplicity, the medium access controllers 24 are each shown as receiving information from one bearer only. The medium access controllers can receive information from more than one bearer and carry out the multiplexing function described hereinbefore.

The medium access controller 24 receives an input from a first bearer Bearer 1 and a second bearer, Bearer 2 and outputs a first transport channel 1 and a second transport channel 2. The input from Bearer 1 maps to the first transport channel 1 and the input from Bearer 2 maps to the second transport channel 2. The transport channels are input to respective macrodiversity combiners 26. The macrodiversity combiners 26 output the transport channels to each base station which is in communication with the mobile station for which the transport channel is intended. In the example shown in Figure 2, the first transport channel 1 is output to first and second base stations 28 and 30 as is the second transport channel 2. Thus the first and second base stations are each arranged to transmit the same channels to a single mobile station.

The mode of operation for transmission of information between the SRNC 20 and base stations will now be described with reference to Figure 3. Two modes are defined. The first mode is the normal mode and the second mode is the silent mode. The data which is to be sent to the mobile station is interspersed with periods where there is no data. This may occur during pauses in a conversation between two parties. Alternatively, in the case of non speech data, the data may be discontinuous.

In the normal mode A of operation, on the transmit side, the SRNC 20 transmits a frame F for every interleaving period. As shown in Figure 2, frames F1 and F2 contain data. If no data is present, frames F3, F4 and F5 which are empty frames E are sent. After N consecutively received empty frames E, the frame protocol connection is switched to the silent mode S. N can have any

suitable value such as 1, 2 or 3 or any other suitable value.

In the silent mode S, on the transmit side, the SRNC 20 is prevented from transmitting any frame if there is no data in the frame. The SRNC may transmit K empty frames F6 at the beginning of the silent mode S to ensure that the base station has switched to the silent mode; also if up to K of the N empty frames previously sent have been lost during the transmission. After M consecutive frames F7 and F8 including data are transmitted, the frame protocol connection is switched to the normal mode A again. K may be 0 or 1 or any other suitable number. M can be 1, 2, 3 or any other suitable number.

In the normal mode A, on the receive side, if a frame is not received in an interleaving period, the base station generates an interface failure alarm and decides whether to transmit the radio frame without the data or to not transmit the frame at all. After the base station has received N empty frames, the frame protocol connection is switched to the silent mode S.

In the silent mode S, on the receive side, if a frame is not received in one interleaving period, the base station considers the bearer to be in an inactive state and sets the transport format indicator TFI to zero. After M consecutive data frames with data have been received, the frame control layer connection is switched to the normal mode A.

The parameters M, N and K may be:

1. predetermined, for example fixed in a standard used by the network;
2. Iub/Iur (Iub is the interface between the SRNC and the base station while Iur is the interface between two radio network controllers) interface protocol configurable parameters, that is the parameters can be set at each interface as required; and
3. signalled from the SRNC to base stations every time a new branch or bearer is set. The parameters may be reconfigurable as required.

Control frames which do not contain data but instead contain control information such as power control and synchronisation information are sent in both the normal mode and the silent mode. Control frames may not be present in either or both of these modes.

Reference will now be made to a second embodiment of the present invention which uses explicit signalling in order to switch from the normal mode to the silent mode. In this second embodiment, the base station will not automatically switch to the silent mode when a predetermined number of consecutive empty frames have been received. However, the transmission of a predetermined number of empty frames when in the normal mode can be used as an indication that the silent mode should be used. Of course, any other suitable measure can be used to determine that a switch should be made between the normal and the silent mode.

Once a determination has been made that the base station should stop using the normal mode and start using the silent mode, the radio network controller will include in the next frame sent to the base station a mode bit indicative of this. This mode bit may have a given value for the silent mode and the other value for the normal mode. Alternatively, one value of the bit indicates that the mode should change either from the normal to the silent mode or from the silent mode to the normal mode. The other value of the bit would indicate that the mode is not to be changed.

When the base station receives the frame transmitted by the radio network controller, it checks the mode bit. If this bit indicates that the mode is to change from the normal mode to the silent mode, the base station changes its mode and sends an acknowledgement confirming that the base station has understood that the mode is changed. Once the radio network controller has received the acknowledgement from the base station, the radio network controller will use the silent mode.

Changes from the silent mode to the normal mode can be achieved

in the same way as in the first embodiment. However, it is also possible to alter the mode from the silent to normal mode in the following. When it is determined that the base station is to receive using the normal mode, the radio network controller will alter the mode bit in the next frame sent to the base station, to indicate that the mode should change to the normal mode. If a data frame is being sent to the base station, the mode bit will be altered in that frame. If no data frame is being sent to the base station due to an absence of data, the radio network controller will send an empty frame with the mode bit set accordingly.

The base station will send an acknowledgement indicating that it has received the frame and has noted that the mode is changed to the normal mode. When the radio network controller receives the acknowledgement, the radio network controller will then use the normal mode.

It is possible to use this second method to notify the base station by sending in advance information that the mode will change after a predetermined number of frames or the like.

The method used by the first embodiment has the advantage that the frame structure does not need to be altered. A second advantage of the first method is that two way communication does not have to be set up if one party, for example, the radio network controller is sending data to the base station and the base station is not sending any data to the radio network controller. The second method is advantageous in that both parties are certain as to which mode of operation is being used.

The acknowledgement sent by the base station to the radio network controller may use a mode bit in the frame, as described hereinbefore in relation to the frames sent from the radio network controller to the base station. Thus the acknowledgement may comprise the mode bit in the frame sent by the base station to the radio network changing to reflect the new mode. Either of

the options for the mode bit described hereinbefore may be used.

It should be appreciated that although the transmissions from the SRNC to the base station are described as using the normal and silent mode of operation, this mode of operation can alternatively or additionally be used for transmissions from the base station to the SRNC. The values of the parameters used in the downlink and uplink directions may differ. Embodiments of the present invention may be applied to the communications between any two nodes of a telecommunications network, wired or wireless.

It should be appreciated that although embodiments of the present invention are particularly advantageous when used in a soft handoff or similar context, that is when a mobile station is in communication with more than one base station at the same time, embodiments of the present invention can also advantageously be used where the mobile station is in communication with one base station at a time. In an alternative embodiment of the present invention, the normal and silent mode of operation may only be used when the mobile station is in communication with more than one base station at a time. A different mode of operation may be used when the mobile station is in communication with only one base station. The different mode of operation may be one which incorporates one of the previously known methods for dealing with empty frames.

Whilst preferred embodiments have been described in the context of a code division multiple access system, embodiments of the present invention can be used with any other spread spectrum technique or any other suitable access technique such as time division multiple access, frequency division multiple and space division multiple access as well as hybrids thereof.

CLAIMS:

1. A method of transmitting from a first node to a second node, said method comprising the steps of:

transmitting in a first mode at least one data frame from said first node to said second node; and

determining if there is no data to be transmitted and if there is no data to be transmitted transmitting at least one empty frame in the first mode; and

switching to a second mode in which no transmission is made in the absence of data to be transmitted at least some of the time.

2. A method as claimed in claim 1, wherein said second mode is used if a predetermined number of empty frames are transmitted consecutively.

3. A method as claimed in claim 2, wherein the first station, if using the first mode, switches automatically to the second mode if the predetermined number of empty frames are transmitted consecutively.

4. A method as claimed in claim 1 or 2, comprising the step of the first node sending information to the second node advising that the mode is to change from the first mode to the second mode.

5. A method as claimed in claim 4, wherein the second node is arranged to confirm receipt of said information and when the first node has received the confirmation from the second node, said first node is arranged to use said second mode.

6. A method as claimed in claim 4 or 5, wherein said information is in a frame transmitted from the first node to the second node.

7. A method as claimed in any of claims 4 to 6, wherein said information is sent in advance of the change of mode.

8. A method as claimed in any preceding claim, wherein in said second mode, data to be transmitted is transmitted in data frames and if a predetermined number of data frames are transmitted, the first mode is used.

9. A method as claimed in claim 8, wherein if the predetermined number of data frames is received in said second mode, the first mode is automatically used.

10. A method as claimed in any of claims 1 to 8, wherein when the first node is using the second mode and the mode is to be switched to the first mode, the first node is arranged to transmit information that the mode is to be switched to said second mode.

11. A method as claimed in claim 10, wherein the second node is arranged to confirm receipt of said information that the mode is to be switched from said second mode to the first mode and the first node is arranged to use the first mode when the confirmation has been received by the first node.

12. A method as claimed in claim 2 or any claim appended thereto, wherein said predetermined number of data frames are consecutive data frames.

13. A method as claimed in any one of the preceding claims wherein if no data is to be transmitted at the beginning of the second mode, a predetermined number of empty frames are first transmitted and then no transmission is made in the absence of data to be transmitted.

14. A method as claimed in any one of the preceding claims, wherein said first node is arranged to transmit the same data to a plurality of second nodes, said plurality of second nodes

transmitting the same data to a third node.

15. A method of receiving transmissions from a first node at a second node, said transmission have a first mode in which if there is no data to be transmitted, empty frames are transmitted and a second mode in which if there is no data to be transmitted nothing is transmitted, said method comprising the steps of:

receiving transmissions from said first node, wherein if the transmissions have a first mode and a frame is not received and error is determined to have occurred.

16. A method as claimed in claim 15, wherein if an error is determined to have occurred, said second node transmits an empty frame to a third node.

17. A method as claimed in claim 15, wherein if an error is determined to have occurred, said second node transmits nothing to a third node.

18. A method as claimed in any of claims 15 to 17, wherein after a predetermined number of empty frames are received in said first mode, determining that the second mode is used by the first node.

19. A method as claimed in claim any of claims 6 to 9, wherein when a predetermined number of frames of data are received in said second mode, determining that the first mode is used by the first node.

20. A method as claimed in any of claims 15 to 20, wherein a change in operation of said first node is determined from information received by the second node from the first node.

21. A method as claimed in claim 20, wherein said information is in at least one frame transmitted from the first node to the second node.

22. A method as claimed in claim 16 or any claim appended

thereto, wherein said third node is a mobile station.

23. A method as claimed in any preceding claim, wherein said first node is a base station or a radio network controller in a wireless cellular telecommunications network.

24. A method as claimed in any preceding claim, wherein said second node is a base station or a radio network controller in a wireless cellular telecommunications network.

25. A first node for transmitting data to a second node, wherein said first node comprises transmitting means for transmitting data to said second node, said transmitting means have a first mode of operation in which data is transmitted in data frames and if there is no data to be transmitted empty frames are transmitted and a second mode of operation in which if there is no data no frames are transmitted at least some of the time.

26. A second node for receiving transmissions from a first node at a second node, said transmissions have a first mode in which if there is no data to be transmitted, empty frames are transmitted and a second mode in which if there is no data to be transmitted nothing is transmitted, said second node comprising means for receiving transmissions from said first node, and determining means for determining that if the transmissions have a first mode and a frame is not received, an error has occurred.

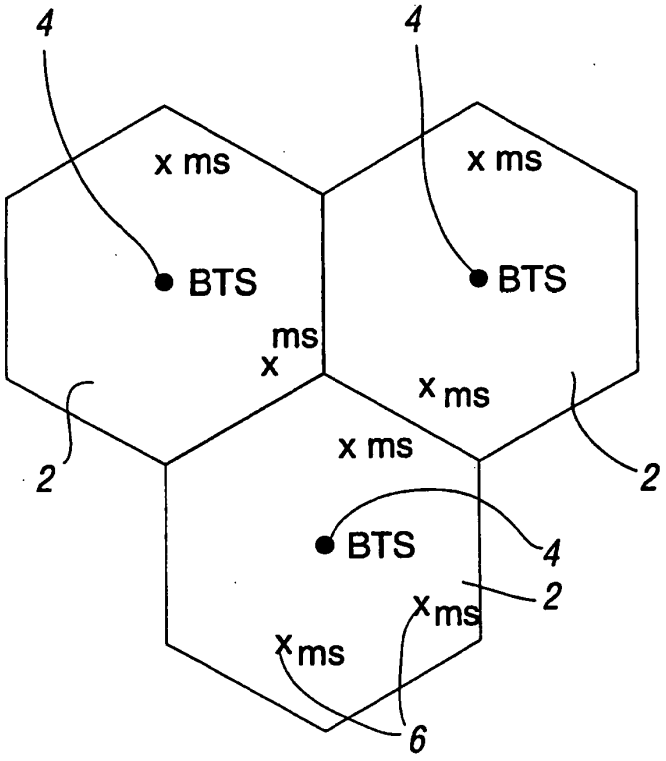


FIG. 1

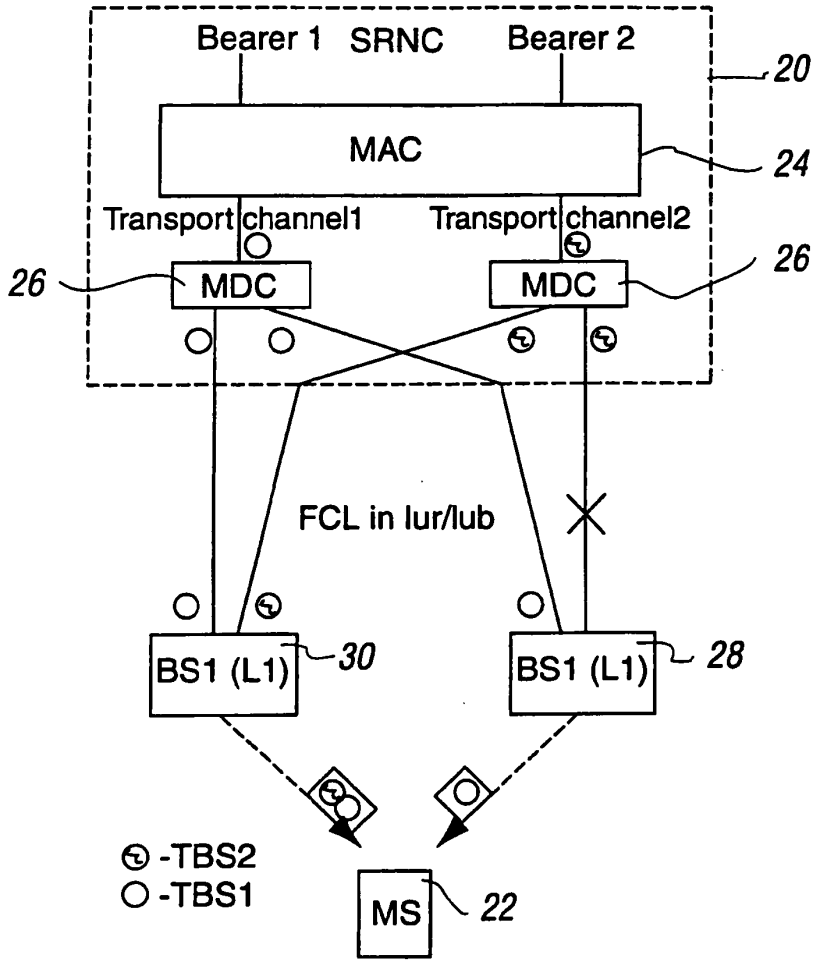

Bearer 1
SRNC
Bearer 2
20
MAC
24
Transport channel1
Transport channel2
26
MDC
MDC
26
FCL in Iur/Iub
BS1 (L1)
30
BS1 (L1)
28
-TBS2
-TBS1
MS
22

FIG. 2

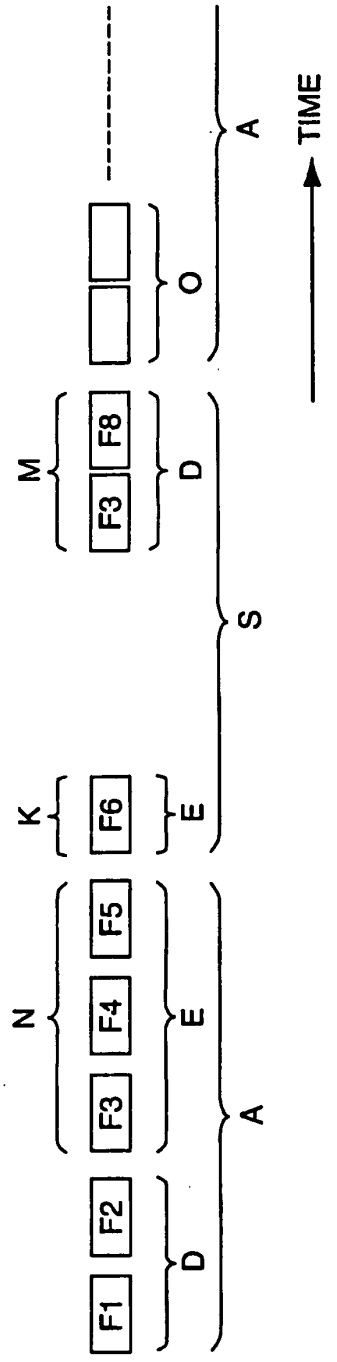


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/03453

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B7/26

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 H04B

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	EP 0 565 504 A (ERICSSON GE MOBILE COMMUNICAT) 13 October 1993 (1993-10-13) abstract column 3, line 40 -column 4, line 47 claims 1,2	1,25 2-24,26
X	WO 97 02561 A (NOKIA MOBILE PHONES LTD ;KAPANEN PEKKA (FI)) 23 January 1997 (1997-01-23) abstract claim 1; figures 2,4,5	1,25

☐ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
29 June 2000	06/07/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Lazaridis, P

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Interna tional Application No
PCT/EP 00/03453

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 December 2000 (14.12.2000)

PCT

(10) International Publication Number
WO 00/76194 A1

(51) International Patent Classification[7]: H04M 7/38

(21) International Application Number: PCT/FI00/00495

(22) International Filing Date: 2 June 2000 (02.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
991283 4 June 1999 (04.06.1999) FI

(71) Applicant *(for all designated States except US)*: **NOKIA NETWORKS OY** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

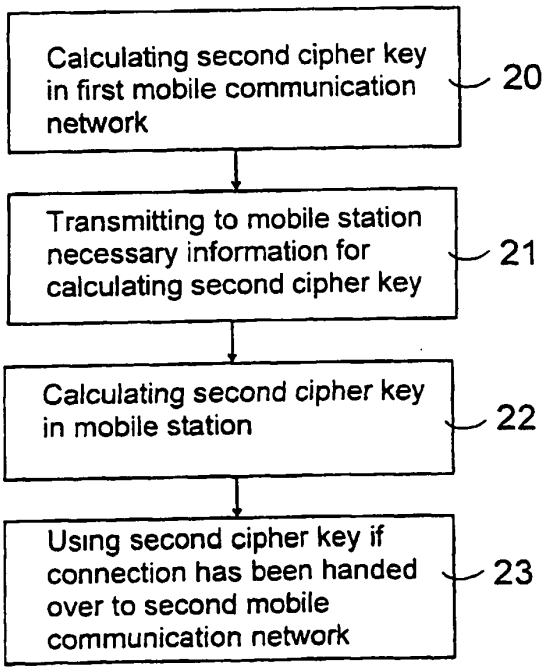
(75) Inventors/Applicants *(for US only)*: **EINOLA, Heikki** [FI/FI]; Kaksoiskiventie 7-9 B 5, FIN-02760 Espoo (FI). **MÄKINEN, Teemu** [FI/FI]; Tanhumäentie 23 B 1, FIN-04420 Järvenpää (FI). **EKOLA, Keijo** [FI/FI]; Lepolankuja 4 C 7, FIN-33900 Tampere (FI). **VIRTANEN, Kari, O.** [FI/FI]; Tohtorinkatu 34 D 17, FIN-33720 Tampere (FI). **TAMMI, Kalle** [FI/FI]; Vernissaraitti 8 A 9, FIN-33720 Tampere (FI). **HALMINEN, Harri** [FI/FI]; Urheilutie 3 B 8, FIN-36200 Kangasala (FI). **TERVO, Vesa** [FI/FI]; Kuusimäenkatu 14, FIN-33560 Tampere (FI). **VILPPULA, Matti** [FI/FI]; Koivutie 16 B 6, FIN-33960 Pirkkala (FI). **LINDHOLM, Rune** [FI/FI]; Mahlarinne 8, FIN-24280 Salo (FI). **TIMONEN, Juha, T.** [FI/FI]; Soirotie 7, FIN-90800 Oulu (FI). **SMOLANDER, Jouni** [FI/FI]; Pellervonkatu 22 A 13, FIN-33540 Tampere (FI).

(74) Agent: **KOLSTER OY AB**; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility

[Continued on next page]

(54) Title: ARRANGING AUTHENTICATION AND CIPHERING IN MOBILE COMMUNICATION SYSTEM



(57) Abstract: A method of arranging authentication and ciphering in a telecommunication system comprising two different mobile communication networks, a mobile station communicating with a first one of the mobile communication networks. In the first mobile communication network, a cipher key according to a second mobile communication network is calculated and information necessary for calculating the cipher key is transmitted to the mobile station, at which the cipher key according to the second mobile communication network is also calculated. After the connection has been handed over to the second mobile communication network, traffic is ciphered by using said precalculated cipher key.

WO 00/76194 A1

model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) **Designated States** *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*
— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

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ARRANGING AUTHENTICATION AND CIPHERING IN MOBILE COMMUNICATION SYSTEM

BACKGROUND OF THE INVENTION

The invention relates to a method and an arrangement for arranging data protection disclosed in the preambles of the independent claims.

In mobile communication systems, at least one part of a transmission path is comprised of a wireless section, whereby data transmission takes place via a radio path. A radio path is a physically open resource, which puts security at risk. Various solutions have been developed in digital mobile communication systems to arrange data protection, including ciphering methods and methods for identifying, i.e. authenticating, a user or a subscriber.

In mobile communications systems, a mobile network typically carries out subscriber authentication in order to make sure that only correct parties have an access right. For example, a mobile station in a digital GSM system comprises a subscriber identity module SIM application comprising means for authenticating the subscriber. The SIM application further uses a personal identity number PIN check, whereby only the person who knows the PIN code can use the SIM application. In authentication, the mobile station transmits to the GSM network identification information, and the SIM and thus also the subscriber are authenticated on the basis of this information. The SIM comprises mobile-operator-specific information, including an SIM-specific international mobile subscriber identity IMSI of a mobile services subscriber. Typically, the SIM also comprises a temporary mobile subscriber identity TMSI within a location area, which can be used to avoid transferring the IMSI over a radio path.

A mobile switching centre MSC, which typically also comprises a visitor location register VLR, transmits an authentication request to an authentication centre AuC. The authentication centre AuC is typically located as a part of a home location register HLR of the subscriber. Subscriber authentication information and authentication algorithms are stored in the authentication centre. On the basis of the IMSI comprised in the authentication request, the authentication centre AuC selects a subscriber-specific authentication key Ki. In addition, a random-number generator generates a number of random-number parameters RAND, which, together with the key Ki, are used to provide each RAND parameter with a checking parameter SRES by applying authentication algorithm A3. The authentication centre AuC typically transmits

these RAND/SRES parameters simultaneously with a calculated cipher key Kc to the visitor location register VLR to be stored.

When the VLR wishes to authenticate a subscriber, it selects a RAND value for the parameter from a RAND/SRES table corresponding to the present subscriber and transmits the RAND value to the mobile station and further to the SIM application. The SIM comprises the same authentication key Ki and authentication algorithm A3 as those used at the authentication centre AuC. The SIM calculates the SRES parameter, which is the authentication response, by means of the received RAND parameter and the key Ki by applying algorithm A3. The mobile station returns the SRES parameter to the visitor location register VLR. The VLR compares the SRES value transmitted by the mobile station with a stored SRES value, and if they are the same, the authentication has succeeded. In principle, the GSM network can request authentication at any stage when a mobile station is registered in the network. Authentication can be carried out particularly when a mobile station registers in a network.

Ciphering is used in many telecommunication systems to prevent data to be transmitted from becoming subject to unauthorised access. For example, it is possible in the GSM system to use ciphering of data transmission which is difficult to crack, whereby speech and data converted into digital form are ciphered at the mobile station to be transmitted over the radio path. Similarly, received ciphered data in the GSM network is deciphered into plain speech and data. In connection with the present application, ciphering can refer either to ciphering or deciphering of traffic. Ciphering and user authentication utilise cipher keys and ciphering algorithms accessible to the particular transmission and reception equipment only.

When in the GSM system the mobile switching centre MSC/VLR has authenticated the user, ciphering of the traffic to be transmitted can be initiated. The cipher key Kc is calculated in connection with authentication by means of the secret key Ki and the random number RAND by applying algorithm A8 both at the authentication centre AuC and the SIM. Algorithms A3 and A8 are typically implemented such that both the SRES parameter and the cipher key Kc are calculated simultaneously. In the authentication parameters the authentication centre transmits the cipher key Kc with the RAND and SRES parameters to the visitor location register VLR, whereby these three parameters form a "triplet". The cipher key Kc is stored in the visitor location

register VLR. The visitor location register VLR transmits the random number RAND to the SIM application for authentication and cipher key calculation. The SIM calculates the cipher key Kc typically in connection with calculating the SRES parameter on the basis of the RAND parameter and the secret key Ki by applying algorithm A8. Consequently, calculating the cipher key Kc is a part of the GSM authentication. The cipher key Kc is stored in the SIM application. According to the GSM standard, the Kc is 64 bits at most.

When the mobile switching centre MSC/VLR commands ciphering to be initiated, the cipher key Kc is transmitted from the visitor location register VLR to a base station. Furthermore, a command is transmitted to the mobile station, which starts using the Kc calculated at the SIM. The GSM network selects the ciphering algorithm on the basis of the identifier of the ciphering algorithm comprised in a "classmark" identifier transmitted by the mobile station. The base station and the mobile station carry out traffic ciphering and deciphering, depending on the direction of the traffic, by means of the cipher key Kc and the number of the traffic frame by applying algorithm A5. *The GSM System for Mobile Communications* by M. Mouly and M. Pautet, Palaiseau, France, 1992, ISBN: 2-9507190-0-7, for example, discloses a more detailed description of the GSM system.

Third generation mobile communication systems have been developed throughout the world. 3rd generation partnership project 3GPP standardizes a third generation mobile communication system which is based on the GSM system and called a universal mobile telecommunications systems UMTS, which comprises a new radio interface, for example. The UMTS radio interface will be based on the wideband code division multiple access WCDMA technique. The GSM core network will be utilised in the UMTS system, whereby connection management and mobility management will mainly remain the same. The UMTS system will provide circuit-switched services and packet-switched services. The packet-switched services will probably be based on the general packet radio service GPRS in the GSM.

An essential requirement in the UMTS system is the handover requirement between the GSM and the UMTS. In connection with the present application, handover refers to changing a radio traffic connection and radio traffic responsibility from a source system to a target system without the data transfer connection provided for a user service being substantially disconnected. In the GSM/UMTS handover, the connection is thus handed over from

the UMTS system to the GSM system, or vice versa. In the GSM/UMTS handover, the connection provided for the user remains similarly uninterrupted to one in the existing internal handover in the GSM system. This enables the UMTS system to be rapidly introduced since particularly in the beginning, the GSM system with its extensive coverage area can be used as backup. For this purpose, it is probable that devices called dual-mode mobile stations supporting both the GSM system and the UMTS system will appear on the market.

In the UMTS standardization work, it is likely that a solution with mainly similar principles to the GSM procedures will be selected as far as the security architecture is concerned. In such a case, as high compatibility with the GSM architecture as possible can be achieved. Both the UMTS network and a user service identity module USIM application of the SIM identity application kind in the GSM comprise a secret key which is required for carrying out authentication. Changes will primarily relate to key lengths and algorithms used; document TR S3.03 version 0.1.2 "3G Security: Security Architecture" in the 3GPP discusses security requirements in the UMTS system. Particularly the cipher key to be used will probably be longer than in the GSM system.

In order to support the GSM system, a UMTS IC card UICC comprising the USIM application may also comprise the SIM application of the GSM system. The UMTS system further requires that services may be provided to mobile stations with only a smart card comprising a GSM identity SIM application. Furthermore, at the early stage the GSM/UMTS core network may be the same, so the core network of the UMTS system can also support authentication and ciphering according to the GSM system as well.

In the GSM system, in a handover situation, ciphering parameters used in handover between mobile switching centres, such as the cipher key, are transmitted from the source network to the target network. Hence, when a connection is handed over from the GSM network to the UMTS network, the cipher key Kc according to the GSM can be used while the traffic remains ciphered all the time. It is naturally required that the UMTS network supports the ciphering according to the GSM system. It is also possible to carry out authentication according to the UMTS system and start using a UMTS cipher key after handover.

When the mobile station is in the UMTS network, a cipher key according to the UMTS system is available for its use. When handover from the UMTS system to the GSM system is carried out, the problem is the ciphering

since a base station sub-system BSS according to the GSM system is not necessarily able to carry out the ciphering by the UMTS parameters. Consequently, the UMTS cipher key cannot be used as such after handover, according to the GSM principles. According to the prior art, when a change to the GSM system takes place, authentication according to the GSM system can be carried out after handover. In such a case, GSM ciphering can be initiated only after the cipher key Kc has been calculated. This, however, is time-consuming, and some of the traffic will be transferred over the GSM radio interface unciphered.

BRIEF DESCRIPTION OF THE INVENTION

An object of the invention is thus to provide a method and an apparatus implementing the method so as to enable the above-mentioned problems to be alleviated. The objects of the invention are achieved by a method and a system which are characterized by what is disclosed in the independent claims. Preferred embodiments of the invention are disclosed in the dependent claims.

The invention is based on the idea that a cipher key of a "second" mobile communication network according to a mobile communication system, such as a GSM system, is determined in a first mobile communication network typically according to a different mobile communication system, such as a UMTS system, when a mobile station operates in the first mobile communication network. In such a case, a "second" cipher key according to the second mobile communication network can be determined which can preferably be stored both in the mobile station and in the first mobile communication network usually using a "first" cipher key for ciphering traffic. The advantage achieved is that the second cipher key according to the second mobile communication network, such as the GSM network, is already available before a potential handover situation.

In a handover situation, the second cipher key can, according to a preferred embodiment of the invention, be transmitted from the first mobile communication network to a network element performing ciphering, such as a base station, in the second mobile communication network. Furthermore, the second cipher key stored in the subscriber identification application, such as the SIM application, is preferably transmitted to a means in the mobile station which carries out ciphering in the mobile station. Hence, as soon as the logical connection has been handed over to the base station system of the second

mobile communication network, it is possible to start to use ciphering according to the network concerned both at the mobile station and at the network element in the second mobile communication network that carries out the ciphering. The advantage then achieved is that, with the exception of the first signalling messages, no traffic is transferred unciphered over the air interface after handover, as is the case in an internal handover situation in the GSM system.

According to a solution of the invention, a mobile communication network and a mobile station can use several different and alternative methods of ciphering or authentication by using different algorithms or keys. If the mobile communication network and the mobile station support more than one ciphering or authentication method, it is thus possible to e.g. change the cipher key used, if necessary.

According to a preferred embodiment of the invention, a first mobile communication network examines, by means of an IMSI and/or classmark identifier, for example, whether a mobile station supports a second mobile communication network. In such a case, the cipher key according to a second mobile communication network is preferably calculated only if the mobile station supports the second mobile communication network. Furthermore, according to a preferred embodiment of the invention, the second cipher key can be calculated simultaneously with authentication according to the first mobile communication system. In such a case, one message is preferably used for requesting of the authentication centre and further, the mobile station, calculation of a cipher key according to two different systems and, possibly, of an authentication response.

On the other hand, according to another preferred embodiment of the invention, a request can be specified for calculating explicitly a second cipher key according to the second mobile communication system. This can be necessary when, for example, it is detected that handover is necessary to a second mobile communication network. In such a case, calculation of the cipher key according to the second mobile communication network only can be requested preferably in connection with authentication. According to an embodiment of the invention, the second cipher key can be calculated only when necessary, in other words when a decision is made about handover to the second mobile communication network.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is now described in closer detail in connection with the preferred embodiments with reference to the accompanying drawings, in which

Figure 1 shows, by way of example, a UMTS system with a GSM base station sub-system also connected thereto;

Figure 2 shows a method according to a preferred embodiment of the invention in a simplified manner and by means of flow diagram;

Figure 3 shows an authentication implementation according to a preferred embodiment of the invention by means of a signalling diagram;

Figure 4 shows, by way of example and by means of a signalling diagram, a handover function from a UMTS system to a GSM system.

DETAILED DESCRIPTION OF THE INVENTION

In principle, the invention can be applied to any mobile communication system. It is particularly well suited for a UMTS system, which will largely be based on the GSM system. In the following, a preferred embodiment of the invention will be described by using an example wherein GSM authentication functions, calculation of a cipher key in particular, are carried out in a UMTS network before a handover function from the UMTS network to a GSM network (Figures 1 and 3) and a handover function which utilizes, according to the invention, a precalculated cipher key (Figure 4). Figure 2 describes in a simplified manner a method according to a preferred embodiment of the invention independently of the mobile communication system used.

Figure 1 shows, by way of example, a mobile communication network according to the UMTS system, a core network CN of the mobile communication network also being able to control a GSM base station sub-system. A UMTS mobile station MS comprises mobile equipment ME and a UICC smart card. A UMTS radio access network RAN comprises one or more base stations BS, and radio frequencies available to the base stations are controlled by a radio network controller RNC.

For circuit-switched services, the radio network controllers RNC are connected to a mobile switching centre MSC, which is responsible for connection establishment of the circuit-switched services and routing them to correct addresses. Two databases are utilized herein which comprise information on mobile subscribers: a home location register HLR and a visitor location register

VLR. Similarly, a serving GPRS support node SGSN utilizing the home location register HLR is used for packet-switched services. Both the MSC and the SGSN communicate with an authentication centre AuC, typically via the home location register HLR.

The mobile switching centre MSC is via an interworking function IWF connected to other telecommunication networks, such as a public switched telephone network PSTN or an integrated services digital network ISDN. A GPRS gateway support node GGSN communicates with packet data networks PDN.

A base station sub-system BSS according to the GSM system is also connected to the core network CN, the base station sub-system BSS comprising at least one base transceiver station BTS and a base station controller BSC.

A home environment HE specified in the UMTS documents of the 3GPP enters a contract with a subscriber for service provision and provides a USIM application. In such a case, the home location register HLR is located in the home environment HE. A serving network SN refers to a network in the area of which the mobile station is currently located. In roaming situations or in situations in which service provision and network operation are separated from each other, separate home environment HE and serving network SN can be discerned. In Figure 1, the home environment HE and the serving network SN are not separated.

In functions described later, the visitor location register VLR may be located in the serving network SN and the authentication centre AuC may be located in the home environment HE of a different operator or they may belong to a network controlled by the same operator. In connection with the present application, networks elements in the core network CN of Figure 1 are named as in the GSM system; the essential feature is that the network elements are capable of carrying out the functions according to the UMTS system.

The security architecture in the UMTS system will be mainly similar to that in the GSM system. Hence, the procedure described earlier according to the GSM will also be implemented in the UMTS; probable differences will be discussed in the following. Table 1 shows UMTS parameters corresponding to GSM parameters that have been discussed in 3GPP document TR S3.03 version 0.1.2 "3G Security: Security Architecture".

Table 1.

DESCRIPTION	GSM	UMTS
random number parameter	RAND	RANDu
authentication checking parameter to be compared (authentication response)	SRES	XRES
cipher key	Kc	CK
integrity key	-	IK
authentication token	-	AUTN

In authentication according to the UMTS system, the authentication centre AuC produces five parameters in accordance with Table 1 and transmits them to the visitor location register VLR. In the GSM system, three parameters are produced, i.e. a triplet. The random number parameter RANDu corresponds to the RAND parameter in the GSM system, but may vary in length. An authentication checking parameter XRES (Expected Response) and a cipher key CK in particular may also vary in length compared to the GSM parameters SRES and Kc. The GSM lacks an authentication token AUTN; it can be transmitted to the USIM application in the same message as the RANDu parameter. By means of the AUTN token, the USIM application can check whether the serving network has the right to serve UMTS services. As distinct from the GSM system, the USIM generates an XRES parameter and calculates a cipher key CK only if the AUTN parameter is acceptable. As in the GSM system, the USIM transmits the calculated XRES parameter to the network to the visitor location register VLR, which compares it with the authentication checking parameter received from the authentication centre. The authentication has succeeded if the XRES calculated in the network and the XRES parameter calculated in the USIM application correspond to each other.

The GSM system lacks an integrity key IK; in the UMTS system, it will be used for protecting certain signalling messages, such as information on features of a mobile station, for example. The IK is calculated both in the USIM application and in the UMTS network. Since UMTS standardization work is still underway, algorithms necessary for producing the parameters shown in Table 1 have not been determined precisely. They will probably differ from GSM al-

gorithms A3, A5 and A8. The key corresponding to the secret key Ki in the GSM is K in the UMTS, K being used in calculating authentication parameters both in the USIM application and the authentication centre.

In principle, the GSM or the UMTS network can request authentication of a mobile station at any time. Authentication can be carried out e.g. in connection with location update or while providing a paging response when a mobile station receives a call. The invention can be applied to authentication at any time.

In the example according to the invention, the mobile station MS is capable of establishing a connection both to the GSM and the UMTS networks, i.e. it is a so-called dual-mode mobile station. The MS thus comprises functions both according to the GSM system and the UMTS system, and further, functions of the SIM application and the USIM application. The SIM/USIM functions are preferably located on a smart card UICC and they can preferably be provided from the same operator, i.e. home environment HE, as one application. It is assumed that the subscriber identifier, preferably the IMSI, is the same both for the GSM and the UMTS system. Hence, the IMSI identifier identifies both the SIM application and the USIM application. On the basis of the IMSI identifier, the UMTS network can preferably also detect whether a subscriber that has the right to access both GSM and UMTS services is at issue. Even though the IMSI identifier were the same, authentication (comprising calculation of cipher keys) can be carried out in the solution according to a preferred embodiment of the invention for both the SIM application and the USIM application separately.

In the following, a method according to a preferred embodiment of the invention will be described in a simplified manner by means of Figure 2, without being restricted to any certain mobile communication system. In Figure 2, the most important steps of the invention are simplified, not all embodiments being shown. Later, by means of Figures 3 and 4, different steps and embodiments will be described in closer detail, applied to the UMTS and the GSM systems.

When a mobile station operates in a first mobile communication network, traffic being transferred over the air interface is ciphered mainly by using a first cipher key. According to the invention, a second cipher key according to a second mobile communication network is calculated in the first mobile communication network (20). This can take place after the first mobile

communication network has detected a need for handover of the active connection to the second mobile communication network, for example, or in connection with authentication according to the first mobile communication network.

After calculating the second cipher key, the first mobile communication network transmits information necessary for calculating the cipher key to the mobile station (21). The mobile station detects that calculation of the second cipher key according to the second mobile communication network is at issue and carries out calculation of the second cipher key (22). Next, the second cipher key is available both in the first mobile communication network and at the mobile station. If the logical connection provided for the mobile station is handed over to the second mobile communication network, the second cipher key is used both at the mobile station and in the second mobile communication network after the handover (23). The first mobile communication network has then preferably transmitted the second key to the network element carrying out the ciphering in the second mobile communication network before handover. Hence, the traffic between the mobile station and the second mobile communication network can be ciphered immediately after handover.

In the following, a solution according to a preferred embodiment of the invention when applied to circuit-switched connections in the UMTS and GSM networks will be described in closer detail by means of Figure 3. Figure 3 shows an exemplary signalling pattern of an authentication process, i.e. production of a cipher key, production and checking of authentication parameters, only including steps that are essential to the invention. When the mobile station is within the area of the UMTS network, it is further assumed that the traffic between the mobile station and the mobile communication network is ciphered using the UMTS cipher key.

In Figure 3, the mobile station MS transmits a location update request message, for example, in order to request location update (identity, arrow 30). The essential point is that the message (identity, arrow 30) comprises a UMTS subscriber identifier, either a TMSI or an IMSI identifier, for a similar purpose to the one in the GSM system, i.e. for identifying a subscriber. In some UMTS specifications, a temporary mobile user identity TMUI corresponds to the TMSI identifier, and an international mobile user identity IMUI to the IMSI identifier.

The UMTS network may also transmit a request to the mobile station to transmit a subscriber identifier, and the mobile station responds by transmitting the requested subscriber identifier (identity, arrow 30).

It is further possible that in the UMTS system, the IMSI identifier is ciphered over the radio path in order to prevent misuse. If the IMSI identifier is ciphered, the visitor location register VLR has to transmit the ciphered IMSI identifier to the home location register HLR, which transmits the unciphered IMSI identifier back to the visitor location register (not shown).

The visitor location register VLR transmits the request for authentication and the IMSI identifier to the home location register HLR and further to the authentication centre AuC (send authentication info, arrow 31).In the network, the VLR and the HLR communicate using the MAP signalling protocol. In the UMTS system, it is possible to use a different MAP version than in the GSM since, compared to the GSM, the above-described UMTS authentication functions require changes in the MAP protocol. Consequently, the home environment HE and further, the authentication centre AuC in connection with the home location register can infer from, for example, the MAP version that the request (send authentication info, arrow 31) has been received from a network capable of the UMTS.

On the basis of the IMSI identifier the home environment HE, preferably the home location register HLR, can detect that the subscriber has the right to access both the GSM and the UMTS network. According to a preferred embodiment of the invention, the authentication centre AuC calculates both the authentication parameters of the UMTS and the authentication parameters of the GSM (triplet) substantially simultaneously and transmits them to the visitor location register VLR. If the serving network SN is not according to the UMTS (an MAP version according to the GSM system, for example), or on the basis of the IMSI identifier only the SIM application can be used, the authentication centre AuC calculates preferably the GSM authentication parameters only. Furthermore, characteristics of the mobile station MS may also set requirements for the calculation of the GSM parameters, i.e. whether the mobile station supports the GSM system. Then, correspondingly, when the mobile station only supports the UMTS system or when, on the basis of the IMSI identifier, only the USIM application can be used, the AUC can calculate the authentication parameters of the UMTS only.

Alternatively, it is possible for the visitor location register VLR to request authentication information according to a desired system or systems in connection with a (send authentication info, arrow 31) message. This can be implemented, for example, by adding bits indicating the type of authentication requested to the authentication information request (send authentication info, arrow 31).

In order to avoid unnecessary processing power consumption, GSM authentication is carried out in the UMTS network only if the mobile station comprises the SIM application and the GSM functionality (dual-mode mobile station). The UMTS network can discern from the classmark identifier, for example, whether the mobile station supports the GSM system. In such a case, the visitor location register can, the classmark identifier and/or the IMSI identifier having indicated that the mobile station supports the GSM system, request authentication both according to the GSM system and the UMTS system of the authentication centre AuC in connection with the (send authentication info, arrow 31) message.

The authentication centre AuC transmits the calculated authentication information to the visitor location register VLR (authentication info, arrow 32), wherein the information is stored. Since the authentication centre has calculated the GSM authentication parameters, a cipher key Kc according to the GSM network is available in the serving network SN for later use. After this step, the idea of the invention can be applied at least in two different ways: by implicit or explicit GSM authentication, which will be described next.

An implicit GSM authentication according to a preferred embodiment of the invention will be discussed in the following. In this case, the UMTS random-number parameter RANDu received from the authentication centre AuC is equal in length to the GSM random-number parameter RAND (preferably 128 bits). The VLR transmits to the mobile station an authentication request (authentication request, arrow 33) comprising the random-number parameter RANDu of the length of the RAND parameter in the GSM system. Since the authentication at issue is authentication according to the UMTS system, an authentication token AUTN is also preferably transmitted to the USIM application of the mobile station.

According to a preferred embodiment of the invention, the mobile station MS transmits the random-number parameter RANDu both to the SIM and the USIM applications even though the authentication request

(authentication request, arrow 33) were according to the UMTS system. The mobile station may comprise, for example, means for checking the random-number parameter, in which case, when the random-number parameter is according to the GSM system, it is also transmitted to the SIM application. Then, according to a preferred embodiment of the invention, the SIM application calculates the cipher key Kc by using the secret key Ki and the RANDu parameter by applying A8 algorithm. The SIM application does not, however, have to produce the authentication checking parameter SRES. The SIM application stores the Kc for later use preferably in the memory of the smart card UICC.

The USIM application receives the RANDu parameter, and, if the authentication token AUTN is acceptable, carries out the calculation of the authentication checking parameter XRES. Then, by means of the secret key K and the RANDu parameter and the authentication algorithm of the UMTS, the USIM produces the XRES parameter. The cipher key CK of the UMTS can be calculated simultaneously by means of the secret key K and the calculation algorithm of the cipher key. The authentication checking parameter XRES is transmitted from the USIM application to the visitor location register VLR (authentication response, arrow 34), which compares it with the checking parameter received from the authentication centre AuC. If they match, authentication according to the UMTS has succeeded.

According to a preferred embodiment of the invention, in the implicit GSM authentication it is further assumed that the GSM authentication has been carried out when the UMTS authentication has succeeded. Furthermore, the cipher key according to the GSM system exists both in the UMTS network and in the USIM application for potential handover from the UMTS network to the GSM network. When authentication has been carried out, the UMTS network can transmit an approval, i.e. acknowledgement of the authentication to the mobile station MS (acknowledgement, arrow 35). Necessary procedures at a given time can then be continued according to the prior art; for example, the UMTS network may give the mobile station MS a command to initiate ciphering.

Since in the implicit GSM authentication it is only necessary to calculate the cipher key Kc, the authentication centre AuC does not necessarily have to calculate and transmit all authentication parameters of the visitor location register VLR. Only the cipher key Kc has to be calculated and transmitted

to the visitor location register, preferably applying the same random-number parameter as in calculating the cipher key CK of the UMTS.

According to a preferred embodiment of the invention, so-called explicit GSM authentication can also be carried out. In such a case, the RANDu parameter can be of a different length than the RAND parameter of the GSM. The UMTS network then transmits, preferably in the authentication request (authentication request, arrow 33), information on which authentication is desired, the GSM authentication, the UMTS authentication, or possibly both.

The authentication request (authentication request, arrow 33) comprises, for example, a GSM bit and a UMTS bit. When the GSM bit has a value 1, the mobile station detects that it is the GSM authentication that is requested. Similarly, if the UMTS bit is 1, authentication according to the UMTS system will be carried out. If both bits are 1, authentication according to both systems can be carried out. The MS can detect the desired authentication also from the length of the random-number parameter RAND or RANDu. Furthermore, the mobile station MS can discern that it is the UMTS authentication that is desired if the authentication request (authentication request, arrow 33) comprises the authentication token AUTN.

If the serving network SN has requested GSM authentication, the RAND random-number parameter is transmitted to the SIM application and calculation according to the GSM system of the authentication response SRES and the cipher key Kc is carried out. The authentication response SRES is transmitted to the visitor location register VLR to be checked (authentication response, arrow 34) and the cipher key Kc is stored in the SIM application for potential later use.

If the serving network SN has requested UMTS authentication, the RANDu random-number parameter is transmitted to the USIM application and authentication according to the UMTS system is carried out in a manner described earlier. If the UMTS authentication succeeds, nothing, however, is assumed concerning the GSM authentication on the basis thereof, but the GSM authentication has to be carried out separately if the serving network SN so desires.

If the serving network SN requests authentication according both to the GSM and the UMTS systems, it preferably transmits both the RANDu and the RAND parameters in the authentication request (authentication request, arrow 33). When the mobile station has detected from, for example, the two

different random-number parameters that both the UMTS authentication and the GSM authentication are requested, it transmits the RAND parameter to the SIM application and the RANDu parameter to the USIM application. The SIM and the USIM calculate the authentication responses SRES and XRES and the cipher keys Kc and CK. The mobile station MS transmits the SRES parameter transmitted by the SIM application and the XRES parameter transmitted by the USIM application to the visitor location register VLR (authentication response, arrow 34) possibly in different messages. The visitor location register VLR compares the authentication responses received from the mobile station MS with the ones received from the authentication centre AuC, and if they match, the authentications have succeeded.

The explicit method described above can generally be applied to a mobile communication system which supports several authentication methods. For example, it is possible that a new, alternative authentication and/or ciphering method will be developed for the UMTS system. The network element (e.g. the AuC) which carries out authentication and calculation of the cipher key and the means (e.g. the USIM) which carries out the corresponding functions in the mobile station comprise the same algorithms. If the serving mobile communication network and particularly the network element carrying out the functions of the visitor location register VLR know how to apply the parameters according to the alternative authentication method, the explicit method may be used. Hence, the serving mobile communication system can transmit to the authentication centre AuC an identifier of the authentication algorithm or algorithms used, for example.

On the other hand, it is also possible that the AuC is aware of the characteristics of the mobile station and further, the serving mobile communication network. In such a case, on the basis of the characteristics, it can also transmit the parameters according to the alternative method to the serving mobile communication network, to the visitor location register VLR, for example. Furthermore, the serving mobile communication network can preferably transmit to the mobile station information on the authentication method used in connection with the authentication request. This enables, for example, the cipher method used to be flexibly changed by calculating the cipher key according to the new authentication both at the authentication centre and the subscriber application. The cipher method used can, if necessary, be changed by transmitting the new cipher key to the means responsible for ciphering both

in the mobile communication network and at the mobile station. Preferably, the authentication centre AuC is also informed that the cipher method has been changed successfully.

The great advantage achieved by the above-described GSM authentication according to the implicit or explicit method is that the cipher key Kc according to the GSM system is ready for potential handover from the UMTS system to the GSM system. The cipher key Kc is stored both in the UMTS network, preferably in the visitor location register VLR, and in the mobile station, preferably in the SIM application.

The calculation of the cipher key Kc according to the GSM system can be carried out if the serving network SN so desires. It can be carried out, for example, always in connection with the UMTS authentication.

The calculation of the cipher key Kc can, according to a preferred embodiment of the invention, also be carried out when it is detected from the local radio cells that a need exists to carry out handover to the base station sub-system BSS according to the GSM system. Furthermore, the cipher key Kc can be calculated while handover is being carried out, which, however, may cause delay in carrying out the handover.

The cipher key Kc according to the GSM system can also be determined by separating it from the cipher key CK of the UMTS when, for example, the connection is being handed over to the GSM base station. The CK will probably be longer than the Kc. Then, the mobile station MS and the UMTS network, preferably the VLR, make the CK key as short as the Kc key and preferably store it in memory for later use. Hence, the Kc key according to the GSM system is available for a potential handover situation. It is then unnecessary to calculate the GSM parameters at the authentication centre or in the SIM application.

In the following, by means of Figure 4, a handover process will be described in a circuit-switched connection by way of example, only taking into account parts relevant to the invention. The mobile station MS carries out measurements of base stations located in the neighboring area, measuring also base stations of the GSM system when the UMTS network has preferably so requested. The mobile station MS transmits the measurement information to a serving radio network controller RNC (measurement, arrow 40).

The RNC makes a decision about inter-system handover on the basis of, for example, whether a handover threshold has been exceeded as far

as the signal strength is concerned. The RNC transmits an announcement about the necessity of the handover to an anchor mobile switching centre AMSC of the serving UMTS network SN (handover required, arrow 41). In handover, the AMSC is a so-called source mobile switching centre. The AMSC preferably comprises interworking function IWF, which enables a handover request according the GSM system to be produced. If the cipher key Kc is not yet precalculated, the AMSC can request that it be calculated after, for example, the AMSC has received the handover request (handover required, arrow 41). Before the handover request is transmitted to the GSM network, the cipher key Kc is calculated, for example, in the explicit manner described above.

The AMSC retrieves the precalculated cipher key Kc preferably from the visitor location register VLR. The AMSC transmits the cipher key Kc in the handover request to a relay mobile switching centre RMSC according to the GSM system together with other information according to the GSM system and necessary in the handover, such as the classmark information of the mobile station (prepare ho request, arrow 42). It is possible that the UMTS base station sub-system and the GSM base station sub-system to which handover is to be performed are connected to the same core network, as illustrated in Figure 1. In such a case, both the GSM and the UMTS base station sub-systems can be controlled by the same mobile switching centre MSC, which transmits the handover request to the GSM base station sub-system according to the GSM system.

The RMSC transmits the handover request, which also comprises the cipher key Kc, to a base station controller BSC (handover request, arrow 43). The BSC allocates the necessary resources according to the handover request and transmits the reply to the RMSC (ho request ack, arrow 44). The RMSC transmits the reply to the handover request to the AMSC (prepare ho response, arrow 45). The AMSC transmits a command according to the UMTS system to carry out the handover to the radio network controller RNC (handover command, arrow 46).

The RNC transmits to the mobile station MS the handover command between the UMTS and the GSM systems (inter-system ho command, arrow 47). This message comprises all necessary information on, for example, the radio channel for the mobile station to be able to carry out handover according to the GSM system. The mobile station MS recognizes that the han-

dover is to the GSM system, and it activates the GSM functions. Furthermore, the mobile station preferably detects that a cipher key according to the GSM system is needed, whereby the cipher key Kc according to the GSM system is requested of the SIM application. The SIM application transmits the cipher key Kc to the means of the mobile station which carries out ciphering according to the GSM system.

The mobile station MS transmits a handover access message on a GSM channel allocated thereto as in a typical GSM system (handover access, arrow 48). The mobile station MS typically transmits one or more unciphered [HANDOVER ACCESS] messages determined in the GSM specifications. Next, the connection is handed over be served by the GSM base station subsystem according to the GSM system which is known per se and which needs not be described in closer detail here. Traffic to be transmitted can, according to a preferred embodiment of the invention, be ciphered by using the precalculated cipher key Kc and the ciphering algorithm A5 preferably immediately after the (handover access, arrow 48) message. The GSM network can possibly also carry out the authentication although the traffic can already be ciphered.

The great advantage achieved from the solution of a preferred embodiment of the invention is that the traffic between the mobile station and the mobile communication network can be ciphered immediately after handover by means of the cipher key Kc according to the GSM system. If no cipher key Kc for ciphering were available in the mobile station and the GSM base station, it would be necessary to carry out authentication and calculation of the cipher key after handover in the GSM network. In such a case, some of the traffic to be transmitted would remain unciphered and time would be wasted.

In order to implement a preferred embodiment of the invention compared to the prior art implementation, such as the GSM system, changes are mainly required in the functions of the mobile switching centre MSC/VLR, the visitor location register VLR and the mobile station MS. The functions required by the solution of the invention can be implemented by software.

The above-described authentication, calculation of the cipher key and handover implementation describe by way of example the application of the invention to the UMTS and the GSM systems. The invention can also readily be applied to other mobile communication systems, such as wireless local area networks.

It is obvious to one skilled in the art that as technology advances, the basic idea of the invention can be implemented in several different ways. The invention and its embodiments are thus not restricted to the above-described examples but they can vary within the scope of the claims.

CLAIMS

1. A method of arranging data protection in a telecommunication system comprising a first mobile communication network wherein a first cipher key is used for ciphering traffic between a mobile station and a mobile communication network, a second mobile communication network wherein a second cipher key is used for ciphering traffic between a mobile station and a mobile communication network, and a mobile station supporting said mobile communication networks, **characterized** by

calculating said second cipher key in the first mobile communication network when the mobile station operates in the first mobile communication network,

transmitting information necessary for calculating said second cipher key from the first mobile communication network to the mobile station when the mobile station operates in the first mobile communication network, and

calculating said second cipher key at the mobile station.

2. A method as claimed in claim 1, **characterized** by

using said second cipher key for ciphering the traffic between the mobile station and the second mobile communication network if the mobile station is handed over from the first mobile communication network to the second mobile communication network during an active connection.

3. A method as claimed in claim 1 or 2, **characterized** by

transmitting said second cipher key from the first mobile communication network to the second mobile communication network,

transmitting said second cipher key calculated at the mobile station to a ciphering means of the mobile station in response to the fact that the first mobile communication network transmits a request to the mobile station for handover to the second mobile communication network, and

using said second cipher key in ciphering traffic after the handover in the mobile station and in the second mobile communication network.

4. A method as claimed in any one of the preceding claims, **characterized** by

checking, in the first mobile communication network, whether the mobile station supports the second mobile communication network,

calculating said second cipher key in the first mobile communication network in response to the fact that the mobile station supports the second mobile communication network,

transmitting a request for calculation of said second cipher key from the first mobile communication network to the mobile station, and

calculating at the mobile station said second cipher key in response to said request.

5. A method as claimed in claim 4, **characterized** by

calculating said second cipher key in the first mobile communication network in response to the fact that an identifier transmitted by the mobile station, such as an IMSI subscriber identifier, and/or a classmark identifier indicate that the mobile station supports the second mobile communication network.

6. A method as claimed in any one of the preceding claims, **characterized** by

calculating said second cipher key at a network element in the first mobile communication network, such as an authentication centre, in response to the fact that a network element of the first mobile communication network, such as a visitor location register or a home location register, comprising identifiers transmitted by the mobile station requests calculation of said second cipher key, and

transmitting said second cipher key from said network element calculating the cipher key to said network element comprising the identifiers transmitted by the mobile station.

7. A method as claimed in any one of the preceding claims, **characterized** by

the mobile station comprising a subscriber identification application, such as a USIM application, to the first mobile communication network and a subscriber identification application, such as an SIM application, to the second mobile communication network,

transmitting the information necessary for calculating said second cipher key received by the mobile station to the identification application according to the second mobile communication network.

8. A method as claimed in any one of the preceding claims, **characterized** by

calculating said second cipher key in the first mobile communication network in connection with calculating an authentication response according to the first mobile communication network and the first cipher key,

transmitting the information necessary for calculating the first cipher key and said second cipher key, such as a random-number parameter, from the first mobile communication network to the mobile station,

transmitting the necessary information at the mobile station for calculating said first and second cipher keys to the identification applications according to the first and the second mobile communication networks,

calculating said second cipher key in the identification application according to the second mobile communication network and the authentication response in the identification application according to the first mobile communication network,

transmitting said authentication response according to the first mobile communication network from the mobile station to the first mobile communication network, and

acknowledging the authentication of the mobile station to be performed for the second mobile communication network in response to the fact that the first mobile communication network accepts the authentication response transmitted by the mobile station.

9. A method as claimed in any one of claims 1 to 7, **characterized** by

determining a random-number parameter and calculating the authentication response according to the second mobile communication network in connection with calculating said second cipher key in the first mobile communication network,

transmitting a request to the mobile station for calculation of an authentication response according to the second mobile communication network,

transmitting the information necessary at the mobile station for calculating said second cipher key to the identification application according to the second mobile communication network,

calculating, in the identification application according to the second mobile communication network, the authentication response according to the second mobile communication network in connection with calculating said second cipher key,

transmitting the authentication response according to the second mobile communication network calculated at the mobile station to the first mobile communication network, and

checking said authentication response according to the second mobile communication network transmitted by the mobile station in the first mobile communication network.

10. A method as claimed in any one of claims 1 to 7, **characterized** by

calculating said second cipher key by shortening the first cipher key in the first mobile communication network and at the mobile station before the handover to the second mobile communication network takes place.

11. A method as claimed in any one of the preceding claims, **characterized** by

calculating said second cipher key in response to the fact that a decision has been made in the first mobile communication network to carry out handover to the second mobile communication network.

12. A telecommunication system comprising at least a first mobile communication network arranged to use a first cipher key for ciphering traffic between a mobile station and a mobile communication network, a second mobile communication network arranged to use a second cipher key for ciphering traffic between a mobile station and a mobile communication network, and a mobile station arranged to support said different first and second mobile communication networks, **characterized** in that

the first mobile communication network is arranged to calculate said second cipher key when the mobile station operates in the first mobile communication network,

the first mobile communication network is arranged to transmit information necessary for calculating said second cipher key from the first mobile communication network to the mobile station when the mobile station operates in the first mobile communication network, and

the mobile station is arranged to calculate said second cipher key.

13. A telecommunication system as claimed in claim 12, **characterized** in that

the mobile station and the second mobile communication network are arranged to cipher the traffic between the mobile station and the second mobile communication network by using said second cipher key if the mobile

station is handed over from the first mobile communication network to the second mobile communication network during an active connection.

14. A telecommunication system as claimed in claim 12 or 13, **characterized** in that

the first mobile communication network is arranged to transmit said second cipher key to the second mobile communication network before the handover to the second mobile communication network,

the mobile station is arranged to transmit said second cipher key calculated at the mobile station to a ciphering means of the mobile station in response to the fact that the first mobile communication network transmits a request to the mobile station for handover to the second mobile communication network, and

the mobile station and the second mobile communication network are arranged to use said second cipher key in ciphering traffic after the handover.

15. A telecommunication system as claimed in any one of claims 12 to 14, **characterized** in that

the first mobile communication network is arranged to check whether the mobile station supports the second mobile communication network on the basis of an identifier transmitted by the mobile station, such as an IMSI and/or a classmark identifier,

the first mobile communication network is arranged to calculate said second cipher key in response to the fact that the mobile station supports the second mobile communication network,

the first mobile communication network is arranged to transmit a request to the mobile station for calculation of said second cipher key, and

the mobile station is arranged to calculate said second cipher key on the basis of said request.

16. A telecommunication system as claimed in any one of claims 12 to 15, **characterized** in that

a network element comprising identifiers transmitted by the mobile station of the first mobile communication network, such as a visitor location register or a home location register, is arranged to transmit the request for calculation of said second cipher key to a network element of the first mobile communication network, such as an authentication centre,

the network element of the first mobile communication network, such as the authentication centre, is arranged to calculate said second cipher key in response to the fact that the network element comprising the identifiers transmitted by the mobile station requests calculation of said second cipher key, and

said network element calculating said second cipher key is arranged to transmit the calculated second cipher key to said network element comprising the identifiers transmitted by the mobile station.

17. A telecommunication system as claimed in any one of claims 12 to 16, **characterized** in that

the first mobile communication network is arranged to calculate said second cipher key in connection with calculation of an authentication response according to the first mobile communication network and the first cipher key,

the first mobile communication network is arranged to transmit to the mobile station information necessary for calculating the first cipher key and said second cipher key, such as a random-number parameter,

the mobile station comprises an identification application according to the first mobile communication network, such as a USIM application, and an identification application according to the second mobile communication network, such as an SIM application,

the mobile station is arranged to transmit said information necessary for calculating the first cipher key and said second cipher key to the identification applications according to the first and the second mobile communication networks,

said identification application according to the second mobile communication network is arranged to calculate said second cipher key and said identification application according to the first mobile communication network is arranged to calculate the authentication response according to the first mobile communication network, and

the mobile station is arranged to transmit the authentication response according to the first mobile communication network to the first mobile communication network.

18. A telecommunication system as claimed in any one of claims 12 to 16, **characterized** in that

the first mobile communication network is arranged to determine a random-number parameter according to the second mobile communication

network and to calculate the authentication response in connection with calculating said second cipher key,

the first mobile communication network is arranged to transmit a request to the mobile station for calculating the authentication response according to the second mobile communication network,

the mobile station comprises an identification application according to the first mobile communication network, such as a USIM application, and an identification application according to the second mobile communication network, such as an SIM application,

the mobile station is arranged to transmit the information necessary for calculating said second cipher key to the identification application according to the second mobile communication network,

the identification application according to the second mobile communication network is arranged to calculate said second cipher key and the authentication response according to the second mobile communication network substantially simultaneously,

the mobile station is arranged to transmit the authentication response according to the second mobile communication network to the first mobile communication network, and

the second mobile communication network is arranged to check the authentication response according to the second mobile communication network.

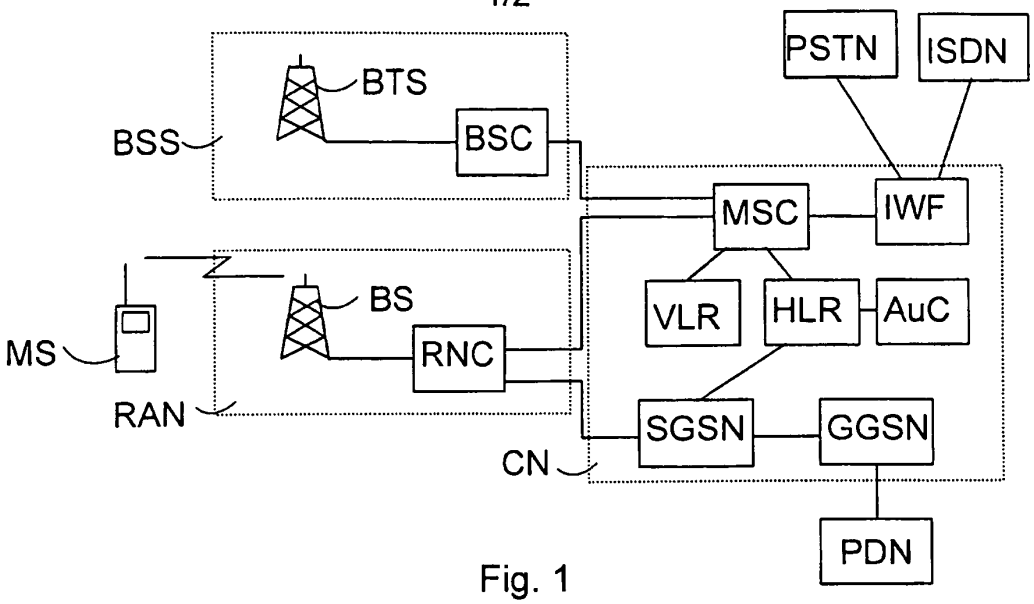

PSTN
ISDN
BTS
BSS
BSC
MSC
IWF
BS
VLR
HLR
AuC
MS
RNC
RAN
SGSN
GGSN
CN
PDN

Fig. 1

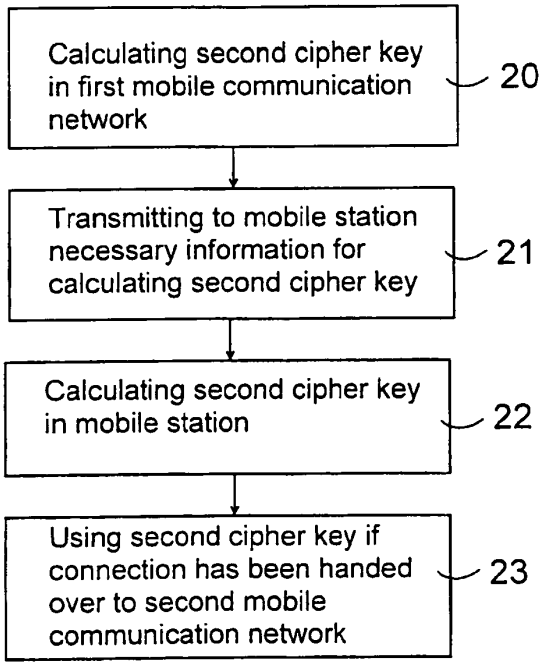

Calculating second cipher key in first mobile communication network
20
Transmitting to mobile station necessary information for calculating second cipher key
21
Calculating second cipher key in mobile station
22
Using second cipher key if connection has been handed over to second mobile communication network
23

Fig. 2

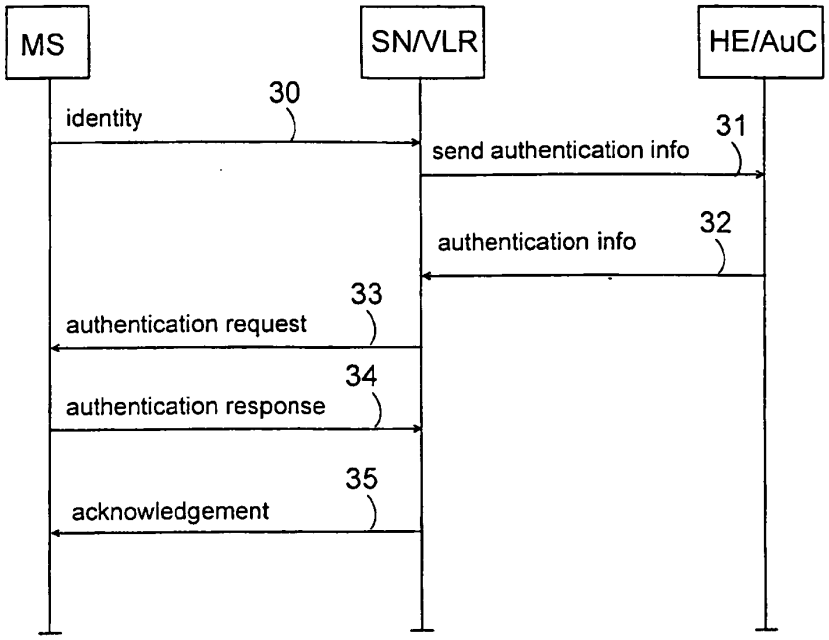

MS
SN/VLR
HE/AuC
30
identity
31
send authentication info
32
authentication info
33
authentication request
34
authentication response
35
acknowledgement

Fig. 3

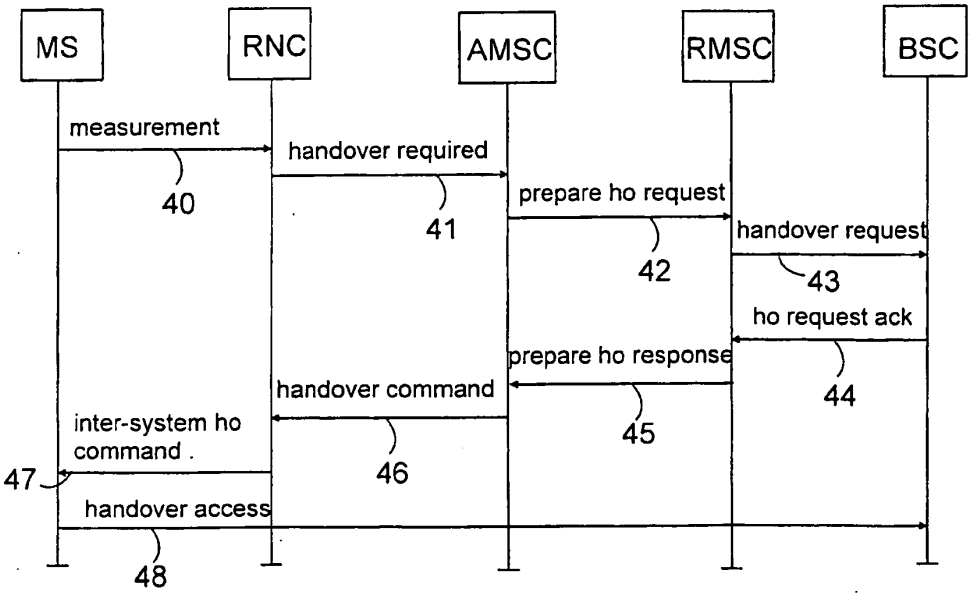

MS
RNC
AMSC
RMSC
BSC
measurement
40
handover required
41
prepare ho request
42
handover request
43
ho request ack
44
prepare ho response
45
handover command
46
inter-system ho command .
47
handover access
48

Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 00/00495

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04M 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)

IPC7: H04M

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9859513 A1 (NOKIA MOBILE PHONES LTD.), 30 December 1998 (30.12.98), page 1, line 3 - page 2, line 24 ---	1-18
P,A	PUTZ, S.; SCHMITZ, R. "Secure interoperation between 2G and 3G mobile radio networks". In: First International Conference on 3G Mobile Communication Technologies, 2000. (Conf. Publ. No. 471), 27-29 March 2000, pages 28-32. ISBN 0-85296-726-8 --- --------	1-18

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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"P" document published prior to the international filing date but later than the priority date claimed
"T" 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
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"Y" 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	Date of mailing of the international search report
13 November 2000	16 -11- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Tomas Erlandsson /OGU Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI 00/00495

WO	9859513	A1	30/12/98	AU	7656498	A	04/01/99
				EP	0992170	A	12/04/00
				FI	105309	B	00/00/00
				FI	972722	A	25/12/98

Form PCT/ISA/210 (patent family annex) (July 1998)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 December 2000 (14.12.2000)

PCT

(10) International Publication Number
WO 00/76243 A1

(51) International Patent Classification[7]: H04Q 7/38

(21) International Application Number: PCT/EP00/04231

(22) International Filing Date: 9 May 2000 (09.05.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9913092.4 4 June 1999 (04.06.1999) GB

(71) Applicant *(for all designated States except US)*: NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: HAUMONT, Serge [FI/FI]; Riistavuorenkuja 3 B As. 10, FIN-00320 Helsinki (FI). AHMAVAARA, Kalle [FI/FI]; Hakaniemenranta 18 D 62, FIN-00530 Helsinki (FI).

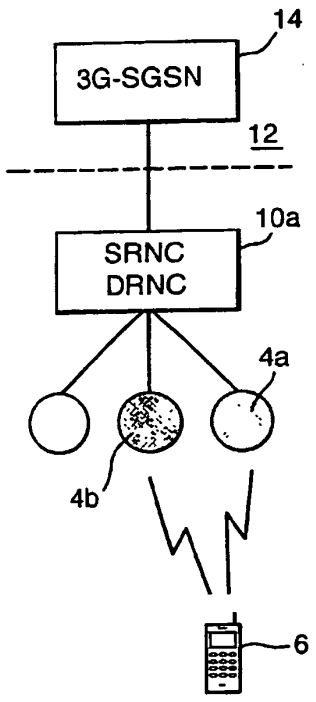
(74) Agents: STYLE, Kelda, Camilla, Karen et al.; Page White & Farrer, 54 Doughty Street, London WC1N 2LS (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU,

[Continued on next page]

(54) Title: RELEASING A CONNECTION IN A WIRELESS COMMUNICATION NETWORK



(57) Abstract: A network element (10a), such as a radio network controller, for use in a communication network (e.g. UMTS), said network element (10a) being arranged between an end station (6) and an end element (14), for example an SGSN, wherein connections are established between said end station (6) and said end element (14) via said network element (10a), said network element (10a) comprising means for determining if the connection between said end element (14) and said end station (6) is to be released.

WO 00/76243 A1

MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

RELEASING A CONNECTION IN A WIRELESS COMMUNICATION NETWORK

Field of the Invention

The present invention relates to a network element for use in a communications network. In particular, but not exclusively, the network element is a radio network controller in a code division multiple access wireless cellular communications network.

Background of the Invention

The use of code division multiple access (CDMA) is being proposed for the next generation of cellular telecommunication networks. Additionally, code division multiple access is also being used in the IS-95 standard in the USA. CDMA is a direct sequence spread spectrum technique. In a wireless cellular network using CDMA, the mobile stations in one cell associated with a first base station will use the same frequency as mobile stations in an adjacent cell associated with the second base station. The different mobile stations can be distinguished by the respective base stations as each mobile station will be using a different spreading code.

In one of the new CDMA standards which is currently being proposed, connections are made between a mobile station to a base station, from the base station to a radio network controller and from the radio network controller to a core network. The core network is arranged to control the establishment and release of connections between the mobile station and the core network. With "bursty" traffic which consists of packets of data which are sent irregularly, the

core network is unable to predict the traffic which is to be transmitted between the core network and the mobile station and vice versa.

It has been proposed that a timer mechanism be used by the core network in order to control the release of the connection. For example, if a packet of data has not been received for X seconds, then the connection is released.

This method has the problem that the core network may not release this connection at an appropriate time. This is because the core network is not aware of parameters of the radio network controller or the mobile station which might indicate that an earlier break in the connection was appropriate. This may result in connections being maintained longer than required. This unnecessarily uses up resources within the network, which may reduce the amount of traffic which can be supported.

Summary of the Invention

It is an aim of embodiments of the present invention to address this problem.

According to one aspect of the present invention, there is provided a network element for use in a communications network, said network element being arranged between an end station and an end element, wherein connections are established between said end station and said end element via said network element, said network element comprising means for determining if the connection between said end element and said end station is to be released.

Brief Description of the Drawings

For better understanding of the present invention and as to how the same may be carried into effect, reference will now be made by way of example to the accompanying drawings in which:-

Figure 1 shows a cellular telecommunication network in which embodiments of the present invention can be incorporated;

Figure 2A shows a mobile station in communication with two base stations under the control of a single radio network controller;

Figure 2B shows a mobile station in communication with two base stations, each of which is connected to a different radio network controller;

Figure 3A shows the connection before the serving radio network controller is changed;

Figure 3B shows the connections after the serving radio network controller has been changed;

Figure 4 shows the various radio resource control modes;

Figure 5 shows a first embodiment of the present invention; and

Figure 6 shows a second embodiment of the present invention.

Detailed Description of Embodiments of the Present Invention

Reference will first be made to Figure 1 in which three cells 2 of the cellular telecommunications network are shown. Each cell 2 is served by a respective base transceiver station (BTS) 4. The base station is sometimes called node B in CDMA systems. Each base transceiver station is arranged to transmit signals to and receive signals from the mobile stations 6 located in the cell

associated with the given base transceiver station 4. Likewise, each mobile station 6 is able to transmit signals to and receive signals from the respective base transceiver station 4.

The cellular telecommunications network shown in Figure 1 uses a code division multiple access technique.

With the proposed new CDMA standard, macro diversity is possible. This means that a mobile station can be connected to more than one radio network controller RNC at the same time. However, as far as the core network is concerned, these connections are controlled by one radio network controller which is defined as the serving radio network controller SRNC. This serving radio network controller SRNC communicates with a third generation serving GPRS support node 3G-SGSN. This serving GPRS support node is analogous to that of the GPRS standard used in conjunction with the GSM standard but has been modified so as to be usable with the CDMA standard.

Reference is made to Figure 2A. In Figure 2A, a mobile station 6 is in communication with two base stations 4a and 4b. Each of these base stations 4a and 4b is connected to the same radio network controller RNC 10a. The common radio network controller 10a is thus the serving radio network controller and is connected to the core network 12. This core network 12 is represented by the dashed line and is the part of the network upstream of the serving radio network controller. The serving radio network controller 10a is in fact connected to the third generation serving GPRS support node 3G-SGSN 14 of the core network 12.

Reference is now made to Figure 2B which shows the mobile station 6 connected to two base stations 4c and 4d. However, unlike in Figure 2A, one base station 4c is connected to one radio network controller 10c whilst the other base station 4d is connected to a second radio network controller 10b. One of these radio network controllers acts as the serving radio network controller SRNC 10b. In the embodiment shown in Figure 2B, the second radio network controller 10b acts as the serving radio network controller. The other radio network controller 10c is defined as being a drift radio network controller DRNC. The drift radio network controller 10c is connected to the serving radio network controller 10b. The serving radio network controller 10b is, as in the arrangement shown in Figure 2A, connected to the SGSN 14. In the arrangement shown in Figure 2A, the drift radio network controller and the serving radio network controller are the same radio network controller.

The serving radio network controller 10a or b is able to combine information received from the mobile station 6 via the two different base stations 4a-d, regardless of whether or not the base stations are connected to the same radio network controller or different radio network controllers. In the latter situation, the drift radio network controller 10c would forward information from the respective base station 4c to the serving radio network controller 10b. The serving radio network controller 10b also copies information which is intended for a given mobile station 6 to the relevant drift radio network controller 10c so that the base station 4c connected to the serving radio network controller 10b as well as the base station connected to the drift radio

network controller 10c can be transmit the same information, where appropriate, to the mobile station 6.

The serving radio network controller SRNC is arranged to control the information transfer and request for radio resources from the appropriate drift radio network controllers DRNC. The drift radio network controllers only relay information between the mobile station and the serving radio network controller SRNC.

It is preferred that the same serving radio network controller SRNC be used for packet switched traffic (i.e. data transmitted in packet form) and circuit switched traffic i.e. speech.

When a mobile station moves, the base station or base stations with which the mobile station is in communication needs to change. This may mean that a different serving radio network controller may be required. This is described in relation to Figures 3A and 3B. In the arrangement shown in Figure 3A, the mobile station 6 is in communication with a single base station 4. This base station 4 is connected to the drift radio network controller 10c. The drift radio network controller is connected to the serving radio network controller 10b, as shown in Figure 2B. The serving radio network controller is connected to the current SGSN 14 which is in turn connected to the gateway GPRS serving node 16. Accordingly, signals to and from the mobile station follow the following path: mobile station 6 to the base station 4c connected to the drift RNC 10c, to the drift RNC 10c, from the drift RNC 10c to the serving RNC 10b, from the serving RNC 10b to the current SGSN 14 and from the current SGSN 14

to the GGSN 16. The same path is used for signals from the GGSN 16 to the mobile station 6, but in reverse.

The SGSN 14 also has a connection to a home location register 18. Each radio network controller 10b and 10c is connected to respective 3G mobile services switching centres 20a and 20b. The drift radio network controller 10c is connected to a different serving GPRS support node 22, which is not in use in this mode. There is also a connection between the home location register 18 and the third generation mobile services switching center 20a connected to the serving radio network controller 10b.

Reference is now made to Figure 3B which shows the connections which are established once the serving radio network controller has changed. In this arrangement, the drift radio network controller 10c becomes the serving radio network controller. The serving radio network controller 10b may become a drift radio network controller or may not be involved in communications with the mobile station 6. The mobile station continues to send and receive signals from the base station 4c connected to the new serving radio network controller 10c. The new serving radio network controller 10c has established a connection with the SGSN 22 to which it is connected. Signals from the serving GPRS node 22 connected to the new serving radio network controller 10c are passed to the GGSN 16. A connection is established between the home location register HLR 18 and the mobile services switching centre 20b connected to the new serving radio network controller 10c. A connection is also established between the home location register 18 and the SGSN 22 connected to the new serving radio network controller 10c.

This relocation procedure takes place when the target radio network controller (i.e. a drift radio network controller) is controlling all of the communications to and from the mobile station. In other words, the serving radio network controller does not communicate with the mobile station 6 with any of the base stations which it controls.

The connection between the mobile station 6 and the GGSN 16 is now via the base station 4c, the new serving radio network controller 10c, and the new SGSN 22.

Radio resource control provides the common control and signalling between the radio network controller and the mobile station. The same radio resource control connection is used both by speech and packet data traffic. The radio resource control (RRC) modes are illustrated schematically in Figure 4. In the RRC-idle mode 30, there is no connection established between the mobile station and the universal mobile telecommunications system terrestrial radio access network (UTRAN). UTRAN is the combination of RNC(s) and BTS(s). If the user equipment is attached to the network, but in RRC-idle mode (which implies that the mobile is not in active communication), the location is tracked by the SGSN. In this mode, there is no signalling between the UTRAN and the mobile station except for system information that is sent from the network downlink on a broadcast channel to the user equipment. The user equipment can also receive paging messages in this mode. No information on the mobile station is stored in the UTRAN in this state.

In the connected mode 32, the main states are the cell connected state 34 and the UTRAN Registration Area (URA)

connected state 36. One radio network controller will be acting as the serving radio network controller and a radio resource control connection is established between the mobile station and the serving radio network controller. When the position of the mobile station is known on the cell level, the mobile station is in the cell connected state. The radio resource control connection mobility is handled by hand over procedures. In this state, the radio link may be use different channels:-

1. Dedicated Channel (DCH). In this channel, a spreading code is allocated to the mobile station and is solely used by that mobile station.

2. Dedicated Shared Channel (DSCH). In this channel, a spreading code is shared amongst a number of mobile stations. The radio channel is optimised for packet traffic.

3. Common Channel on the downlink and Random Access Channel on the uplink. These are common channels and are suitable for use with short packets.

When the mobile position is known only on the URA level, i.e. which group of cells it is in, the mobile station is in the URA connected state. The URA comprises a set of cells of the network. In other words, the mobile station is in one of a plurality of cells which together define the URA. The URA updating procedures provide the mobility functioning. Paging is performed for downlink packet transfer.

A radio access bearer represents the connection between the SGSN and the mobile station. The radio access bearer comprises two branches. The first branch is the GTP (GPRS tunnelling protocol) tunnel between the radio network controller and the SGSN. The second branch is between the mobile station and the radio network controller. Between one mobile station and the SGSN, there are as many radio access bearers as there are PDP (packet data protocol) context activated when a radio access bearer is established. A radio resource control connection is established between the mobile station and the radio network controller, for signalling. However, no radio access bearer may be established. A radio access bearer is established only when the connection between the radio network controller and the SGSN is also established.

Reference is now made to Figure 5. In this arrangement inside the radio network controller 50, a process determines that the RRC connection of a particular mobile station should be released to optimise the use of resources. By releasing the connection which otherwise uses unnecessary signalling, the radio resources of the network are conserved, thus improving capacity and/or quality. The radio network controller 50 therefore sends an Iu release request 54 to the SGSN 52. Iu is the interface between the radio network controller and the SGSN 52. The request sent to the SGSN 52 indicates the reason why the bearer should be released. In the embodiments of the invention, the connection may be broken in order to optimise resources. This will be described in more detail hereinafter.

It is known to release the connection if the operation and maintenance controller of the network has intervened and

wants the connection to be broken or if there is equipment failure at some point between the mobile station and the SGSN 52.

The SGSN 52 decides whether or not to confirm the request for the release of the radio bearer. If the SGSN 52 agrees that the connection should be broken, a release command 56 is sent to the radio network controller 50 via the Iu interface.

If the radio resource connection between the radio network controller 50 and the mobile station 58 has not already been released, the radio network controller sends a radio resource control connection release message 60 to the mobile station. The mobile station releases the connection and sends a radio resource control connection released message 62 to the radio network controller 50. The radio network controller 50 then sends a confirmation 59 that the connection has been released to the SGSN 52 on the Iu interface.

Reference is now made to Figure 6 which shows an alternative embodiment to that shown in Figure 5. In the embodiment shown in Figure 6, the radio network controller 50 does not send a release request to the SGSN 52. Instead, the RNC 50 sends a release radio connection message 64 to the mobile station 58. The mobile station sends an acknowledgement message 66 to the radio network controller 50 and the connection therebetween is broken. The radio network controller 50 then advises the SGSN 52 via the Iu interface that the connection has been released. The SGSN 52 then releases all of the Iu connections. This alternative signalling is applicable particularly if there is no need of

confirmation from the SGSN. The RNC process which triggers the signalling procedure shown in Figure 5 or 6, should make the decision to release the RRC connection of a particular mobile station based (among other things) on the quality of service profile of the radio access bearer established. The process may only release the RRC connection, if the quality of service profile indicates that this bearer(s) are used for bursty traffic between the SGSN 52 and the mobile station 58. This type of traffic is indicated by the traffic class parameter.

One class of traffic is referred to background traffic whilst the other type of traffic is interactive traffic. Background traffic is, for example message traffic which is not time sensitive whilst interactive traffic is, for example traffic resulting in web browsing. With both of these types of traffic, the SGSN is unable to predict when and what traffic is to be forwarded to the mobile station and likewise when and what traffic is going to be received from the mobile station. The radio network controller carries out a process to control the release of the bearer for one or more of the following reasons:

1. The radio network controller has a timer which measures the time since the last packet was transferred to or received from the mobile station. If a given time lapses without a packet being transferred, then the radio network controller releases the connection. Different times may be used depending on the quality of services profile, in particular whether or not the traffic is interactive or background traffic. A shorter time may be provided for background traffic.

2. The radio network controller can take into account the radio state of the mobile station. For example, the RNC may release the RRC connection only in the URA connected mode.

3. The connection may be kept when another radio bearer is established, for example from the mobile switching centre to the mobile station via the radio network controller. The reason is that the RNC has to keep this mobile RRC-connected for this circuit switched connection, so that it can maintain the radio access bearer for a packet connection without using additional resources.

4. The radio network controller can take into account the movement of the mobile station. If the mobile station is moving above a given speed, the bearer connection may be released. A fast moving mobile station uses up a relatively large amount of radio resources for updates (e.g. URA updates). The radio network controller could set a maximum number of URA updates, for example 10 and if no user data traffic has been received within that time, the connection could be released. This is an elegant way to take into account the mobile movement.

5. The radio network controller may release the connection if the mobile station enters an area controlled by a different radio network controller. In this regard, reference is made to Figures 3a and 3b.

As mentioned hereinbefore, a combination of these methods may be used for determining if a radio network controller should release the bearer. For example, if a mobile station, which is in the URA update state enters a new radio network controller area, the serving radio network

controller can be arranged to release the radio bearer. This may in turn trigger a routing area update from the mobile station. The routing area update is used by mobile to inform the SGSN of its location in RRC-idle mode.

If the bearer is released the internal resources of the radio network controller can be conserved. For example, each time a connection is established, the radio network controller requires some buffer resource to be allocated thereto If a connection is not being used, the buffer resource may be wasted.

In another example, if a mobile station has a circuit switch connection i.e. speech connection, the radio network controller could keep the packet bearer established longer than otherwise. This is because a user is more likely to transfer data during or after a call and the radio network controller would merely have to re-establish that bearer otherwise.

In one modification of the embodiments described hereinbefore, the SGSN could be arranged to give an indication in the bearer set up procedure to the radio network controller whether or not the radio network controller is permitted to suggest the release of the bearer. Rules associated with this may also be transferred from the SGSN to the radio network controller. Those rules may take any suitable form. The indication in the bearer set up may be implicitly derived by the radio network controller from quality of service parameters provided by the SGSN to the radio network controller.

The SGSN could indicate the timer value, or indicate not to release RRC connection if a bearer with particular quality

of service profile is established. The SGSN can thus instruct the RNC as to how it should interpret the rules which it has for determining when to release a connection.

Whilst the present invention has referred to mobile stations, it should be appreciated that embodiments of the present invention are applicable to other types of user equipment, for example computer terminals. These computer terminals may be fixed or mobile.

Embodiments of the present invention have been described in the context of a code division multiple access system. It should be appreciated that embodiments of the present invention can be used with any other suitable spread spectrum access technique, frequency division multiple access techniques, time division multiple access technique or hybrids thereof.

CLAIMS:

1. A network element for use in a communication network, said network element being arranged between an end station and an end element, wherein connections are established between said end station and said end element via said network element, said network element comprising means for determining if the connection between said end element and said end station is to be released.

2. A network element as claimed in claim 1, wherein said network element is arranged to release said connection when the determining means determines that the connection is to be released.

3. A network element is claimed in claim 2, wherein said network element is arranged to release the connection between the network element and said end station.

4. A network element as claimed in claim 2 or 3, wherein said network element is arranged to send a message to the end element indicating that said connection has been released.

5. A network element as claimed in claim 1, wherein said network element is arranged to send a request for the connection to be released to said end station.

6. A network element as claimed in claim 5, wherein the end element sends a connection release command to said network element in response to the release request received by said network element, said network element controlling the release of said connection.

7. A network element as claimed in claim 6, wherein said network element is arranged to send a release request to said end station in response to the release command received from said end element.

8. A network element as claimed in claim 7, wherein said network element is arranged to send a message to said end element advising that the connection has been released.

9. A network element as claimed in any preceding claim, wherein said determining means determines that the connection is to be released if the connection has not been used for a predetermined time.

10. A network element as claimed in claim 9, wherein the predetermined time depends on the type of traffic for which the connection is intended.

11. A network element as claimed in claim 9, wherein the predetermined time depends on the quality of service profile of the traffic for which the connection is intended.

12. A network element as claimed in any preceding claim, wherein said determining means is arranged to determine if the connection is to be released based on the state of the end station.

13. A network element as claimed in any preceding claim, wherein said determining means is arranged to determine if the connection should be released based on the movement of the end station.

14. A network element as claimed in claim 13, wherein the amount of updating information received in a given time from the end station is used as a measure of the movement of the end station.

15. A network element as claimed in claim 14, wherein said updating information comprises URA updates.

16. A network element as claimed in any preceding claim, wherein said determining means is arranged to determine if the connection should be released based on the location of said end station.

17. A network element as claimed in claim 16, wherein said determining means determines that the connection should be released if the end station is associated with a different network element.

18. A network element as claimed in any preceding claim, wherein said network element is a radio network controller.

19. A network comprising a network element as claimed in any preceding claim, an end station and an end element.

20. A network as claimed in claim 19, wherein said end station is a mobile station.

21. A network element as claimed in claims 19 or 20, wherein said end element is a SGSN.

22. A network as claimed in claims 19, 20 or 21 wherein said network operates in accordance with the UMTS Standard.

Fig.1.

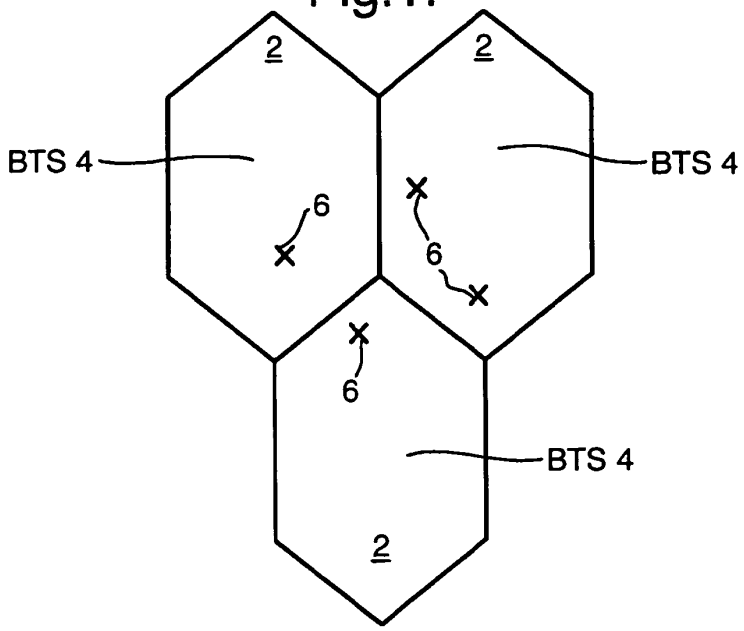


Fig.2A.

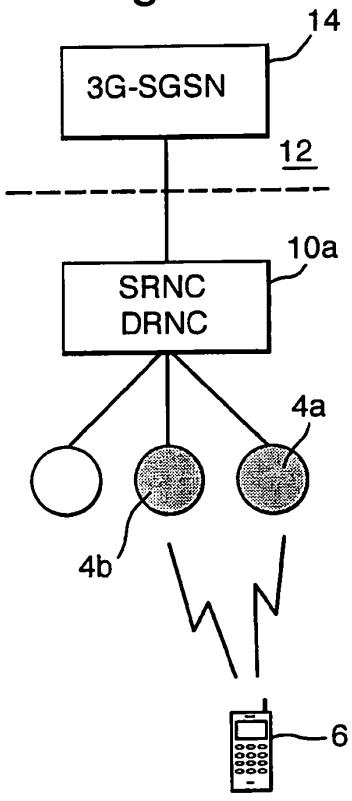


Fig.2B.

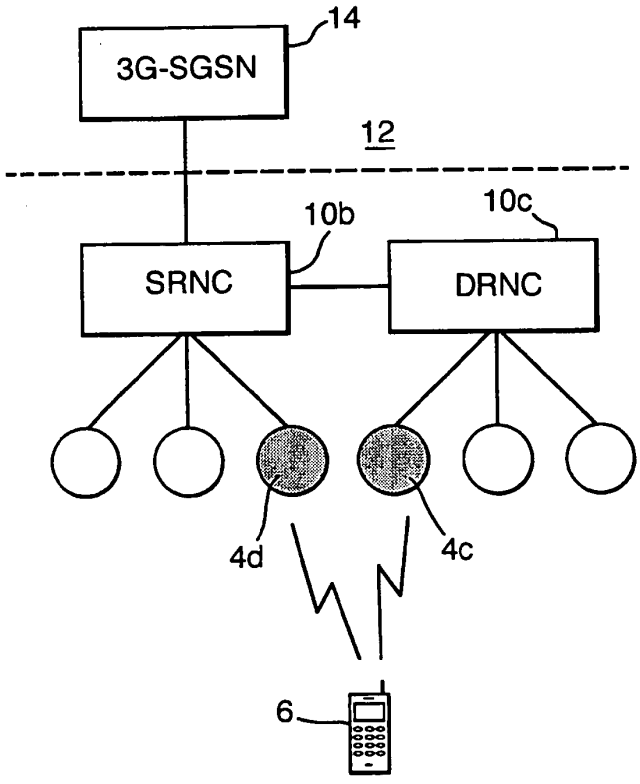


Fig.3A.

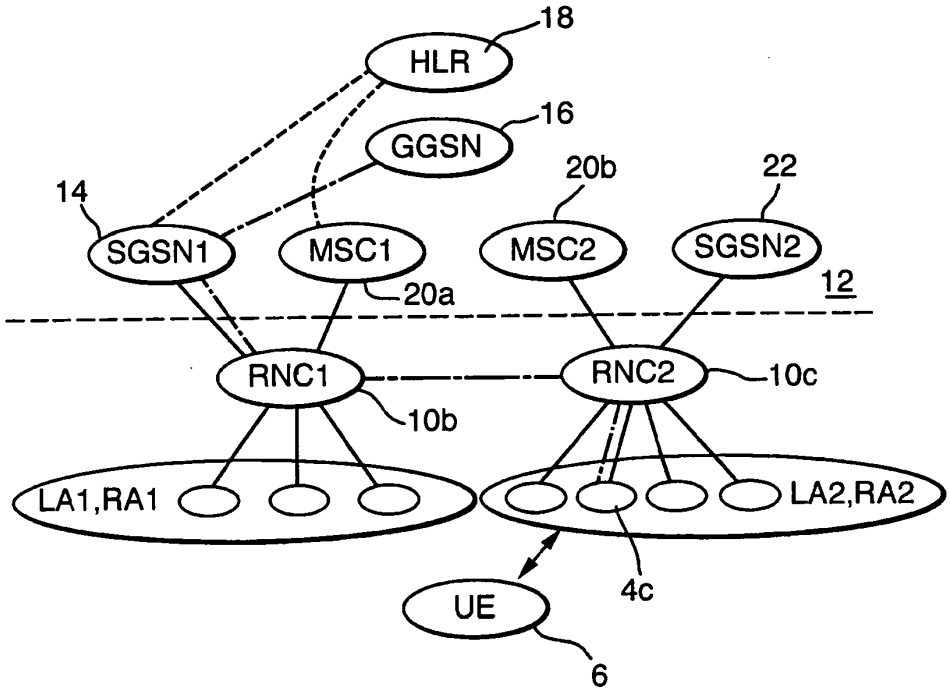

18
HLR
16
GGSN
20b
22
14
SGSN1
MSC1
MSC2
SGSN2
20a
12
RNC1
RNC2
10c
10b
LA1,RA1
LA2,RA2
4c
UE
6

Fig.3B.

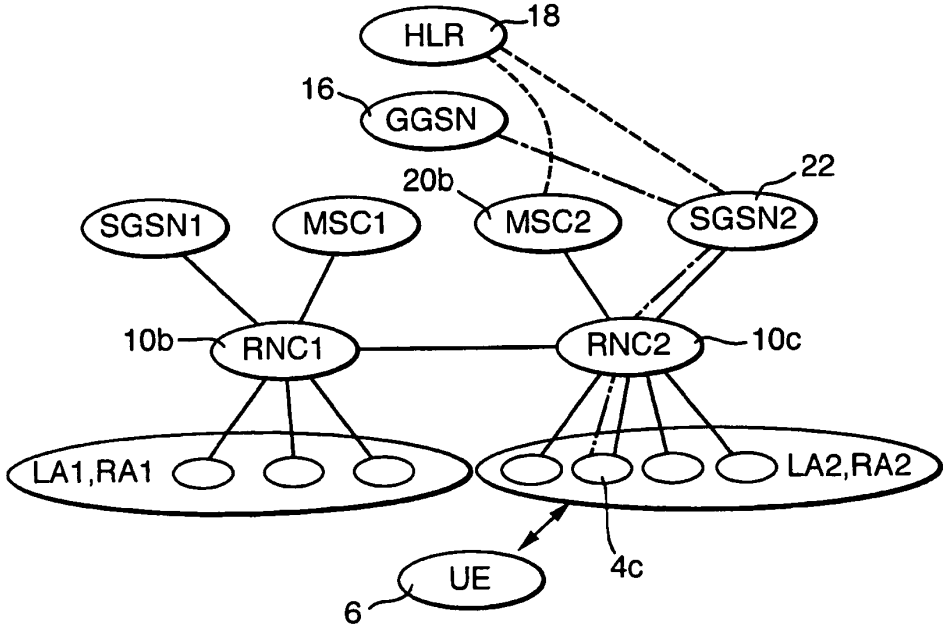

18
HLR
16
GGSN
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20b
SGSN1
MSC1
MSC2
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10b
RNC1
RNC2
10c
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LA2,RA2
4c
UE
6

Fig.4.

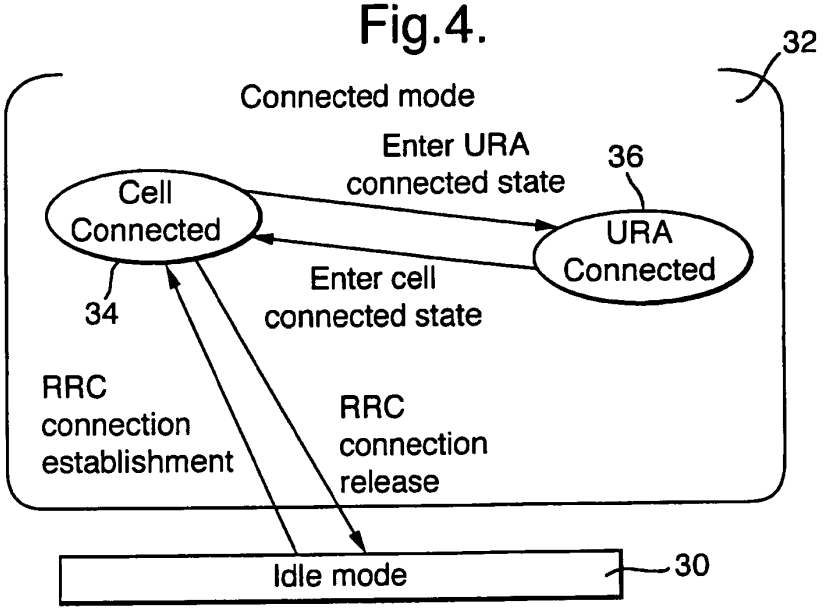


Fig.5.

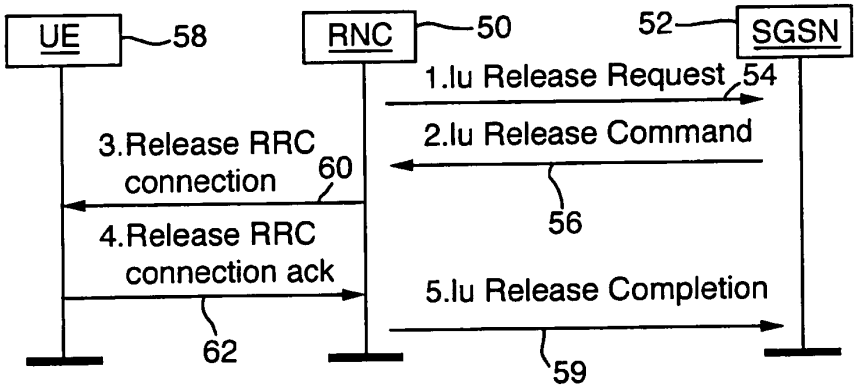
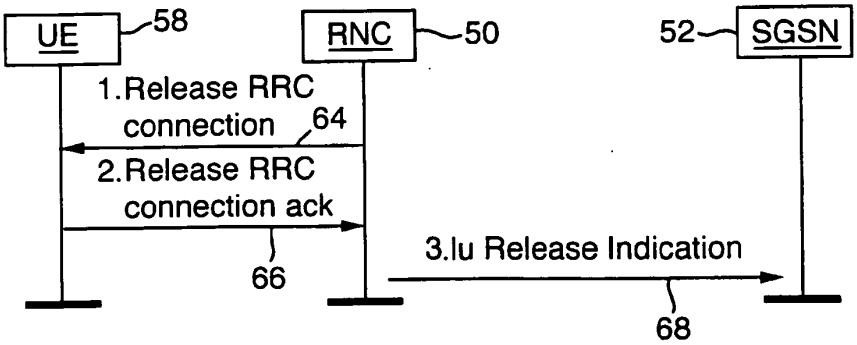


Fig.6.



INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/EP 00/04231

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38

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 data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	EP 0 568 212 A (NOKIA MOBILE PHONES LTD) 3 November 1993 (1993-11-03) column 4, line 34 -column 5, line 28	1-3,16, 17,19,20 4
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 August 2000	22/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Schut, G

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INTERNATIONAL SEARCH REPORT

Inter ...nal Application No
PCT/EP 00/04231

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter nal Application No
PCT/EP 00/04231

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Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 January 2001 (04.01.2001)

PCT

(10) International Publication Number
WO 01/01711 A1

(51) International Patent Classification[7]: H04Q 7/22

(21) International Application Number: PCT/IB00/00770

(22) International Filing Date: 9 June 2000 (09.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/339,116 24 June 1999 (24.06.1999) US

(71) Applicant: NOKIA CORPORATION [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(71) Applicant *(for LC only)*: NOKIA INC. [US/US]; 6000 Connection Drive, Irving, TX 75039 (US).

(72) Inventors: RAUTILLA, Heikki; Visamaki 5 A 9, FIN-02130 Espoo (FI). KALL, Jan; Jupperinmetsa 2B, FIN-02730 Espoo (FI). RATSCHUNAS, Kalevi; Jamerantaival 3 a 122, FIN-02150 Espoo (FI).

(74) Agents: BRUNDIDGE, Carl, I. et al.; Antonelli, Terry, Stout & Kraus, LLP, Suite 1800, 1300 North Seventeenth Street, Arlington, VA 22209 (US).

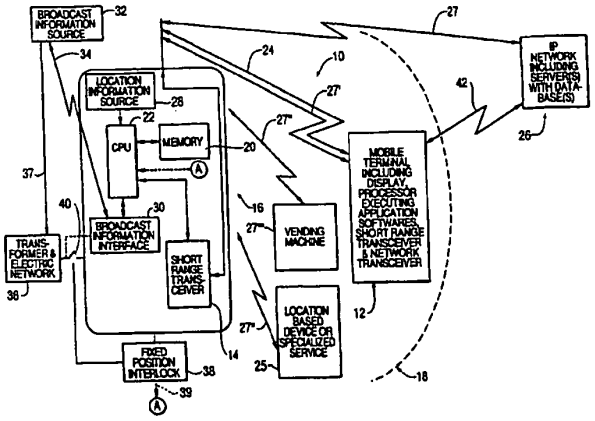
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*
— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR CONNECTING A MOBILE TERMINAL TO A DATABASE



(57) Abstract: The invention is a communication system (10) and a method of communication. The communication system includes an information source (20); a position transceiver (14) disposed at a broadcast location (16) and coupled to the information source, the position transceiver broadcasting information from the information source within a broadcast area (18) where the position transceiver is located, the information including identification information relating to the information source; a mobile terminal (12) within the broadcast area comprising first and second transceivers (44 and 46), the first transceiver communicating with the position transceiver; a network (42) communicating with the second transceiver; and a database (26), communicating with the network, storing information which is transmitted to the second transceiver associated with the identification information in response to the database receiving at least the identification information by transmission of the network from the mobile terminal to the database.

WO 01/01711 A1

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

METHOD AND SYSTEM FOR CONNECTING A MOBILE TERMINAL TO A DATABASE

BACKGROUND OF THE INVENTION

The invention relates to a system and method for transmitting information to a mobile terminal from an information source which transmitted information is transmitted by the mobile terminal to a database to fetch information associated with the transmitted information stored in the database for transmission back to the mobile terminal.

BACKGROUND ART

Advertisement media in publicly travelled places have the objective of obtaining the interest of a passerby. Typically, advertisements contain information which is directed to the consumer to obtain the consumers interest and further provide contact information, such as a telephone number or a fax number, where further information about the advertised goods or services may be obtained. Since the advent of IP networks (e.g., the internet), a uniform resource locator (URL) reference is also typically given in advertisements which enables the user to download information to a computer from an IP network about the advertisement to provide a more detailed consideration of the advertised goods or services.

Additionally, systems have been proposed in which the location of a user controls the accessing of an information source, such as a server based service. These systems may use a GPS receiver or a mobile telephone to provide the user's location to a system to control accessing of the information source which is particular to the users location.

Location services and location based services are becoming more important in telecommunication networks. It is possible to localize and indicate the position of a mobile telephone

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used, for example, for emergency calls. Many existing and new telecommunications services will benefit from knowing the position of the terminal being used. The drawback in current and planned telecommunications networks is that it is not possible to determine the position of the terminal being used or in an idle state accurately enough for all types of position dependent services in all circumstances. The achievable position determining accuracy is around 100m within a cellular network and around 10m with GPS. Not all mobile terminals will have GPS functionality.

Mobile terminals, which utilize cellular communications, are suitable for connecting a user to a website or other database to obtain information. The obtaining of information by a mobile terminal typically uses a linkage between a cellular telephone network to which the terminal subscribes and an IP network. However, the user of a mobile terminal, in order to access advertisement information or other sources of information, is required to write down from the advertisement the information for linking the mobile terminal to the website or other database, and use that information to connect the mobile terminal to an IP service provider to fetch information from the website or database. While it is possible to link an advertisement with a mobile terminal using cellular communications, such a cellular linkage has the disadvantage in highly crowded places, such as airports, of requiring substantial network capacity to link the advertisement to a large number of persons carrying mobile terminals which are passing by the advertisement.

Low power RF systems have been proposed, e.g. Bluetooth, for providing communications between a number of transceivers without or in a local area network by a short range radio link having a broadcast range of a few meters. Such systems will be commercially available in the near future and are designed to operate in open spectrum, e.g. 2.4 gigahertz.

Additionally, low power optical communication systems using an infrared carrier have been proposed which will provide

a linkage between a number of transceivers over a short range. These systems will perform functions similar to Bluetooth.

DISCLOSURE OF THE INVENTION

The present invention is a communication system and a method of communication which provides connectivity between at least one information source which provides information, such as information relating to location based services, at least one mobile terminal and at least one database. With the invention, at least one position transceiver is disposed at a broadcast location and is coupled to the information source. The information source provides information to the position transceiver which is broadcast to the at least one mobile terminal.

The position transceiver overcomes the location problems of the prior art by indicating and transmitting its own very exact predefined position to at least one mobile terminal within range and which is able to receive this information. The at least one mobile terminal can then communicate this position to a network and servers connected to the network to access information, such as information related to or part of position dependent services offered to the user of the mobile terminal.

In one preferred embodiment of the invention, the position transceiver is connected to a network server by fixed telephone lines or wireless connections. This connectivity enables the network server to update the information which is broadcasted by the position transceiver.

In another preferred embodiment of the invention, the information which is broadcasted is changed using a keyboard of the position transceiver or a PC connected to the position transmitter. The position transmitter only accepts appropriately authenticated changes.

The position transceiver can broadcast information to the mobile terminal continuously or on request of the user of the mobile terminal or only when the position transceiver

recognizes by any known mechanism that a mobile terminal or a mobile user of the mobile terminal is in the vicinity of the position transceiver.

The at least one position transceiver broadcasts information directed to the user of each mobile terminal to induce the user to communicate with the at least one database to retrieve information stored in each database over a network. The information broadcast by each position transceiver includes identification information which is related to and identifies the information source and which is transmitted by the mobile terminal over the network to the at least one database to address or identify the information in each database which is transmitted by the network back to the mobile terminal to enable the user thereof to use the retrieved information which is associated with the information source at the broadcast location. A display, which is part of each mobile terminal, enables the user to selectively review the information broadcast from a plurality of position transceivers and choose which information sources in each database from which the user wishes to obtain additional information associated with any of the identification information broadcast from the position transceivers. The broadcast information, may without limitation, be diverse types of information such as, but not limited to, advertising information and includes identification information relating to the source of the broadcast information.

Each mobile terminal is located within a broadcast area defined by the broadcast range of the at least one position transceiver located at a broadcast location. The at least one position transceiver preferably has a limited broadcast range so that the broadcast range is limited within the optical view of the users of the mobile terminals as they pass by the broadcast location.

Each mobile terminal is a multimode transceiver which operates in short range and cellular modes, and includes first and second transceivers. The first transceiver communicates

with at least one position transceiver and receives broadcasts therefrom which preferably are of limited range. While not limited thereto, the first transceiver may use a low power optical or RF broadcast communications to connect each position transceiver at the broadcast location to the first transceiver and the information source. A network communicates with the second transceiver which may be, without limitation, a cellular network connected to an IP network. Each database communicates with the network and stores information which is transmitted to the second transceiver of each mobile terminal associated with the identification information.

In a preferred operational mode of the present invention, the user of the mobile terminal passes within the broadcast area of at least one position transceiver disposed at a broadcast location. Each position transceiver either continually broadcasts information to the broadcast area, which permits each user of a mobile terminal to view with a display which is part of the mobile terminal information received by the first transceiver thereof which is being broadcast to the user, such as advertisement information and the identification information, which is used to fetch the information stored in each database by transmission from the second transceiver by the network to each database or broadcasts upon demand of the user of the mobile terminal to the mobile terminal.

Each mobile terminal includes a processor and associated memory. The associated memory stores the information received from each position transceiver by the first transceiver permitting the user of the mobile terminal at the time of reception or at a later time to utilize the second transceiver to connect to addressable areas in each database using the identification information transmitted to the first transceiver.

The identification information which is used to retrieve information for transmission to the second transceiver may be of many different types. For example, the identification information may be a function of a geographic position of the

broadcast location at which each information transceiver is located and may comprise one or more of geographical coordinates, the elevation of the broadcast location, an address of the broadcast location, including street address, or a pointer, or a uniform resource locator, which is an address or provides an identification of the information stored in the database associated with the identification information. While the invention is not limited thereto, the network in a preferred embodiment includes a cellular telephone network which is connected to an IP network which facilitates transmission by the transmission control protocol/internet protocol (TCP/IP).

In a preferred embodiment of the present invention, the broadcast location includes a plurality of information sources and a plurality of position transceivers disposed at the broadcast location respectively coupled to a different one of the plurality of information sources. Each position transceiver broadcasts information including identification information relating to one of the information sources from the broadcast location. The broadcast location includes a display which displays information relating to the information which is broadcast including the identification information broadcasted by each of the plurality of position transceivers. Each database stores information which is transmitted to the second transceiver associated with the identification information of the plurality of position transceivers in response to each database receiving at least the identification information by transmission by the network from the mobile terminal to each database.

A billboard type display may be utilized to display advertisement information or other information from a plurality of information sources which are viewed from a public place, such as an airport, through which multiple users of mobile terminals pass to attract their attention in a classic advertising manner. The billboard may continuously broadcast via the plurality of position transceivers over a limited range

(low power) RF or optical transmission medium information which is directed to the passersby with mobile terminals from each of the information sources. An activation switch may be associated with each of the information sources to permit the passers by to selectively activate the position transceiver associated with the information source to which the passerby is attracted by display of information on the billboard type display. Finally, the broadcast may be activated by detecting the presence of the passersby by a known mechanism, such as a motion detector, to activate the position transceivers to broadcast the information.

There are numerous applications for the position transceiver besides transmitting advertisement information. These additional applications are: emergency calls; navigational services in which the user of the mobile terminal is provided information how to travel from point A to point B; calibration of the location of the mobile terminal in a cellular network and calibration of the cellular network to determine location of mobile terminals; location based services, e.g. printing a document at the closest available printer; informing the user of the mobile terminal of special services available only at the broadcast location of the position transmitters, such as special telecommunications services; transmission of price information about goods and services and payment information, the user of the mobile terminal in response thereto sends the requested payment as a short message service (SMS) to a network server, and the position transceiver in response thereto receives payment acknowledgment from the network server receiving the payment and transmits the payment acknowledgment to the user of the mobile terminal and provides a transmission permitting the user of the mobile terminal to have access to the purchased goods or services.

A method of transmitting data in a communications system including an information source, a position transceiver coupled to the information source and disposed at a broadcast location,

a mobile terminal within a broadcast area, the mobile terminal comprising first and second transceivers with the first transceiver communicating with the position transceiver, a network communicating with the second transceiver and at least one database, communicating with the network and storing information associated with the identification information includes broadcasting information including identification information relating to the information source with the position transceiver to the first transceiver within the broadcast area; transmitting at least the identification information from the second transceiver with the network to the database; and in response to the database receiving at least the identification information, transmitting from the database the stored information associated with the identification information to the second transceiver. The identification information comprises information which is a function of a geographic position of the broadcast location which may be one or more of geographical coordinates, elevation of the broadcast location, an address of the broadcast location, which may be a street address, and further, a location within the street address, or a pointer, or a uniform resource locator which is an address of or identifies the information associated with the identification information in the database.

In a preferred embodiment of the method, the broadcast location comprises a plurality of information sources; a plurality of position transceivers disposed at the broadcast location respectively coupled to a different one of the plurality of information sources, each position transceiver broadcasting information including identification information relating to one of the information sources from the broadcast location; and a display which displays information relating to the information broadcasted by each of the plurality of position transceivers. Information which is stored in the database is transmitted to the second transceiver associated with the identification information of the plurality of position transceivers in response to the database receiving at

least the identification information by transmission by the network from the second transceiver of the mobile terminal to the database. The information which is broadcasted from each of the plurality of position transceivers may include a webpage or application software which is executed by a processor in the mobile terminal which controls the first and second transceivers. The application software may comprise without limitation a program for opening a window or a web browser for searching the information stored in the database identified by the identification information.

The broadcasted information may be encrypted. The position information transmitted from the second transceiver to the database may be signed by the user of the mobile terminal of when the information was transmitted from the information transceiver to the mobile terminal to indicate the user's current location to permit database verification that the user is where the user should be; and the database checks validity of the signature, decrypts the information which is received from the network and checks validity of the time stamp and if the time stamp and signature are valid, the database transmits the stored information associated with the identification information with the network to the second transceiver.

The plurality of position transceivers of the broadcast location may cease to broadcast the information when the plurality of information transceivers are moved. A device may be provided at the broadcast location which senses when the plurality of position transceivers are moved and which disables transmission of the information when movement is sensed. The device for sensing movement may be of diverse designs and may be a mechanical connection between the information transceivers and a physical location at which the information transceivers are located which, when opened, disables their normal function, e.g. by disconnecting electrical power. As an alternative, the position transceiver can start transmitting an error indication if the position transceiver is moved.

In a preferred embodiment of the method, each position transceiver broadcasts the information with a limited range RF carrier or a limited range infrared carrier and the network comprises a cellular telephone network and an IP network.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a system diagram of an embodiment of the present invention.

Fig. 2 illustrates a schematic diagram of a mobile terminal in accordance with the present invention.

Fig. 3 illustrates a preferred embodiment of the broadcast location at which a plurality of position transceivers are located which are designed to communicate with multiple users of terminals in a public place which pass within broadcast range of the plurality of information transceivers.

Fig. 4 illustrates a memory map of a preferred embodiment of the database of the system of Fig. 1.

Like reference numerals identify like parts throughout the drawings.

BEST MODE FOR CARRYING OUT THE INVENTION

Fig. 1 illustrates a communication system 10 in accordance with the present invention. The communication system 10 provides a mechanism by which a user of a mobile terminal 12 receives information broadcast by a position transceiver 14 which without limitation has a short (limited) range and which is part of a broadcast location 16 which broadcasts information within a broadcast area 18. Only one position transceiver 14 is illustrated, but it should be understood that in a preferred embodiment of the present invention, a plurality of position transceivers are part of the broadcast location as described below in conjunction with Fig. 3. The position transceiver 14 broadcasts information, which is stored in memory 20, under the control of CPU 22, by means of a low power RF or infrared link 24. In a preferred form of the present invention, the link 24 may be in accordance with the Bluetooth specification

which has been proposed in unregulated spectrum, such as 2.4 GHz or known or proposed infrared communication links. In a preferred embodiment of the specification as illustrated in Fig. 2, a plurality of information transceivers 14, simultaneously, on demand or upon detection of a user of the mobile terminal 12 by any known mechanism within broadcast area 18, broadcast information via the low power RF or infrared link 24 to one or more mobile terminals 12 located within the broadcast area.

The information which is broadcast via the link 24 is diverse in nature and includes identification information. The information which is broadcast by at least one position transceiver 14 includes without limitation advertisements, information relating to making emergency calls, information relating to providing navigation services to enable a user of the mobile terminal 12 to move from a first position to a second position, information for calibrating a position of the mobile terminal 12 within a cellular network providing connection to the network transceiver therein or for calibrating the network positioning determination function, information relating to location and location based devices or services 25 which are proximate to the broadcast location and the mobile terminal from which the user of the mobile terminal receives goods or services after communication of the mobile terminal with a database within IP network including servers with database 26, such as printing a document by a closest available printer, information informing a user of the special services, such as telecommunications available only at the location of the position transceiver with the advertisement information including a price of goods or services and a requested form of payment indication with the user sending with the mobile terminal the requested form of payment to the database using a short message system (SMS) format and the network transmitting acknowledgment of payment 27 from the database to the position transmitter 14 and the position transmitter transmitting the acknowledgment 27' of payment to

the user of the mobile terminal and access 27'' location based device or specialized service 25 or to machine 27''' providing the purchased goods or receiver.

Broadcast advertising information may be diverse in nature. Advertising information may be a webpage and identification information which provides the mobile terminal 12 with the ability to access an IP network, including server(s), with database 26 and specifically, information stored in the database associated with the identification information transmitted from the position transceiver 14 to the mobile terminal 12 via link 24. The identification information provides an address of the server, database, or a portion of the database at which the information associated with the identification information is stored.

The broadcast location 16 further includes a location information source 28, which may be a GPS receiver which informs the CPU 22 of the physical location of the position transceiver 14, to provide the CPU with one possible form of the identification information which is a function of the geographic position of the broadcast location, e.g. geographical coordinates, and the elevation of the broadcast location. Alternatively, the physical location may be programmed into the memory 20 at the time of setup of the system and entered by keyboard and a PC. The identification information may be a physical address of the broadcast location, such as the street address, and further information defining the location of the broadcast location 16 within the street address, such as floor and room number at which at least one position transceiver is located which is stored in the memory 20 as a consequence of this information being readily programmable. Furthermore, the identification information may be a pointer, which may be numerically based or a uniform resource locator (URL).

The function of the identification information, regardless of its content as described above, is to provide a linkage between the user of the mobile terminal 12, the information

source of the information transmitted by at least one position transceiver 14 and the information which is transmitted from the database within the IP network including servers with database 26 to the mobile terminal which is associated with the identification information broadcast from the at least one position transceiver 14 by the link 24 to the mobile terminal 12.

The broadcast location 16 facilitates the diverse applications discussed above, including marketing and advertising. The broadcast location obtains the initial interest of the user of the mobile terminal 12 by the displays 50 of information associated with the broadcast location 16 as described below in association with Fig. 3, or from a display 49' in Fig. 2 associated with the mobile terminal indicating the nature of the information being transmitted from the at least one position transceiver 14 to the mobile terminal 12, e.g. a webpage, etc. The user of the terminal 12 is then induced by the initial visual contact with the displays 49' and/or 50 to contact the database within the IP network, including server(s) with database, to obtain more information associated with the identification information.

The broadcast location 16 further includes a broadcast information interface 30. The broadcast information interface 30 is coupled to the CPU 22 and associated memory 20. The memory 20 functions as the source of broadcast information after it is inputted through the broadcast information interface 30. A broadcast information source 32, which may be a server in a network, is coupled to the broadcast information interface 20 by wireline (not illustrated), RF link 34, which may be cellular or other RF communications, or through modulation of information transmitted over the electric mains 37 to transformer and electric network 36. The broadcast information source 32 may be proximate to the broadcast location 16 or remote therefrom and provides the broadcast location with the capability of having the information which is broadcast updated. Alternatively, the broadcast information

source 32 may be eliminated by use of a keyboard or local PC at the location 16 to directly provide the information including identification to the memory 20 which is broadcast by the at least one position transceiver 14. A fixed position interlock 38 may be used to disable the application of electrical power from the transformer and electrical network 36 to the broadcast location 16 by opening switch 40 when the broadcast location 16 is physically moved or to cause an error message to be broadcast in response to signal 39 generated by the fixed position interlock. The fixed position interlock 38 may be, for example without limitation, a mechanical lock, hidden seals, a movement detector or magnetic sensor which, upon movement, causes switch 40 to open to disconnect electric power from the broadcast location 16 or to generate the signal 39 to cause the error message to be broadcast.

The mobile terminal 12 includes first and second transceivers which respectively are a transceiver which is connected to the broadcast location 16 via links 24 and 27 and a network transceiver, which is preferably a cellular transceiver, that is connected by RF link 42 to the IP network, including servers with database 26. However, it should be understood that the present invention is not limited to the use of a cellular network connected to an IP network including server(s) with database 26. Alternatively, the cellular network or other communication network may link the second transceiver directly to a database with or without a server.

Fig. 2 illustrates a block diagram of one form of a mobile terminal 12 which may be used to practice the invention. The mobile terminal 12 is a multimode receiver including a first transceiver 44 which communicates with the position transceiver 14 and may operate as a short range device without limitation in accordance with the Bluetooth RF specification or a limited range infrared specification and a second transceiver which operates as a network transceiver 46 which without limitation may be a cellular transceiver over which the user of the terminal 12 receives voice, PCS, etc.,

communications. The mobile terminal 12 has a main CPU 48 and associated memory 49 which stores the information which is transmitted and received by the first and second transceivers 44 and 46. The main CPU 48 executes software which transfer the information received by the first transceiver 44 to the second transceiver 46 and drives the display 49' which displays the information received from the at least one position transceiver 14 including, but not limited to, the identification information and other information for the above-identified diverse applications including advertising, such as a web page, browser, etc.

As has been described above, identification information, which is transmitted by the link 24, performs the function of addressing or identifying particular blocks of data within the database of the IP network, including servers with database 26, which are transmitted by link 42 to the network transceiver 46 within the mobile terminal 12. The information which is received from the database 26 by the network transceiver 46 enables the user of the mobile terminal 12 to obtain more detailed information about the information which is broadcast by the link 24 including display on display 49'. This function enhances the diverse applications discussed above, including an advertising function, by providing a complete linkage to the detailed source of information associated with the identification information broadcast by the broadcast location 16 stored within the database within the IP network including server(s) with database 26.

In normal operation, each mobile terminal 12, when it is within the broadcast area 18, displays on the display 49' information regarding the information being broadcast from the broadcast location 16. This enables the user of each mobile terminal 12, when multiple short range position transceivers 14 are used, to pick and choose from the information which is most interesting which is being broadcast from a plurality of information sources at the broadcast location 16. This information, which is displayed on the display 49' of the

mobile terminal 12, has associated with it the identification information which is transmitted via links 24 and 42 to the database within the IP network, including server(s) with database 26, to fetch the more detailed information stored in the database which is associated with the identification information for transmission back to the users of each mobile terminal 12 to enable the users to learn of more information regarding the source of the broadcast information from the location 16. This functionality facilitates advertisement and the other applications discussed above by obtaining the attention of users of mobile terminals 12 while at the same time not having to rely upon calls being made to cellular transceivers within the broadcast area 18. With the present invention, the information that is broadcast to each mobile terminal 12 when the users are within the broadcast area 18 contains sufficient information to obtain the attention of the users and to enable the users to obtain complete access to information stored in the remote databases, such as manufacturer's information to induce a sale, which is associated with the information, which is broadcast and/or displayed at the broadcast location 16, as described below in conjunction with Fig. 3.

The CPU 48 within the mobile terminal 12, which controls overall operation thereof, coordinates the transmission of information between the broadcast location 16 and the IP network, including server(s) with database 26. The CPU 48 processes the identification information which is received by the first short range transceiver 44 from the broadcast location 16 and is transmitted by the second network cellular transceiver 46 to the IP network including server(s) with database 26. The CPU 48 provides accessability to the memory 49 therein to both of the first and second transceivers 44 and 46 so as to facilitate transmission of information between the transceivers to provide the requisite information flow.

While the invention is not limited thereto, the identification information sent by the location position 16, may contain added information for security reasons. The information which is transmitted from the broadcast location 16 by link 24 to the mobile terminal 12 may include unencrypted information and encrypted information. The encrypted information may include as part of its identifying information, a time stamp with all of the encrypted information being encrypted by a MLC public key which may be encrypted, for example, with RSA public key cryptography. The encrypted message may be signed by the user with secret key. The server in the IP network, including server(s) with database 26, checks the signature, decrpyts the transmission of information from the mobile terminal 12, and determines if the time stamp is valid. If all of this information is verified, the server within the IP network including server(s) with database 26 may conclude with a high probability that the user of the mobile terminal 12 is in fact an authorized user and provide the user of the mobile terminal 12 with access thereto.

Fig. 3 illustrates a preferred embodiment of the broadcast location 16. The location source 16 includes a plurality of information sources 50 which are N in number. Each information source 50 provides a display of information and has an associated display driver including processor which is designed to attract the attention of the users of the mobile terminal 12 to induce the users to communicate with the databases within the IP network, including server(s) with database 26, to obtain more detailed information associated with the identification information which is transmitted by the communication link 24. Each information source 50 is associated with a particular position transceiver 14 so that the visual impression produced by the display thereof is related to the information which is transmitted to the mobile terminals 12 and displayed on the display 49' thereof and is related to the identification information which performs the function of addressing or identifying particular information stored in the database of

the IP network, including server(s) with database 26. The stored information, which is identified by the identification information, is transmitted by link 42 back to the second transceiver 46, as described below in association with Fig. 4 or via link 27 to the broadcast location 16. Each information transceiver 14 may include an on/off switch 52 which is associated with a correspondingly identified display 50 and which, upon activation by the user of the mobile terminal 12 within the broadcast area 18, causes the information, including identification information, to be transmitted by the link 24 to the user's terminal 12.

The displays 50 are a form of billboard and may contain diverse information but in environments where marketing is to be performed, the information is directed to soliciting the attention of the users of the mobile terminals 12 to obtain more information about the goods or services available for purchase which are described in the display. The particular displays 50 are not limited to any particular configuration and the overall broadcast location 16 of Fig. 3 may be located at a table with each of the individual transceivers 14 being located on the table.

Fig. 4 illustrates a memory map 100 of an individual server in the IP network including server(s) with database 26. The database 102 includes a plurality of bodies of information which are N in number which correspond to the N information sources of the broadcast location 16. Each information source 104 is addressed or identified by the identification information broadcasted over the link 24 to the mobile terminal 12 and transmitted by the network over link 42 to the server including the database 102. The server associated with the database 102, in response to the identification information, fetches a particular block of information 104 associated with the identification information. The fetched information is transmitted over communication link 42 to the mobile terminal 12 to enable the user thereof to learn more about the goods or services or other information associated

with the individual information sources 50 of the broadcast locations of Fig. 2.

While the invention has been described in terms of its preferred embodiments, it should be understood that numerous modifications may be made thereto without departing from the spirit and scope of the invention as defined in the appended claims. It is intended that all such modifications fall within the scope of the appended claims.

CLAIMS

1. A communication system comprising:

an information source;

a position transceiver disposed at a broadcast location and coupled to the information source, the position transceiver broadcasting information from the information source within a broadcast area where the position transceiver is located, the broadcasted information including identification information relating to the information source;

a mobile terminal within the broadcast area comprising first and second transceivers, the first transceiver communicating with the position transceiver;

a network communicating with the second transceiver; and

a database, communicating with the network, storing information which is transmitted to the second transceiver associated with the identification information in response to the database receiving at least the identification information by transmission of the network from the mobile terminal to the database.

2. A communication system in accordance with claim 1 wherein:

the identification information comprises information which is a function of a geographic position of the broadcast location.

3. A communication system in accordance with claim 2 wherein:

the identification information comprises geographical coordinates.

4. A communication system in accordance with claim 3 wherein:

the identification information further comprises elevation of the broadcast location.

5. A communication system in accordance with claim 2 wherein:
the identification information comprises an address of the broadcast location.

6. A communication system in accordance with claim 5 wherein:
the address is a street address.

7. A communication system in accordance with claim 6 wherein:
the identification information further defines a location within the street address.

8. A communication system in accordance with claim 1 wherein:
the identification information is a pointer which identifies a location of the position transceiver associated with corresponding data of the database where the information which is transmitted to the second transceiver is stored.

9. A communication system in accordance with claim 1 wherein:
the identification information, which is broadcasted from the position transceiver, includes a uniform resource locator which is an address of the information associated with the identification information in the database in the network.

10. A communication system in accordance with claim 1 wherein the broadcast location comprises:
a plurality of information sources;
a plurality of position transceivers disposed at the broadcast location respectively coupled to a different one of

the plurality of information sources, each position transceiver broadcasting information including identification information relating to one of the information sources from the broadcast location; and

a display which displays information relating to the information broadcasted by each of the plurality of position transceivers; and wherein

the database stores information which is transmitted to the second transceiver associated with the identification information of the plurality of position transceivers in response to the database receiving at least the identification information by transmission of the network from the mobile terminal to the database.

11. A communication system in accordance with claim 10 wherein:

the identification information, which is broadcasted from each of the plurality of position transceivers, includes a uniform resource locator which is an address of the information associated with the identification information in the database in the network.

12. A communication system in accordance with claim 10 wherein:

the information, which is broadcasted from each of the plurality of position transceivers, includes a web page.

13. A communication system in accordance with claim 10 wherein:

the information, which is broadcasted from each of the plurality of position transceivers, includes application software which is executed by a processor in the mobile terminal.

14. A communication system in accordance with claim 13 wherein:

the application software comprises an application program for opening a window.

15. A communication system in accordance with claim 13 wherein:

the application software comprises a web browser for searching the information stored in the database identified by the identifying information.

16. A communication system in accordance with claim 1 wherein:

the information is encrypted.

17. A communication system in accordance with claim 16 wherein:

the transmission of the information from the mobile terminal to the database is signed by a user of the mobile terminal with a time stamp of when the information was transmitted from the position transceiver to the mobile terminal to indicate the user's current location to permit database verification that the user is where the user should be; and

the database checks validity of the signature, decrypts the encrypted information which is received from the network and checks validity of the time stamp and if the time stamp and signature are valid, the database transmits the stored information associated with the identification information via the network to the second transceiver.

18. A communication system in accordance with claim 10 wherein:

the plurality of position transceivers of the broadcast location cease to broadcast the information when the plurality of position transceivers are moved.

19. A communication system in accordance with claim 18 wherein:

the broadcast location includes a device which senses when the plurality of position transceivers are moved and which disables transmission of the information when movement of the plurality of position transceivers is sensed.

20. A communication system in accordance with claim 1 wherein:

the position transceiver broadcasts the information with a limited range RF carrier.

21. A communication system in accordance with claim 1 wherein:

the position transceiver broadcasts the information with an infrared carrier.

22. A communication system in accordance with claim 10 wherein:

the broadcast location includes a device which senses when the plurality of position transmitters are moved; and

the plurality of position transceivers transmit an error indication when the device senses the plurality of information transceivers are moved.

23. A communication system in accordance with claim 1 wherein:

the broadcasted information includes an advertisement.

24. A communication system in accordance with claim 1 wherein:

the broadcasted information includes an emergency call.

25. A communication system in accordance with claim 1 wherein:

the broadcasted information includes information providing a service to enable a user of the mobile terminal to move from a first location to a second location.

26. A communication system in accordance with claim 1 wherein:

the broadcasted information provides calibration of where the mobile terminal is located in the network.

27. A communication system in accordance with claim 1 wherein:

the broadcasted information provides position calibration of the network.

28. A communication system in accordance with claim 1 wherein:

the broadcasted information relates to services which are available to a user of the mobile terminal when the user is in a vicinity of the broadcast location.

29. A communication system in accordance with claim 1 wherein:

the broadcasted information relates to communication services which are available to a user of the mobile terminal only when the user is in a vicinity of the broadcast location.

30. A communication system in accordance with claim 1 wherein:

the broadcasted information relates to a price for goods or services and an indication where payment may be transmitted if a user of the mobile terminal wishes to purchase the goods or services; and

the mobile terminal transmits payment for purchasing the goods or services to the database.

31. A communication system in accordance with claim 30 wherein:

acknowledgment of the payment is transmitted to the position transmitter and;

the position transceiver transmits the payment acknowledgment to the mobile terminal.

32. A communication system in accordance with claim 31 wherein:

the transmission of the payment acknowledgment to the mobile terminal also permits the user of the mobile terminal to have access to the purchased goods or services.

33. A method of transmitting data in a communication system including an information source, a position transceiver coupled to the information source and disposed at a broadcast location, a mobile terminal within a broadcast area comprising first and second transceivers with the first transceiver communicating with the position transceiver, a network communicating with the second transceiver and a database, communicating with the network, storing information associated with the identification information comprising:

broadcasting with the position transceiver information including identification information relating to the information source to the first transceiver within the broadcast area;

transmitting at least the identification information from the second transceiver with the network to the database; and

in response to the database receiving at least the identification information, transmitting from the database the stored information associated with the identification information to the second transceiver.

34. A method in accordance with claim 33 wherein:

the identification information comprises geographical coordinates.

35. A method in accordance with claim 34 wherein:
the identification information further comprises an elevation of the broadcast location.

36. A method in accordance with claim 35 wherein:
the identification information comprises an address of the broadcast location.

37. A method in accordance with claim 36 wherein:
the identification information further defines a location within a street address.

38. A method in accordance with claim 33 wherein:
the identifying information is a pointer which identifies a location of the position transceiver associated with corresponding data of the database where the information which is transmitted to the second transceiver is stored.

39. A method in accordance with claim 33 wherein:
the broadcast location comprises a plurality of information sources, a plurality of position transceivers disposed at the broadcast location respectively coupled to a different one of the plurality of information sources, each position transceiver broadcasting information including identification information relating to one of the information sources from the broadcast location;
a display which displays information relating to the information broadcasted by each of the plurality of position transceivers; and
information, stored in the database associated with the identification information of the plurality of position transceivers, is transmitted to the second transceiver in response to the database receiving at least the identification

information by transmission by the network from the mobile terminal to the database.

40. A method in accordance with claim 33 wherein:
the identification information, which is broadcasted from the position transceiver, includes a uniform resource locator which is an address of the information associated with the identification information in the database in the network.

41. A method in accordance with claim 39 wherein:
the identification information, which is broadcasted from each of the plurality of position transceivers, includes a uniform resource locator which is an address of the information associated with the identification information in the database in the network.

42. A method in accordance with claim 39 wherein:
the information, which is broadcasted from each of the plurality of position transceivers, includes a web page.

43. A method in accordance with claim 39 wherein:
the information, which is broadcasted from each of the plurality of position transceivers, includes application software which is executed by a processor in the mobile terminal.

44. A method in accordance with claim 43 wherein:
the application software comprises an application program for opening a window.

45. A method in accordance with claim 43 wherein:
the application software comprises a web browser for searching the information stored in the database identified by the identifying information.

46. A method in accordance with claim 33 wherein:
the information is encrypted.

47. A method in accordance with claim 46 wherein:
the transmission of the information from the second transceiver to the database is signed by a user of the mobile terminal with a secret key and includes a time stamp of when the information was transmitted from the position transceiver to the mobile terminal; and
the database checks validity of the signature, decrypts the information which is received from the network and checks validity of the time stamp and if the time stamp and signature are valid, the database transmits the stored information associated with the identification information via the network to the second transceiver.

48. A method in accordance with claim 39 wherein:
the plurality of position transceivers of the broadcast location cease to broadcast the information when the plurality of information transceivers are moved.

49. A method in accordance with claim 48 wherein:
the broadcast location includes a device which senses when the plurality of position transceivers are moved and which disables transmission of the information when movement is sensed.

50. A method in accordance with claim 33 wherein:
the position transceiver broadcasts the information with a limited range RF carrier.

51. A method in accordance with claim 33 wherein:
the position transceiver broadcasts the information with a limited range infrared carrier.

52. A method in accordance with claim 33 wherein

the network comprises a cellular telephone network and an IP network.

53. A method in accordance with claim 33 wherein:
the broadcast location includes a device which senses when the plurality of position transmitters are moved; and
the plurality of position transceivers transmit an error indication when the device senses the plurality of information transceivers are moved.

54. A method in accordance with claim 33 wherein:
the broadcasted information includes an advertisement.

55. A method in accordance with claim 33 wherein:
the broadcasted information includes an emergency call.

56. A method in accordance with claim 33 wherein:
the broadcasted information includes information providing a service to move from a first location to a second location.

57. A method in accordance with claim 33 wherein:
the broadcasted information provides calibration of where the mobile terminal is located in the network.

58. A method in accordance with claim 33 wherein:
the broadcasted information provides calibration of the network.

59. A method in accordance with claim 33 wherein:
the broadcasted information provides calibration of position determination by the network.

60. A method in accordance with claim 33 wherein:

the broadcasted information relates to services which are available to a user of the mobile terminal when the user is in a vicinity of the broadcast location.

61. A method in accordance with claim 33 wherein:
the broadcasted information relates to communication services which are available to a user of the mobile terminal only when the user is in a vicinity of the broadcast location.

62. A method in accordance with claim 33 wherein:
the broadcasted information relates to a price for goods or services and an indication where payment may be transmitted if a user of the mobile terminal wishes to purchase the goods or services; and
the mobile terminal transmits payment for purchasing the goods or services to the database.

63. A method in accordance with claim 62 wherein:
acknowledgment of the payment is transmitted to the position transmitter and;
the transceiver transmits the payment acknowledgment to the mobile terminal.

64. A method in accordance with claim 63 wherein:
the transmission of the payment acknowledgment to the mobile terminal also permits the user of the mobile terminal to have access to the purchased goods or services.

65. A method in accordance with claim 33 wherein:
the information broadcasted with the position transceiver is continuously broadcast.

66. A method in accordance with claim 33 wherein:
the information broadcasted with the position transceiver is broadcasted upon activation of the position transmitter by the user of the mobile terminal.

67. A method in accordance with claim 33 wherein:

the information broadcasted with the position transceiver detection is broadcasted when presence of a user of the mobile terminal in a vicinity of the position transmitter is detected.

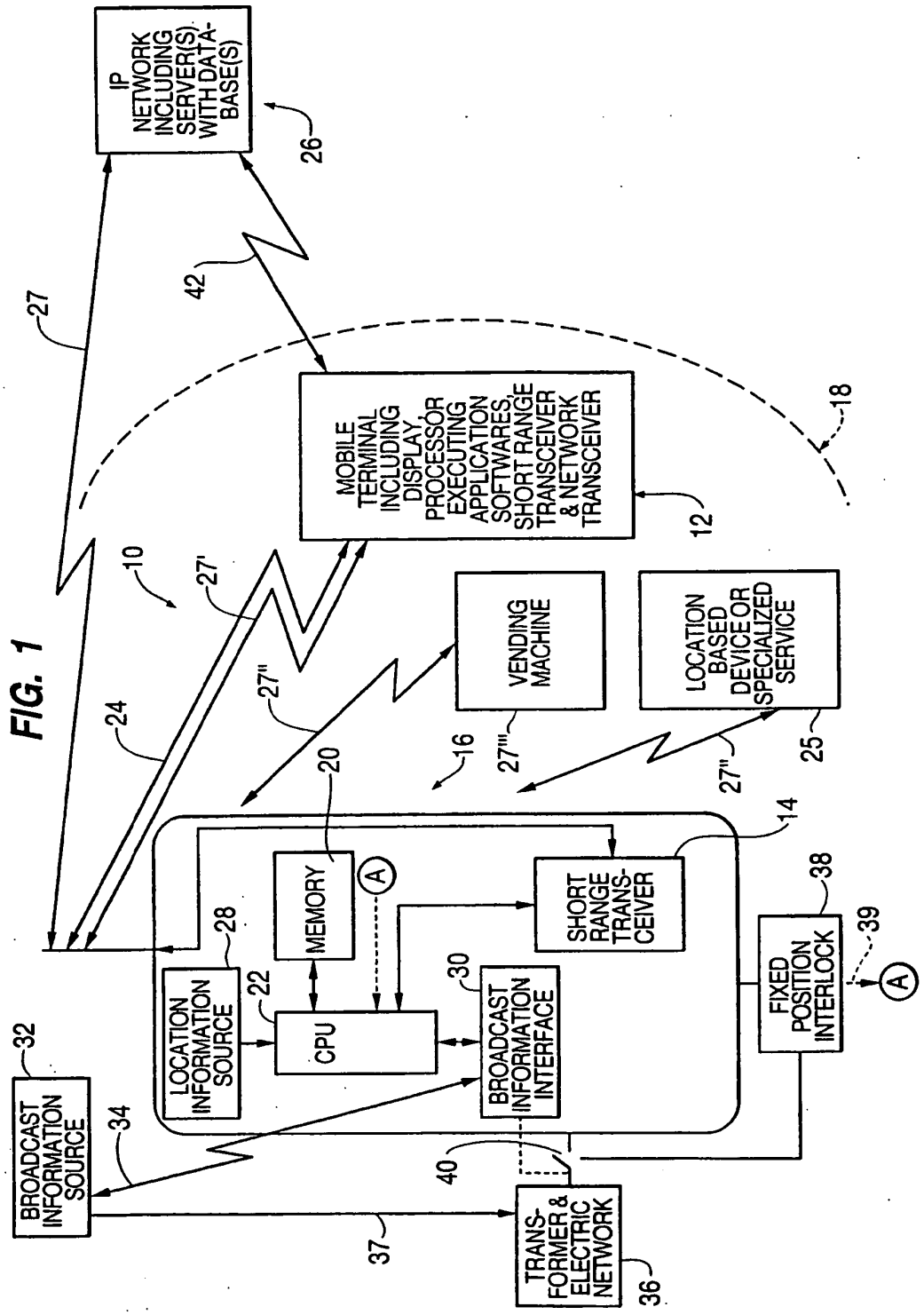

IP NETWORK INCLUDING SERVER(S) WITH DATA-BASE(S)
26
42
27
MOBILE TERMINAL INCLUDING DISPLAY, PROCESSOR EXECUTING APPLICATION SOFTWARES, SHORT RANGE TRANSCEIVER & NETWORK TRANSCEIVER
12
18
10
27'
VENDING MACHINE
LOCATION BASED DEVICE OR SPECIALIZED SERVICE
27"
24
16
27'''
27''
25
20
14
MEMORY
A
SHORT RANGE TRANS-CEIVER
38
28
30
39
LOCATION INFORMATION SOURCE
22
CPU
BROADCAST INFORMATION INTERFACE
FIXED POSITION INTERLOCK
A
32
34
40
BROADCAST INFORMATION SOURCE
37
TRANS-FORMER & ELECTRIC NETWORK
36

FIG. 1

FIG. 2

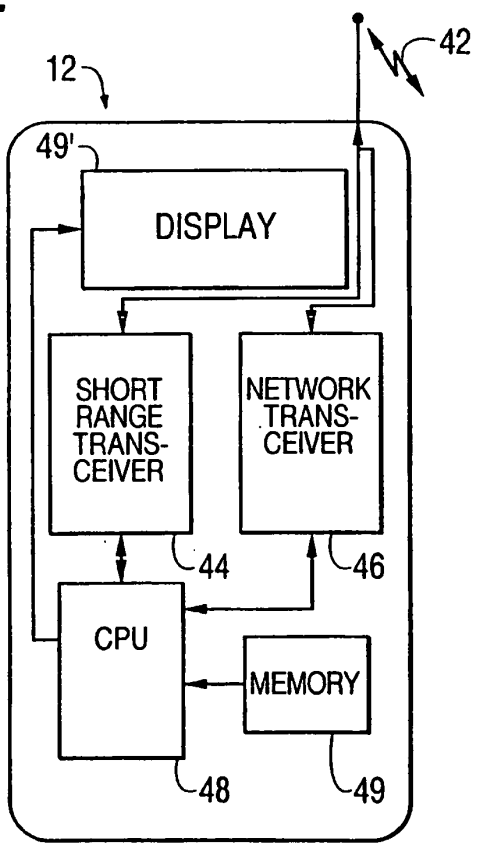

42
12
49'
DISPLAY
SHORT RANGE TRANS-CEIVER
NETWORK TRANS-CEIVER
44
46
CPU
MEMORY
48
49

FIG. 3

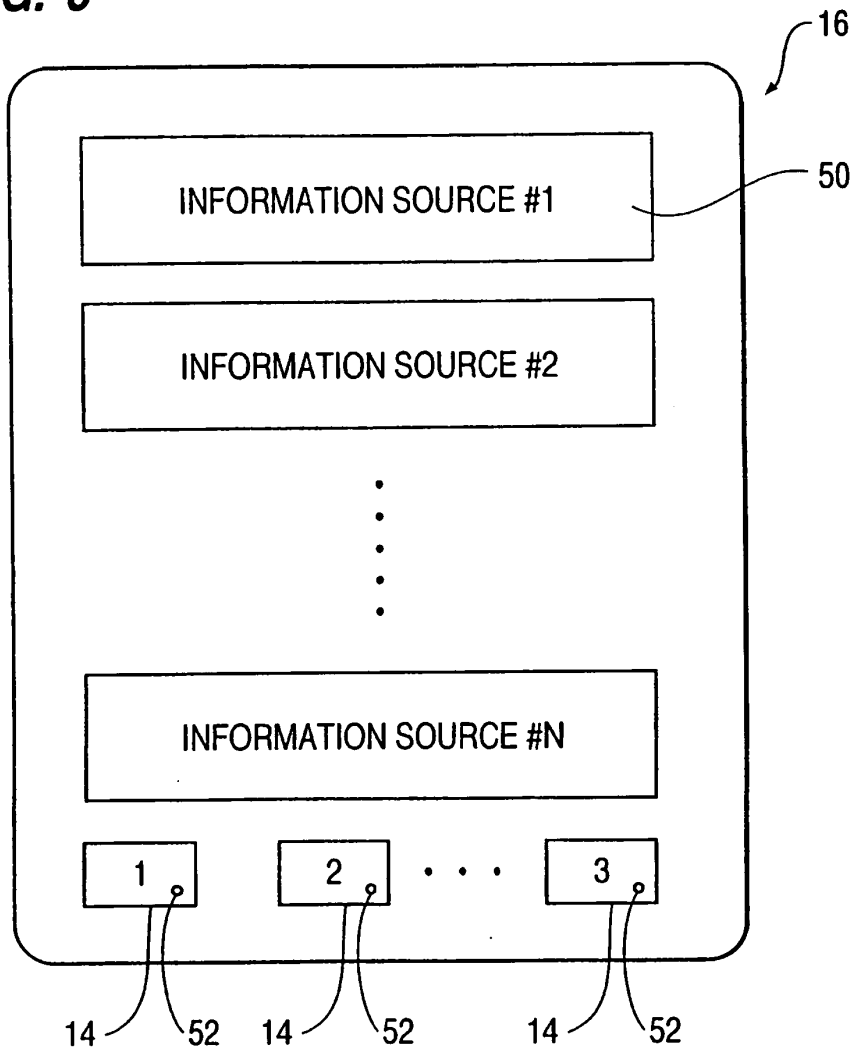
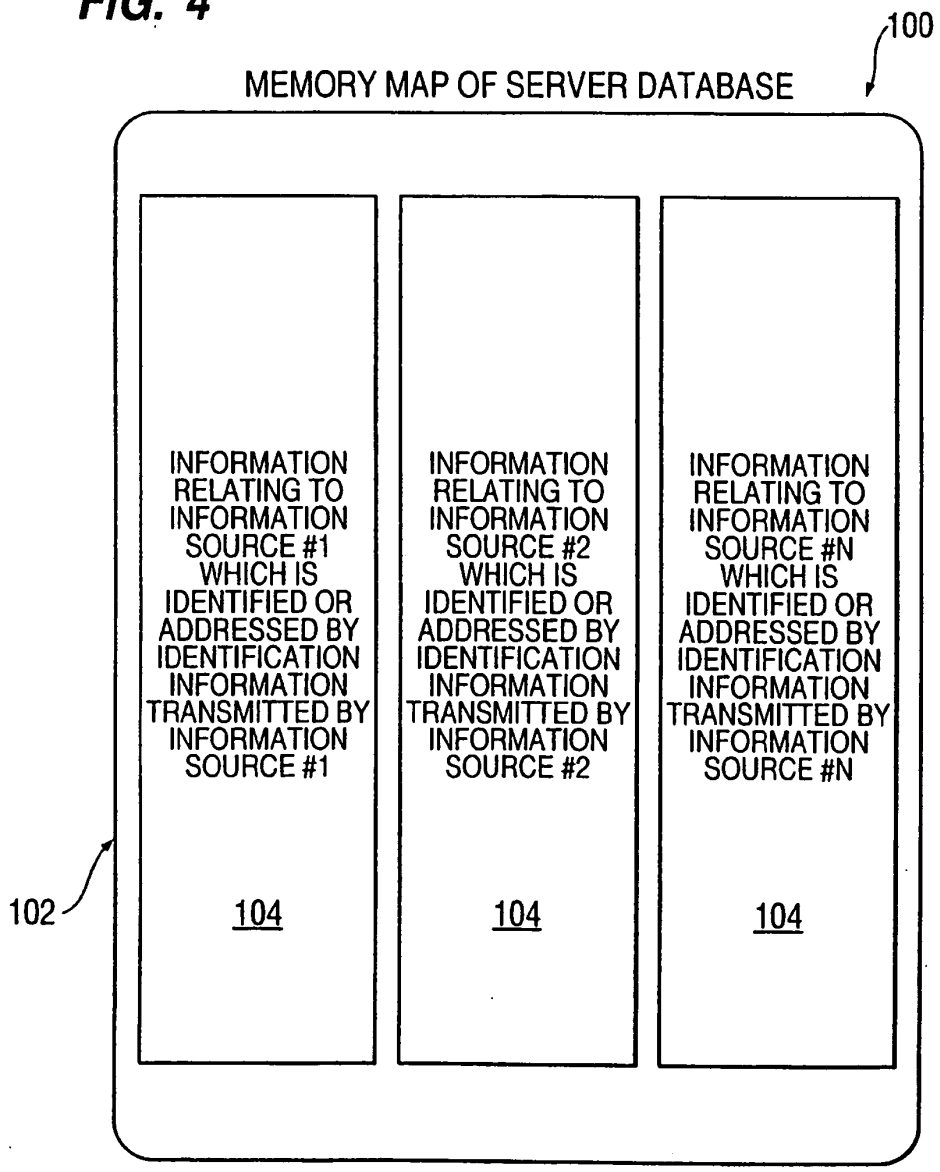

16
50
INFORMATION SOURCE #1
INFORMATION SOURCE #2
INFORMATION SOURCE #N
1
2
3
14
52
14
52
14
52

FIG. 4


100
MEMORY MAP OF SERVER DATABASE
INFORMATION RELATING TO INFORMATION SOURCE #1 WHICH IS IDENTIFIED OR ADDRESSED BY IDENTIFICATION INFORMATION TRANSMITTED BY INFORMATION SOURCE #1
INFORMATION RELATING TO INFORMATION SOURCE #2 WHICH IS IDENTIFIED OR ADDRESSED BY IDENTIFICATION INFORMATION TRANSMITTED BY INFORMATION SOURCE #2
INFORMATION RELATING TO INFORMATION SOURCE #N WHICH IS IDENTIFIED OR ADDRESSED BY IDENTIFICATION INFORMATION TRANSMITTED BY INFORMATION SOURCE #N
102
104
104
104

INTERNATIONAL SEARCH REPORT

Int ional Application No
PCT/IB 00/00770

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/22

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 G01S H04M

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 796 351 A (YABUKI TSUTOMU) 18 August 1998 (1998-08-18) column 1, line 57 -column 2, line 54 figure 1 — -/—	1-9,16, 20,21, 23, 26-30, 33-38, 40,46, 50-52, 54, 57-62, 65-67

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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

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

"O" 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

"T" 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

"Y" 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	Date of mailing of the international search report
2 November 2000	20/11/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Janyszek, J-M

3

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INTERNATIONAL SEARCH REPORT

Int ional Application No
PCT/IB 00/00770

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 848 564 A (BOSCH GMBH ROBERT) 17 June 1998 (1998-06-17) column 2, line 24 - line 57 column 4, line 18 - line 24 figure 1	1-9,16, 20,21, 23, 26-30, 33-38, 40,46, 50-52, 54, 57-62,65
A	EP 0 697 670 A (AT & T CORP) 21 February 1996 (1996-02-21) column 2, line 33 -column 4, line 32 figures 1-3	1,30-33, 62-64
A	EP 0 785 535 A (MITSUBISHI ELECTRIC CORP) 23 July 1997 (1997-07-23) column 4, line 15 -column 5, line 50 column 7, line 31 -column 8, line 16 claims 1,4,6,7,9 figures 2,3,8-10	1-3, 9-15,33, 34,40-44
A	WO 98 47116 A (ERICSSON TELEFON AB L M) 22 October 1998 (1998-10-22) page 3, line 24 -page 4, line 6 page 23, line 24 -page 24, line 1 figure 1	1,16,17, 33,46,62

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

EX1002 - Page 967

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte onal Application No
PCT/IB 00/00770

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		JP 8102700 A	16-04-1996
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		EP 0976116 A	02-02-2000
		NO 995031 A	16-12-1999

Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 January 2001 (04.01.2001)

PCT

(10) International Publication Number
WO 01/01718 A1

(51) International Patent Classification[7]: H04Q 7/38

(21) International Application Number: PCT/FI00/00357

(22) International Filing Date: 26 April 2000 (26.04.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
991466 28 June 1999 (28.06.1999) FI

(71) Applicant *(for all designated States except US)*: **NOKIA NETWORKS OY** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **RAJANIEMI, Jaakko** [FI/FI]; Lapinrinne 2 A 11, FIN-00180 Helsinki (FI). **AHMAVAARA, Kalle** [FI/FI]; Hakaniemenranta 18 D 62, FIN-00530 Helsinki (FI). **EINOLA, Heikki** [FI/FI]; Kaksoiskiventie 7-9 B 5, FIN-02760 Espoo (FI). **BÄCK, Juha** [FI/FI]; Kulosaarenpuistotie 44 B 22, FIN-00570 Helsinki (FI). **HULKKONEN, Tony** [FI/FI]; Porvoonkatu 1 F 214, FIN-00510 Helsinki (FI). **HAUMONT, Serge** [FR/FI]; Riistavuorenkuja 3 B 10, FIN-00320 Helsinki (FI).

(74) Agent: **KOLSTER OY AB**; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).

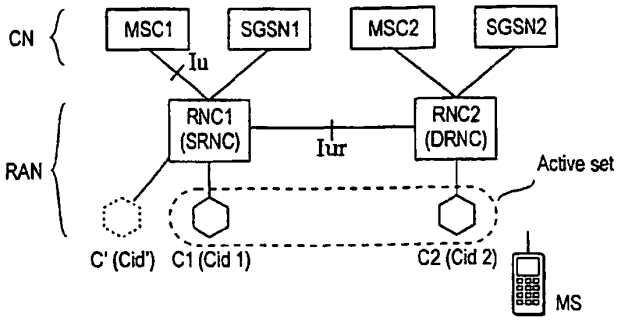
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LOCATION MANAGEMENT FOR CELLULAR SYSTEMS



(57) Abstract: A method for indicating a mobile station's (MS) location. A first radio network controller, RNC, acts as the mobile station's serving RNC (SRNC), for reporting the mobile station's location to the core network (CN). A second RNC acts as the mobile station's drift RNC (DRNC), for maintaining a radio connection with the mobile station. In response to fulfilment of at least one criterion in a first set of criteria, the mobile station (MS) sends location information about its location to the second RNC (DRNC) which forwards the location information to the first RNC (SRNC) for reporting to the core network (CN). There is also a second set of criteria for transforming the location information. In response to fulfilment of at least one criterion in the second set, the first RNC (SRNC) sends falsified information about the mobile station's location to the core network (CN).

WO 01/01718 A1

Location management for cellular systems

Background of the invention

The invention relates to methods and equipment for reporting a mobile terminal's location. The invention can be used e.g. for implementing handover in a mobile communications system. The invention is particularly useful in a system which is at least partly a third generation (3G) mobile communications system. 3G mobile communications systems, such as the UMTS (Universal Mobile Telecommunications System) are being standardised by the UMTS Forum and the European Telecommunication Standard Institute ETSI. The current vision is that 3G systems will include both circuit-switched and packet-switched components.

Fig. 1 is a block diagram of a telecommunications system showing the components which are essential for understanding the invention. A UMTS Mobile Station MS consists of Mobile Equipment ME and a USIM card (User and Services and Identity Module). There is a radio interface Uu between the MS and a Radio Access Network RAN, which comprises Base Stations BS under control of Radio Network Controllers RNC. For circuit-switched services, the RNCs are connected, via an Iu interface, to Mobile services Switching Centres MSC, and for packet-switched services, there is a connection, via a Gb interface, to Serving GPRS Support Nodes SGSN (GPRS = General Packet Radio Service). The MSC and SGSN elements may include separate UMTS addition sections. Subscriber data related to the MS is stored permanently in a Home Location Register HLR and for circuit-switched operation, the data is transferred to the Visitor Location Register VLR of the MSC which currently serves the MS. There may be separate Interworking units IWU for adapting the A and Gb interfaces of GSM/GPRS systems to the Iu interface of the UMTS. For storing equipment-related data, the network comprises an Equipment Identity Register EIR. For entering and updating subscriber-specific data, there is an Operation and Maintenance O&M section having a Man-Machine Interface MMI. For creating and managing supplementary services, there is typically a dedicated Service Control Node SCN which can be seen as an evolved version of a Service Control Point (SCP) of Intelligent Networks.

Only the packet-switched section will be described in more detail, and it is assumed that this section will resemble a GPRS system. The GPRS infrastructure comprises support nodes such as a GPRS gateway support node (GGSN) and a GPRS serving support node (SGSN). The main functions

of the GGSN nodes involve interaction with the external data network. The GGSN updates the location directory using routing information supplied by the SGSNs about an MS's path and routes the external data network protocol packet encapsulated over the GPRS backbone to the SGSN currently serving the MS. It also decapsulates and forwards external data network packets to the appropriate data network and handles the billing of data traffic.

The main functions of the SGSN are to detect new GPRS mobile stations in its service area, handle the process of registering the new MSs along with the GPRS registers, send/receive data packets to/from the GPRS MS, and keep a record of the location of the MSs inside of its service area. The subscription information is stored in a GPRS register (HLR) where the mapping between a mobile's identity (such as MS-ISDN or IMSI) and the PSPDN address is stored. The GPRS register acts as a database from which the SGSNs can ask whether a new MS in its area is allowed to join the GPRS network.

The GPRS gateway support nodes GGSN connect an operator's GPRS network to external systems, such as other operators' GPRS systems, data networks 11, such as an IP network (Internet) or a X.25 network, and service centres. Fixed hosts 14 can be connected to the data network 11 e.g. by means of a local area network LAN and a router 15. A border gateway BG provides access to an inter-operator GPRS backbone network 12. The GGSN may also be connected directly to a private corporate network or a host. The GGSN includes GPRS subscribers' PDP (Packet Data Protocol) addresses and routing information, i.e. SGSN addresses. Routing information is used for tunnelling protocol data units PDU from data network 11 to the current switching point of the MS, i.e. to the serving SGSN. The functionalities of the SGSN and GGSN can be connected to the same physical node.

The home location register HLR of the GSM network contains GPRS subscriber data and routing information and it maps the subscriber's IMSI into an SGSN address and one or more pairs of the PDP type and PDP address. The HLR also maps each PDP type and PDP address pair into a GGSN node. The SGSN has a Gr interface to the HLR (a direct signalling connection or via an internal backbone network 13). The HLR of a roaming MS and its serving SGSN may be in different mobile communication networks.

The intra-operator backbone network 13, which interconnects an operator's SGSN and GGSN equipment, can be implemented, for example, by

means of a local network, such as an IP network. It should be noted that an operator's GPRS network can also be implemented without the intra-operator backbone network, e.g. by providing all features in one computer.

Fig. 2 shows the protocol stacks used at various points in a 3G network.

A mobile station (MS) engaged in GPRS traffic sends a CELL UPDATE (CU) message after detecting that it has changed its cell. A number of cells constitute a routing area (RA), and when the routing area changes, the MS sends a ROUTING AREA UPDATE (RAU) message. In the UMTS the cell update messages are not sent to the SGSN, only to the RNC. Therefore the SGSN is not aware of the exact cell of the MS. For an active MS, the SGSN only knows an identifier of the RNC which handles the MS. For an idle MS, the SGSN only knows the MS's routing area identifier.

A first problem underlying the invention will now be described with reference to Fig. 3. A 3G system may pose certain problems which do not exist in 2G systems, such as the GSM and the GPRS. For example, when the MS is changing its cell, it is possible that a connection-oriented connection is not handled by the RNC controlling the MS's active cells but by another RNC. The former RNC is called a 'drift RNC' and the latter RNC is called a 'serving RNC'. In Fig. 3, RNC1 is the serving RNC (SRNC) and RNC2 is the drift RNC (DRNC). In such a case, the CU and RAU messages are transmitted over the air interface piggybacked to the channel which is reserved for the circuit-switched connection (connection-oriented connection), and they terminate at the serving RNC. In a GPRS core network, if the Radio Access Network (RAN) inserts a cell ID (identifier) into the CU or RAU messages, thereby indicating where the MS is actually located, and if that cell is not controlled by the serving RNC, the SGSN may use another RNC for the packet-switched connections. This is not possible, however, because all simultaneous connections for one user should be handled by one RNC. In other words, there may be an ambiguity concerning the RNC which the SGSN should use. The same holds in a UMTS system if the Radio Access Network (RAN) inserts a cell ID (identifier) into a RAU message or an equivalent.

A second, related problem is that current GPRS or 3G systems do not offer a smooth Inter-SGSN routing area update (RAU) procedure. A lot of signalling is needed between the new SGSN and the old SGSN, the HLR, MSC and the GGSN(s). In particular, the new SGSN must receive the sub-

scriber data from the old SGSN before it can be sure that it can accept the RAU and continue signalling. This signalling causes a delay of up to several seconds, which in some cases could be unacceptable. Moreover, in packet traffic a virtual connection can last for several days. Therefore, the existing concepts of an anchor-MSC and float-MSC are not appropriate.

Disclosure of the invention

It is an object of the invention to provide a method and equipment for eliminating the first problem associated with prior art systems. The object is attained with the method and equipment which are characterized by what is disclosed in the characerizing part of the appended independent claims. Solutions to the second problem and preferred solutions to the first problem are disclosed in the appended dependent claims.

The invention is based on the idea that for a terminal sending information on the basis of which its location can be determined (such as a mobile station having a connection-oriented connection while sending a CU or RAU message), the terminal's location information (e.g. its cell ID) can betransformed, e.g. by using a masked or falsified (faked) location information, such as a fake cell ID. The fake location information is preferably chosen so that the SGSN assumes the location of the MS to be under the serving RNC. A certain pool or group of cell addresses can be used for this purpose. It might be beneficial to choose the addresses so that the SRNC (or SGSN) can detect that the traffic has been forwarded.

According to various preferred embodiments of the invention, the information about the MS's location indicates one or more of the following:

a location (e.g. a cell) which is controlled by the SRNC and which is part of the MS's active set, if such a cell exists;

a virtual location (e.g. cell), which is not controlled by either RNC, in case the MS's active set does not comprise a cell which is controlled by the SRNC;

the last location (e.g. a cell) which is controlled by the SRNC and which has been part of the MS's active set in case the MS's active set does not comprise a cell which is controlled by the SRNC;

a location (e.g. a cell) controlled by the DRNC in case the MS's active set does not comprise a cell controlled by the SRNC; and/or

a location (e.g. a cell) whose location information the MS received last.

The fact that the MS's location information indicates one of these cells has two possible interpretations. The MS's location information may indicate such a cell either explicitly or implicitly. An explicit indication means that the location information contains actual cell identifiers. An implicit indication means that the location information contains some information (e.g. one or more routing or location area identifiers) on the basis of which a cell can be identified (if so desired). It is also feasible to transfer only some location-related data and use it for calculating the MS's location.

The criteria for sending location information preferably comprises a change of the MS's location, activation of a PDP context for the MS and expiry of a recurring period of time.

As briefly noted above, the information about the MS's location may indicate a location, such as a cell, whose location information the MS received last. When a mobile station has at least one active connection, it receives system information only via its dedicated signalling connection. This system information comprises e.g. current location (such as routing area, location area and cell identity) of the mobile station. The system information is similar in nature to the information which the MS receives via a broadcast control channel BCCH when it does not have any active connections. The SRNC only sends system information about the cells controlled by it. In other words, it does not send system information about cells controlled by the DRNC. Based on the system information, the MS can determine whether or not it has moved into a new routing or location area. The SRNC sends this information as necessary. One suitable criterion for sending it is that the MS has moved and its active set does not contain the cell whose system information the SRNC has sent last, or after an SRNC handover (relocation).

Use of the transformed location, such as a fake cell ID, causes another problem, however. When the MS's last connection-oriented connection is terminated and the serving RNC deleted from the MS-URAN connection, the SGSN must be informed about the new (correct) RNC. This holds also for cases where the serving RNC is changed. This problem can be solved as follows. If the MS's last connection-oriented connection is terminated or if the serving RNC is changed, an additional CU or RAU must be performed for the MS, even if the MS's location information has not changed.

The location reporting functionality performed by a serving RNC can be summarised as follows:

1. Check if RNC handover should be performed. If not, then:

2. Select a location, such as a cell which is controlled by the serving RNC and which is part of the MS's active set, if such a cell exists. (N.B. The active set must also comprise at least one cell controlled by the drift RNC, otherwise the concept of drift RNC would not exist.)

If no handover was performed in step 1 or no cell was found in step 2, then do one of the following:

3A. Select a virtual location, such as a cell. A virtual cell is not a real cell (i.e. it is not covered by radio transceivers); or

3B. Select, among the cells controlled by the serving RNC, the last one used by the MS.

If step 3A is taken, i.e. a virtual location is selected, the core network elements (the MSC and/or the SGSN) must determine that the location information does not refer to reallocation. Such a determination can be made on the basis of a suitable cell ID numbering plan or a translation table.

Brief description of the drawings

The invention will now be described in connection with its preferred embodiments, with reference to the accompanying drawings, in which:

Fig. 1 is a block diagram of a telecommunications system showing the components which are essential for understanding the invention;

Fig. 2 shows the protocol stacks used at various points in a 3G network;

Fig. 3 is a simplified block diagram for pointing out the problem more clearly;

Fig. 4 shows a routing area update (RAU) procedure for a GPRS network; and

Fig. 5 shows an alternative Inter-SGSN routing area update procedure according to a preferred embodiment of the invention.

Detailed description of the invention

Fig. 4 shows a routing area update (RAU) procedure for a GPRS network. In step 4-1 the MS sends a ROUTING AREA UPDATE REQUEST via RNC2 (drift RNC) to RNC1 (serving RNC). In step 4-2 RNC1 adds the MS's location information and forwards the RAU Request to SGSN1. In step 4-3 SGSN2 requests the MS's PDP context from SGSN1 which responds in step 4-4. In step 4-5 SGSN1 begins to forward MS-terminated (MT) packets to

SGSN2. Security functions have been shown as step 4-6. In step 4-7 SGSN2 sends an UPDATE PDP CONTEXT REQUEST to the GGSN node which responds in step 4-8. In step 4-9 the MS's location is updated in the HLR. In step 4-10 the HLR cancels the MS's location in SGSN1 which acknowledges this in step 4-11. In step 4-12 the HLR sends an INSERT SUBSCRIBER DATA to SGSN2 which acknowledges in step 4-13. In step 4-14 the HLR sends to SGSN2 an acknowledgement to the message sent in step 4-9. In step 4-15, if the MS is IMSI-attached and does not have a circuit-switched connection, the SGSN-VLR association must be updated. SGSN2 updates the MS's location and SGSN number in the VLR, which acknowledges these in step 4-16. In steps 4-17 and 4-18 the RAU process is completed.

Fig. 5 shows an alternative Inter-SGSN routing area update procedure according to a preferred embodiment of the invention. This embodiment and its alternative modifications solve the second problem underlying the invention.

Due to macrodiversity, the triggering of a RAU is less clear than in 2G systems. A RAU could be triggered e.g. if all cells in the MS's active set belong to the new RA, or if more than half of the cells belong to it. In step 5-1 the MS sends a ROUTING AREA UPDATE REQUEST via RNC2 (drift RNC) to RNC1 (serving RNC). The MS sends the RAU request via its uplink connection, if one exists. Because of the coexistence of the drift RNC and the serving RNC, the update is received by the SRNC which does not control the MS's new routing area. The MS should suspend its session management procedures. In step 5-2 RNC1 adds the MS's location information and forwards the RAU REQUEST to SGSN1. This is in contrast to prior art GPRS systems where the RAU REQUEST is sent to SGSN2. In step 5-3 security functions may be performed, as usual. A benefit of sending the RAU REQUEST to SGSN1 is that SGSN1 already knows the MS's digital signature (PTMSI signature in GPRS terms), and it is likely to have authentication triplets for it. Thus there is no need to fetch these separately, whereby the delays due to the inter-SGSN handover can be shortened.

In step 5-4, if the security functions are completed successfully, the SGSN1 sends a FORWARD RAU REQUEST to SGSN2. This message includes parameters for resuming the connection(s) after the RAU. Such parameters include session management data and eventually Iu information (address of

RNC2). SGSN1 may start a timing period during which it will keep the MS's data in its memory.

In step 5-5 SGSN2 updates the MS's location (IMSI, SGSN address) in the HLR. In step 5-6 the HLR inserts the subscriber data (IMSI, subscription details) into SGSN2 which validates the MS's presence in the new RA. If all regional and other checks are passed, SGSN2 establishes an MM (Mobility Management) context for the MS and returns an acknowledgement to the HLR in step 5-7.

In step 5-8 SGSN2 may establish an Iu link to RNC2 which may send some radio parameters to resume quickly a connection with the MS. This feature is especially useful if the MS has a delay-sensitive application (this can be determined by checking the MS's session management context).

In step 5-9 SGSN2 returns an accept message to the message sent in step 5-4. The accept message includes the new RA index, the MS's new temporary identity (P-TMSI in GPRS terms) and/or its new digital signature. Additionally, some radio parameters or codes obtained from RNC2 may be sent. SGSN1 should immediately acknowledge this message to facilitate error handling. In step 5-10 SGSN1 sends to the MS an RAU ACCEPT message which preferably contains the same parameters as the message of step 5-9. Additionally, if an acknowledgement transmission is active, it may contain some protocol state information known by SGSN1 (this corresponds to LLC acknowledgement in GPRS).

In step 5-11 SGSN1 suspends downlink data transmission for acknowledged mode, in order to keep the protocol state intact. Depending on the QoS, SGSN1 may continue data transmission for unacknowledged mode.

In step 5-12 the MS acknowledges with a RAU COMPLETE message which contains the new temporary identity (P-TMSI) and some protocol state information known by the MS, such as an LLC acknowledgement for each LLC connection used by the MS (which confirms all MT N-PDUs transferred succesfully before the start of the update procedure. If the packet acknowledgement (equivalent to LLC acknowledgement in GPRS) confirms reception of certain N-PDUs, these N-PDUs will be discarded by SGSN1. This message will trigger RNC relocation (which in this embodiment is triggered by the MS).

In step 5-13 the MS establishes a radio connection with RNC2. If radio parameters were sent in step 5-10 (RAU ACCEPT), the MS could set up a radio connection immediately with these parameters. Otherwise, the MS

should re-establish the radio connection by accessing the common channel, which causes a longer break in the connection. This is why sending the radio parameters in step 5-10 may be QoS-dependent. The MS should send an uplink packet (not shown) to SGSN2 in case the RAU COMPLETE message was lost because of error handling. An alternative embodiment, omitting step 5-13, will be described later.

In step 5-14 SGSN1 sends a FORWARD RAU COMPLETE message to SGSN2. In step 5-15 SGSN1 cancels the Iu links towards RNC1 and begins to forward downlink packets to SGSN2. It may keep the MS's context and forward MT packets until the expiry of the optional timing period which was started in step 5-4. In step 5-16, when SGSN2 receives the FORWARD RAU COMPLETE message, it resumes data transmission towards the MS.

In step 5-17 SGSN2 sends to the relevant GGSN(s) an UPDATE PDP CONTEXT REQUEST (SGSN2 address, Tunnel Identifier, QoS Negotiated). The GGSNs update their PDP context fields and return a response in step 5-18. N.B: Steps 5-17 and 5-18 may take place any time after step 5-5.

In step 5-19 the HLR cancels the MS's location in SGSN1. This message contains the MS's IMSI, and the cancellation type is set to Update procedure. If the optional timer was not set in step 5-4, SGSN1 deletes the MS's MM and PDP contexts. Otherwise it waits until the timer expires. The timing period allows SGSN1 to complete forwarding of N-PDUs. It also ensures that the MS's MM and PDP contexts are kept in case the MS initiates another Inter-SGSN RAU before completing the ongoing RAU. In step 5-20 SGSN1 acknowledges with a CANCEL LOCATION ACK.

According to an alternative embodiment step 5-13 is omitted. Instead, during step 5-15 RNC1 receives an indication from SGSN1 that the RNC could now be relocated. RNC1 will inform RNC2 which will start handling the MS directly.

In general, the invention is equally applicable if the SGSN is replaced by a 3G MSC (or an MSC/SGSN combination). For this embodiment, the MSC and/or SGSN could be called 'switching elements' since they route packets and/or establish circuit-switched connections.

In GSM systems no location area updates are performed during connection, in order not to confuse the relay and anchor MSCs. With macro diversity the LAU could reach the old MSC directly, whereby it is possible to have a LAU during a call. However, in a hard inter-MSC handover, a special

message (LAU with an active call indication) may be needed. Such a message could trigger the new MSC to establish a connection with the old MSC and try to resume the call. A problem is that this would happen especially between the GSM and the UMTS, which means that a GSM MSC would need to interpret this special LAU message.

It should be noted that figures 4 and 5 illustrate worst-case scenarios in the sense that both RNCs are under different SGSN nodes or MSCs. If the SGSNs or the MSCs are the same, these scenarios could be simplified accordingly.

Claims

1. A method for indicating a terminal's (MS) location in a telecommunications system comprising:

a core network (CN); and

an access network (RAN) comprising a first network controller, which at least temporarily acts as the terminal's serving network controller (SRNC), for reporting the terminal's location to the core network, and a second network controller, which at least temporarily acts as the terminal's drift network controller (DRNC), for maintaining a connection with the terminal; wherein

there is a first set of predetermined criteria for sending information about the terminal's (MS) location to the core network (CN); and

in response to fulfilment of at least one criterion in the first set, the terminal (MS) sends to the second network controller (DRNC) location information (4-1, 5-1) on the basis of which the terminal's location can be determined; and the second network controller (DRNC) forwards the location information to the first network controller (SRNC) for reporting to the core network (CN);

characterized in that

there is a second set of at least one predetermined criterion for transforming the location information;

the first network controller (SRNC) checks whether at least one criterion in the second set is fulfilled; and

in response to fulfilment of at least one criterion in the second set, the first network controller (SRNC) sends transformed information (4-2, 5-2) about the terminal's location to the core network (CN).

2. A method according to claim 1, characterized in that in response to terminating the last connection-oriented connection with the terminal, the first network controller (SRNC) reports the terminal's correct location to the core network (CN).

3. A method according to claim 1 or 2, characterized in that the information about the terminal's (MS) location indicates a location which is controlled by the first network controller (SRNC) and which is part of the terminal's active set, if such a location exists.

4. A method according to claim 3, characterized in that if the terminal's active set does not comprise a location which is controlled by the first network controller (SRNC), the information about the terminal's (MS) location indicates a virtual location, which is not controlled by either of said network controllers.

5. A method according to claim 3, characterized in that if the terminal's active set does not comprise a location which is controlled by the first network controller (SRNC), the information about the terminal's (MS) location indicates the last location which is controlled by the first network controller and which has been part of the terminal's active set.

6. A method according to claim 3, characterized in that if the terminal's active set does not comprise a location which is controlled by the first network controller (SRNC), said information about the terminal's (MS) location indicates a location which is at least partially controlled by the first network controller.

7. A method according to any one of the preceding claims, characterized in that the information about the terminal's (MS) location indicates a location the location information of which the terminal received last.

8. A method according to any one of the preceding claims, characterized in that if the terminal's (MS) active set does not comprise a location controlled by the first network controller (SRNC), the information about the terminal's (MS) location indicates a location controlled by the second network controller (DRNC).

9. A method according to any one of the preceding claims, characterized in that said information about the terminal's (MS) location indicates at least one cell identifier, routing area identifier or location area identifier.

10. A method according to any one of the preceding claims, characterized in that said first set of criteria comprises a change of the terminal's location, activation of a PDP context for the terminal and expiry of a recurring period of time.

11. A method according to any one of the preceding claims, characterized in that

the first and the second network controller (RNC1, RNC2) are associated, respectively, with a first and a second switching element (SGSN1, SGSN2) for maintaining subscription information related to the terminal (MS); and

information about the terminal's location is received by the first switching element (SGSN1) sends (5-4) information about the terminal's location to the second switching element (SGSN2) without a separate request.

12. A method according to claim 11, characterized in that said information about the terminal's location comprises the terminal's Packet Data Protocol and/or Mobility Management context.

13. A method according to claim 11 or 12, characterized in that each of the first and the second switching element (SGSN1, SGSN2) is substantially an SGSN node, a Mobile services Switching Centre or a combination of both.

14. A method according to any one of the preceding claims, characterized in that said terminal is a mobile station, said access network is a radio access network and said network controller is a radio network controller.

15. A first network controller for supporting a terminal (MS) in a telecommunications system which comprises a core network (CN) and an access network (RAN);

wherein said first network controller is adapted to act, at least temporarily, as the terminal's serving network controller (SRNC) in said access network (RAN), for reporting the terminal's location to the core network (CN); and

the first network controller (SRNC) is adapted to receive location information from a drift network controller (DRNC) and to report it to the core network (CN) for determining the terminal's (MS) location;

characterized in that

the first network controller (SRNC) is adapted to transform said information about the terminal's location before reporting it to the core network (CN).

Fig. 1

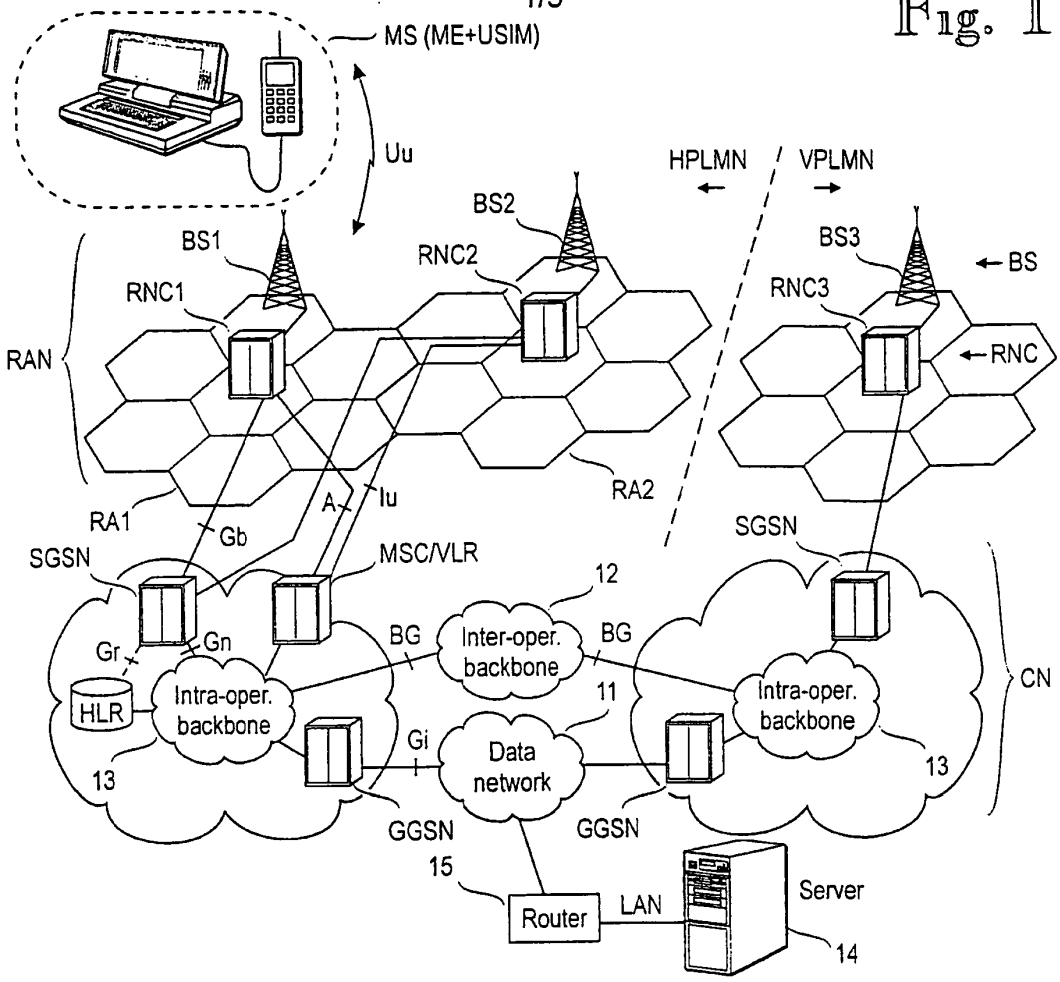
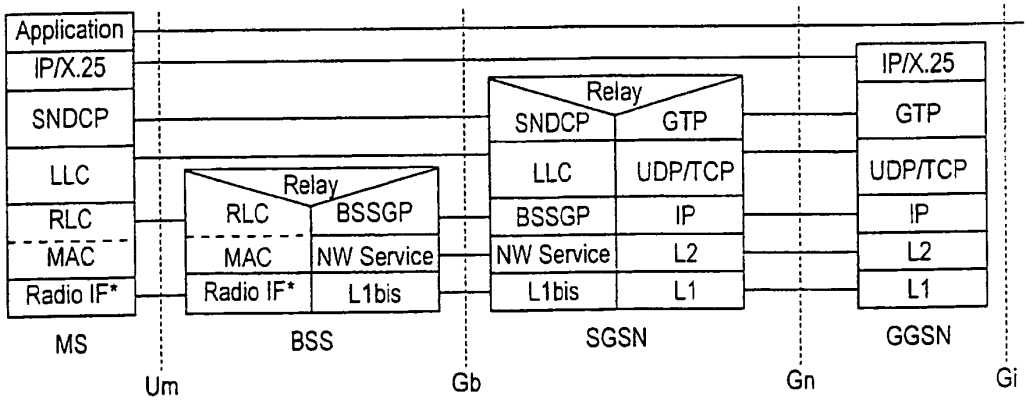


Fig. 2



*WCDMA in 3G

Fig. 3

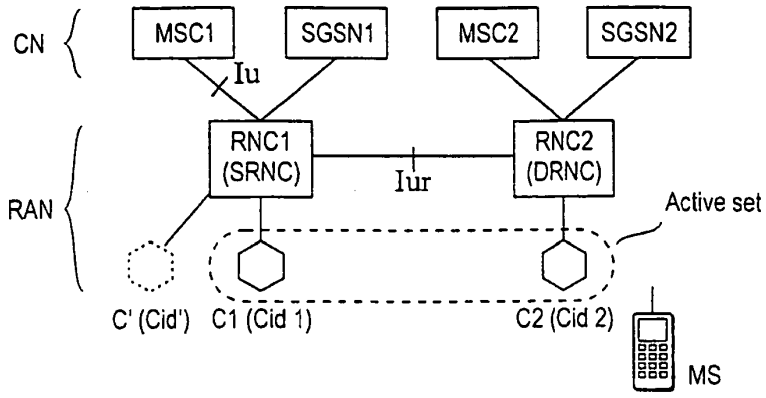

CN
MSC1
SGSN1
MSC2
SGSN2
Iu
RAN
RNC1
(SRNC)
Iur
RNC2
(DRNC)
Active set
C' (Cid')
C1 (Cid 1)
C2 (Cid 2)
MS

Fig. 4

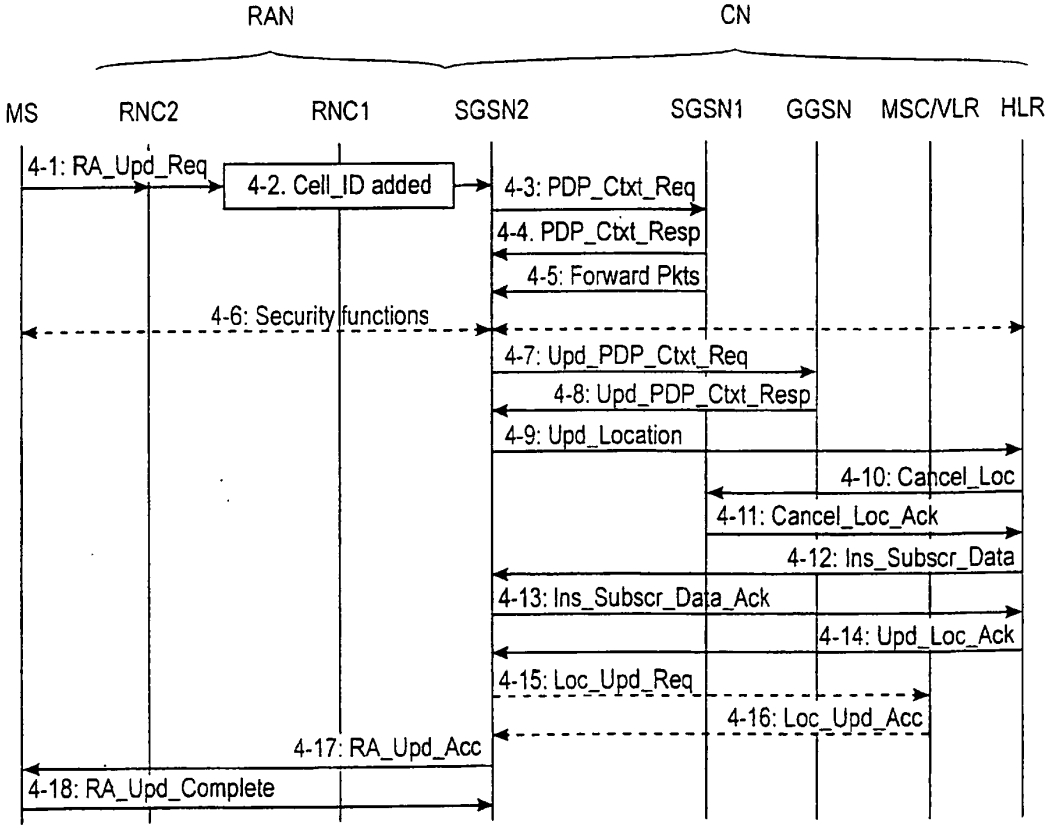
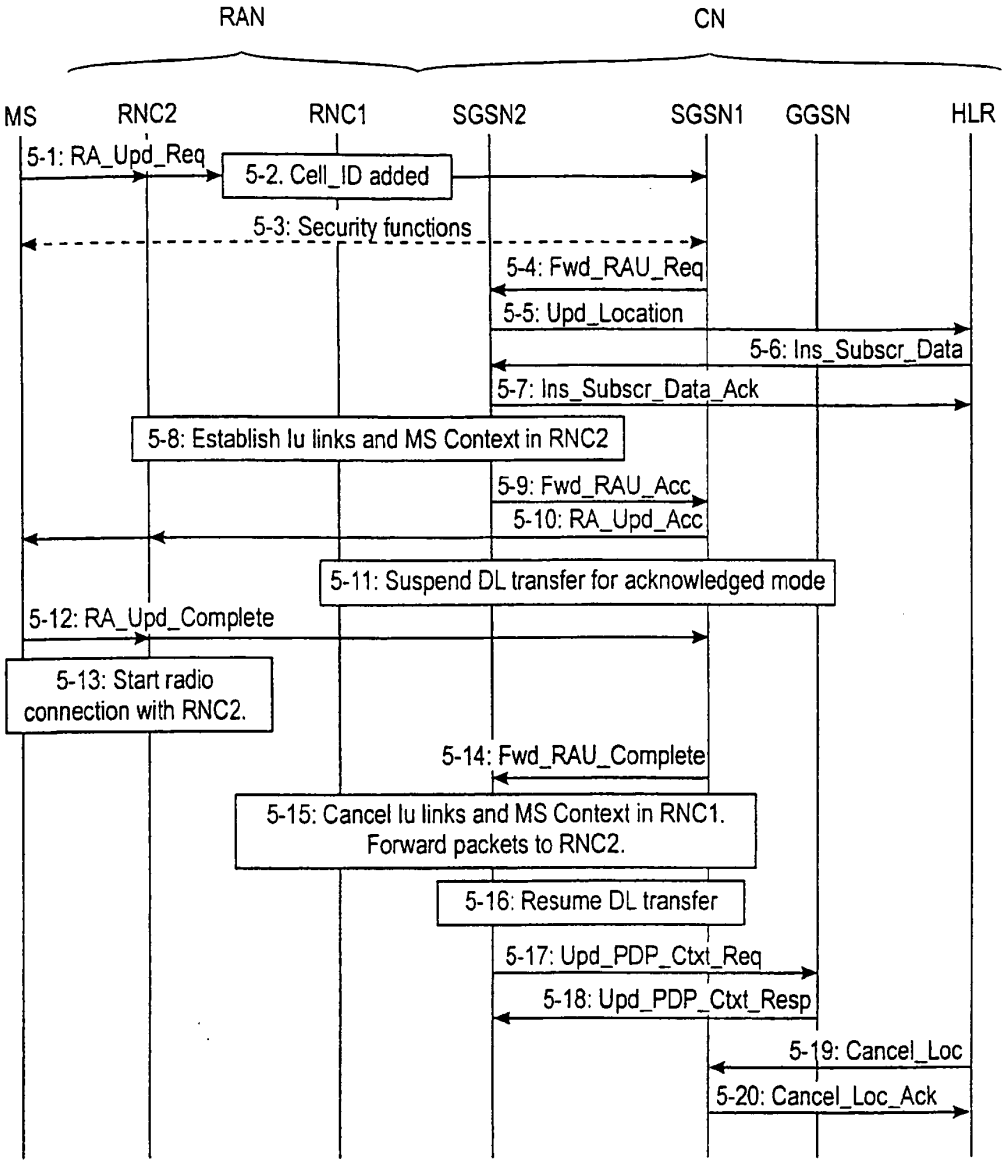

RAN
CN
MS
RNC2
RNC1
SGSN2
SGSN1
GGSN
MSC/VLR
HLR
4-1: RA_Upd_Req
4-2. Cell_ID added
4-3: PDP_Ctxt_Req
4-4. PDP_Ctxt_Resp
4-5: Forward Pkts
4-6: Security functions
4-7: Upd_PDP_Ctxt_Req
4-8: Upd_PDP_Ctxt_Resp
4-9: Upd_Location
4-10: Cancel_Loc
4-11: Cancel_Loc_Ack
4-12: Ins_Subscr_Data
4-13: Ins_Subscr_Data_Ack
4-14: Upd_Loc_Ack
4-15: Loc_Upd_Req
4-16: Loc_Upd_Acc
4-17: RA_Upd_Acc
4-18: RA_Upd_Complete

Fig. 5


RAN
CN
MS
RNC2
RNC1
SGSN2
SGSN1
GGSN
HLR
5-1: RA_Upd_Req
5-2. Cell_ID added
5-3: Security functions
5-4: Fwd_RAU_Req
5-5: Upd_Location
5-6: Ins_Subscr_Data
5-7: Ins_Subscr_Data_Ack
5-8: Establish Iu links and MS Context in RNC2
5-9: Fwd_RAU_Acc
5-10: RA_Upd_Acc
5-11: Suspend DL transfer for acknowledged mode
5-12: RA_Upd_Complete
5-13: Start radio connection with RNC2.
5-14: Fwd_RAU_Complete
5-15: Cancel Iu links and MS Context in RNC1. Forward packets to RNC2.
5-16: Resume DL transfer
5-17: Upd_PDP_Ctxt_Req
5-18: Upd_PDP_Ctxt_Resp
5-19: Cancel_Loc
5-20: Cancel_Loc_Ack

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 00/00357

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: 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)

IPC7: H04Q

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 9966740 A2 (EINOLA), 23 December 1999 (23.12.99), page 3, line 7 - page 7, line 24	15
P,A	--	1-14
P,A	WO 0011878 A2 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 2 March 2000 (02.03.00), page 6, line 18 - page 8, line 13	1-15
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A	WO 9920071 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 22 April 1999 (22.04.99), page 5, line 6 - page 7, line 3, abstract	1-15
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 October 2000	17 -10- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jaana Raivio/mj Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT
Information on patent family members

01/08/00

International application No.
PCT/FI 00/00357

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9966740 A2	23/12/99	AU 4554499 A	05/01/00
		AU 5900699 A	21/03/00
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WO 9920071 A1	22/04/99	AU 9468798 A	03/05/99
		SE 9703697 A	11/04/99

Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 January 2001 (11.01.2001)

PCT

(10) International Publication Number
WO 01/03406 A1

(51) International Patent Classification[7]: H04M 1/57

(21) International Application Number: PCT/EP99/04519

(22) International Filing Date: 30 June 1999 (30.06.1999)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: KALL, Jan [FI/FI]; Jupperinmetsä 2B, FIN-02730 Espoo (FI).

(74) Agents: GRAMS, Klaus et al.; Tiedtke-Bühling-Kinne et al., Bavariaring 4, D-80336 München (DE).

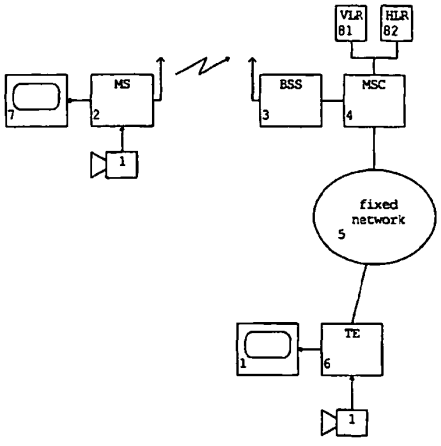
(81) Designated States *(national)*: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND SYSTEM FOR PROVIDING A CALLER PICTURE



(57) Abstract: The present invention relates to a method and system for providing a caller picture via a telecommunication network to a called party. When the calling party makes a call, the caller picture is transferred to the network and further to the terminal of the called party. The caller picture is generated and transmitted to a network element at the beginning of the call. Then, the network element stores the caller picture. Thereby, it is possible to achieve a better quality and to generate any caller picture at the terminal of the calling party in real-time, so as to provide an up-to-date picture. Alternatively, the caller picture can be stored in advance, such that the user may edit the caller picture before it is sent to the network. Furthermore, the caller picture presentation can be defined as a supplementary service which subscribers can subscribe to.

WO 01/03406 A1

Method and System for Providing a Caller Picture

FIELD OF THE INVENTION

The present invention relates to a method and system for providing a caller picture via a telecommunication network to a called party.

BACKGROUND OF THE INVENTION

Conventionally, multi-media communication apparatuses capable of performing speech and image communication via a communication line are known.

Document US 5,414,457, for example, discloses a communication apparatus, wherein, in a reception state, an image of a calling party and a selection signal for a telephone number are registered in a volatile memory in correspondence with each other, and the registered image is displayed on an image display section. When a calling operation is performed to a party corresponding to the registered image, an operator need only designate the image of the party to be called from displayed images, and a CPU automatically outputs a selection signal for a telephone number corresponding to the designated image. Therefore, the image of a party to be called can be visually recognized before calling. Thus, since calling can be made after confirmation of an image such as a face of a party to be called, a dialing error can be prevented. However, a subscriber B may only store an image information transmitted from a subscriber A and to be used when the subscriber B is about to make a call to the subscriber A. Thus, the subscriber B does not receive a caller picture

from the subscriber A, before answering to the phone, if the subscriber A has not phoned him up before.

Furthermore, document US 5,761,279 discloses a system for displaying a graphic information such as a facial representation on a communication's terminal. The facial representation is digitized, compressed and stored in a memory at an appropriate control center of a communication network. Upon receipt of a display command, the digitized data is retrieved from a memory and transmitted to the called party's display terminal using a modem technology. However, the user has to provide a photo to the service provider in advance, who digitizes it. Thus, the caller pictures are not real-time pictures and their quality is not very high.

Thus, a drawback of the above prior art ist that the caller picture is determined in advance and cannot be changed according to the actual needs of the calling party.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a method and system for providing a caller picture to a called party in a more flexible manner.

This object is achieved by a method for providing a caller picture via a telecommunication network to a called party, comprising the steps of:

generating the caller picture at a terminal of a calling party;

transmitting the caller picture to the telecommunication network at the beginning of a call;

storing the caller picture at a network element of the telecommunication network; and

transmitting the caller picture from the network element to a terminal of the called party.

Furthermore, the above object is achieved by a system for providing a caller picture to a called party via a telecommunication network, having a plurality of terminals and at least one network element for routing calls,

wherein said plurality of terminals comprise camera means for generating the caller picture, display means for displaying the caller picture, and transmitting means for transmitting the caller picture to the at least one network element at the beginning of a call; and

wherein the network element comprises receiving means for receiving the caller picture, storing means for storing the caller picture, and transmitting means for transmitting the caller picture to a terminal of the called party.

Accordingly, a camera function is provided at the terminal of a calling party, such that the terminal both digitizes a caller picture and transmits it to the network element of the telecommunication network. Then, the network element which may be a switching means, stores the picture. Thereby, a much better quality of the caller picture can be achieved, and not only a facial representation, but anything just like post cards can be transmitted in real-time to the called party. Therefore, the picture is up-to-date and a selection function for selecting one of a plurality of centrally stored caller pictures based on the calling person is not required.

Preferably, the transmission of the caller picture to the network element, the storing of the caller picture at the

network element, and the transmission of the caller picture from the network element to the terminal of the called party are performed in response to a subscriber information indicating a subscription of a supplementary service for providing the caller picture. Thus, the user may subscribe a supplementary service if he wishes to provide or receive a caller picture. The subscriber information may either indicate a caller picture presentation or a caller picture presentation restriction.

Preferably, the caller picture is taken by the camera function at the beginning of the call. Additionally, the caller picture may selectively be stored in a memory of the terminal of the calling party, and may be transmitted from the memory to the telecommunication network at the beginning of the call. In this case, the selective storing operation of the caller picture in the memory of the terminal of the calling party may be performed in accordance with a selection input operation at the terminal of the called party. Thereby, the calling person may store any picture taken in advance, wherein the stored picture may then be transmitted via the network element to the called party at the beginning of the call.

Preferably, the network element comprises a control means for checking a subscriber information of the called party stored in a subscriber data base, and for controlling the storing means based on the subscriber information. In particular, the data base may be a location register of a mobile network. The telecommunication network may be a GSM or a UMTS network. The network element may be a switching means such as a mobile switching center or a serving GPRS support node (SGSN).

The terminal of the calling party may comprise a switching means for selectively connecting a transmitting means to a camera means or to a memory means in accordance with a selection operation of a selection means for selecting a direct transmission operation in which the caller picture is generated and transmitted at the beginning of the call, or a memory operation in which the caller picture is generated and stored in the memory means from which it can be transmitted later. Thereby, a flexible generation timing of the caller picture can be provided.

The subscriber terminal may be a mobile terminal of a mobile communication network. Furthermore, the terminal of the called party as well as a terminal of a calling party may both be mobile terminals.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the present invention will be described in greater detail on the basis of a preferred embodiment with reference to the accompanying drawings, in which:

Fig. 1 shows a principle block diagram of a mobile telecommunication network in which the method and system according to the present invention is implemented;

Fig. 2 shows a principle block diagram of a mobile terminal according to the preferred embodiment of the present invention;

Fig. 3 shows a principle block diagram of a mobile switching center according to the preferred embodiment of the present invention; and

Fig. 4 shows a flow diagram of an operation of the mobile switching center according to the preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the following, the preferred embodiment of the method and system according to the present invention will be described on the basis of a mobile telecommunication network such as a GSM or UMTS network.

Fig. 1 shows a principle block diagram of a mobile communication network comprising a mobile terminal or mobile station (MS) 2 having an integrated or separate camera 1 and an integrated or separate display 7 for displaying a picture taken at a terminal of a calling party. In the following, this picture is referred to as caller picture.

The MS 2 is radio-connected to a Base Station Subsystem (BSS) 3 which is connected to a Mobile Switching Center (MSC) 4 arranged to provide a switching function for switching or routing received calls according to the location of the called party. Furthermore, subscriber data bases such as a Visitor Location Register (VRL) 81 and a Home Location Register (HLR) 82 are connected to the MSC 4 so as to provide a file system for storing subscriber information such as a location information of mobile terminals, an information about supplementary (operator) services subscribed by individual subscribers, and the like.

The MSC 4 is connected via an interworking function to a fixed network 5 such as a Public Switched Telephone Network (PSTN) or an IN network. Thereby, a connection can be established between a multi-media end terminal (TE) 6 of the fixed network 5 and the MS 2. The TE 6 also comprises an external or internal camera 1 and an external or internal display 7.

According to the communication system shown in Fig. 1, a caller picture can be supplied to a called mobile station of the mobile telecommunication network or to the end terminal TE 6 of the fixed network 5. In particular, a caller picture taken by the camera 1 is transferred via the MSC 4 to the display 7 at the terminal of the called party at the beginning of the call. The calling party may selectively store the picture into a memory provided in the calling terminal, such as the MS 2 or the TE 6. Alternatively, the caller may take a picture just at the beginning of the call and may directly transmit the generated caller picture to the terminal of the called party. There are no limitations for the coding system of the picture, as long as the terminal of the called party is able to decode and display the image information received from the terminal of the calling party.

Furthermore, a supplementary service can be applied both to telephone calls and video calls. The supplementary service may be arranged to define a Caller Picture Presentation / Caller Picture Presentation Restriction (CPP/CPPR), wherein the subscriber defines by a corresponding service subscription whether a CPP or a CPPR is to be established for desired connections. The subscriber information defining the CPP/CPPR can be stored in the HLR 82 or the VLR 81, depending on the location of the MS 2.

Alternatively, a separate storing means may be provided in the MSC 4 for storing the above subscriber information. In the fixed network 5, the subscriber information may be stored in a corresponding data base of a switching means of the fixed network 5.

Thus, according to the preferred embodiment, both caller picture presentation and caller picture presentation restriction are defined as a supplementary service that can be applied to a telephone call (teleservice) or video call. These services can be subscribed to e.g. in GSM, UMTS or any other telecommunication system.

Fig. 2 shows a principle block diagram of the MS 2. It is to be noted that the same components are also included in the end terminal TE 6 of the fixed network 5. Therefore, the description of the present invention is restricted to the block diagram of the MS 2.

According to Fig. 2, the camera 1 which may be a separate or an integrated camera is connected via an I/O interface 26 to a signal processing unit 21 arranged for performing e.g. an encoding, encryption and/or compressing operation required for transmitting the generated caller picture via the communication network. The signal processing unit 21 is connected via a switch 23 either to a transceiver (TRX) 24 or to a volatile or non-volatile memory 22. Thus, a picture taken by the camera 1 may selectively be stored in the memory 22 or directly transmitted via the TRX 24 to the MSC 4.

The switch 23 is controlled by a control unit 27 connected to the TRX 24 and the I/O interface 26. The I/O interface 26 is further connected to the display 7 which may be an

LCD or the like, and to an operating unit such as a key pad 25. In particular, the key pad 25 and the display 7 may correspond to the conventional input/output units of a multi-media end terminal.

In the block diagram shown in Fig. 2, a memory storing operation for storing a picture received from the camera 1 in the memory 22, a direct transmission operation for directly transmitting the picture received from the camera 1 to a called party, or a memory transmission operation for transmitting a caller picture stored in the memory 22 may be selected by a corresponding input operation at the key pad 25. Based on this input operation, the control unit 27 controls the switch 23 so as to selectively store the picture received from the camera 1 in the memory 22 or transmit an actual or stored picture via the TRX 24 to the called party. Furthermore, the control unit 27 may receive a subscriber information via the TRX 24 from the telecommunication network, wherein the subscriber information indicates a restriction of the supplementary CPP service. Based on this subscriber information, the control unit 27 may control the switch 23 so as to switch a picture taken by the camera 1 to the memory 22 irrespective of an input operation at the key pad 25. In this case, a corresponding error message indicating that the CPP service is not subscribed to can be displayed on the display 7.

Thus, at the beginning of a call, e.g. before or after the dialing operation, a calling person performs the above selection by a corresponding input operation at the key pad 25. The input operation may be controlled by the control unit 27 on the basis of a control menue displayed at the display 7. Additionally, a default operation may be provided, if a selection is not performed. The

corresponding control program may be stored in a non-volatile program memory (not shown) provided in the control unit 27.

Fig. 3 shows a principle block diagram of the MSC 4. According to Fig. 3, the MSC 4 comprises a transceiver (TRX) 41 connected to the BSS 3. The TRX 41 is connected to a switch 42 arranged to perform switching according to the location of the desired called party. Furthermore, the switch 42 is connected to the VLR 81 and the HLR 82, such that the MSC 4 may refer to the subscriber information of a calling party or a called party.

Furthermore, the MSC 4 comprises a control unit 43 arranged for controlling a storing function of a caller picture received from a calling party in a corresponding memory 44. Thus, in case a call is received by the MSC 4, it refers to the VLR 81 or HLR 82 in order to retrieve the corresponding subscriber information of the called party and/or the calling party. In case the subscriber information of the called party indicates that the CPPR has been activated, i.e. the caller picture presentation is restricted, the control unit 43 inhibits the storing of the received caller picture in the memory 44. Furthermore, a function may be provided according to which the MSC 4 transmits a subscriber information to the calling party so as to indicate that the caller picture presentation is restricted at the called terminal. Based on this subscriber information, the terminal of the calling party may inhibit the transmission of the caller picture. The same operations indicated above may be performed if the MSC 4 determines based on the retrieved subscriber information that the calling party has restricted the caller picture presentation.

In case the subscriber information retrieved from the VLR 81 or the HLR 82 indicates that the caller picture presentation is subscribed or activated by the called party, the control unit 43 controls the memory 44 so as to store the received caller picture. After the connection has been established between the calling party and the called party, the stored caller picture is transmitted from the MSC 4 to the called party, so as to be displayed at the terminal of the called party. Based on the displayed caller picture, the called party may decide whether to respond to the call or not.

Fig. 4 shows a principle block diagram of a processing performed by the control unit 43 of the MSC 4.

Initially, it is determined in step S100 whether a call has been received. If not, the control unit waits in step S100 until a call has been received from the mobile network. If a call has been received, the control unit 43 initiates a checking operation so as to refer to the subscriber data base, e.g. the VLR 81 or the HLR 82 (S101). In case the checking step indicates that the CPPR is activated for the called party, the flow branches to an optional step S105 where a corresponding CPPR information is transmitted to the calling party so as to indicate the restricted caller picture presentation. In case the CPP is activated, i.e. the called party has subscribed to the caller picture presentation, the image data of the caller picture are received and stored in the memory 44 (step S102). Thereafter, the connection between the called party and the calling party is established in step S103, and the stored image data of the caller picture are transmitted in step S104 to the called party.

Then, the control unit 43 waits in step S106 for a signaling indicating the end of the call. If such a signaling has been received, the connection is released in step S107 and the flow returns to step S100 in order to wait for the receipt of a new call.

As already mentioned, the checking operation in step S101 may also be performed for the calling party, wherein the storing and transmission of the caller picture at the MSC 4 is only performed if both parties have not restricted the caller picture presentation service.

It is to be pointed out that the caller picture may be stored in any network element having a switching or routing function. In particular, the control operation according to Fig. 4 may be performed in a Service GPRS Support Node (SGSN) of a General Packet Radio System (GPRS), or in any switching means of the fixed network 5. Furthermore, the present invention may be applied to any telecommunication network to which multi-media communication apparatuses can be connected. The subscriber terminal may be a terminal or device connected to a fixed lines telecommunications network, such as a PSTN, ISDN or a local area (data) network.

As an alternative, the caller picture may be transferred between two mobile terminals, wherein a service is provided for transmitting the caller picture via the MSC 4 to a called mobile terminal at the beginning of a mobile connection.

The above description of the preferred embodiment and the accompanying drawings are only intended to illustrate the

present invention. The preferred embodiment of the invention may thus vary within the scope of the attached claims.

In summary, the present invention relates to a method and system for providing a caller picture via a telecommunication network to a called party. When the calling party makes a call, the caller picture is transferred to the network and further to the terminal of the called party. The caller picture is generated and transmitted to an network element at the beginning of the call. Then, the network element stores the caller picture. Thereby, it is possible to achieve a better quality and to generate any caller picture at the terminal of the calling party in real-time, so as to provide an up-to-date picture. Alternatively, the caller picture can be stored in advance, such that the user may edit the caller picture before it is sent to the network. Furthermore, the caller picture presentation can be defined as a supplementary service which subscribers can subscribe to. (Fig. 1)

Claims

1. A method for providing a caller picture via a telecommunication network to a called party, comprising the steps of:

a) generating said caller picture at a terminal of a calling party;

b) transmitting said caller picture to said telecommunication network at the beginning of a call;

c) storing said caller picture at a network element of said telecommunication network; and

d) transmitting said caller picture from said network element to a terminal of said called party.

2. A method according to claim 1, wherein steps b) to d) are performed in response to a subscriber information indicating a subscription of a supplementary service for providing said caller picture.

3. A method according to claim 2, wherein said subscriber information indicates a caller picture presentation or a caller picture presentation restriction.

4. A method according to any one of the preceding claims, wherein said caller picture is taken by a camera function at the beginning of the call.

5. A method according to anyone of claims 1 to 4, wherein said caller picture is selectively stored in a memory of said terminal of said calling party, and transmitted from said memory to said telecommunication network at the beginning of the call.

6. A method according to claim 5, wherein said selective storing operation of said caller picture in said memory of said terminal of said calling party is performed in accordance with a selection input operation at said terminal of said calling party.

7. A system for providing a caller picture to a called party via a telecommunication network having a plurality of terminals **(2, 6)** and at least one network element **(4)** for routing calls,

a) wherein each of said plurality of terminal **(2, 6)** comprises camera means **(1)** for generating said caller picture, display means **(7)** for displaying said caller picture, and transmitting means **(24)** for transmitting said caller picture to said at least one network element **(4)** at the beginning of a call; and

b) wherein said network element **(4)** comprises receiving means **(41)** for receiving said caller picture, storing means **(44)** for storing said caller picture, and transmitting means **(42)** for transmitting said caller picture to a terminal of said called party.

8. A system according to claim 7, wherein each of said plurality of terminals **(2, 6)** comprises memory means **(22)** for storing said caller picture; and selecting means **(25)** for selecting a direct transmission operation in which said caller picture is generated and transmitted at the beginning of the call, or a memory operation in which said caller picture is generated and stored in said memory means **(22)**.

9. A system according to claim 7 or 8, wherein said network element **(4)** comprises control means **(43)** for checking a subscriber information of said called party, stored in a

subscriber data base **(81, 82)**, and for controlling said storing means **(44)** based on said subscriber information.

10. A system according to claim 9, wherein said subscriber information indicates a subscription of a caller picture presentation service.

11. A system according to claim 9 or 10, wherein said data base is a location register **(81, 82)**.

12. A system according to any one of claims 7 to 11, wherein said network element **(4)** is a switching means of said telecommunication network.

13. A system according to claim 12, wherein said switching means is a mobile switching center **(4)** or an SGSM.

14. A system according to any one of claims 7 to 13, wherein said telecommunication network is a GSM or a UMTS network.

15. A system according to claim 14, wherein said terminal of said called party and a terminal of a calling party are both mobile terminals.

16. A network element for a telecommunication network, comprising:

a) receiving means **(41)** for receiving a caller picture from a terminal **(2)** of a calling party at the beginning of a call;
b) storing means **(44)** for storing said caller picture; and
c) transmitting means **(42)** for transmitting said caller picture to a terminal **(6)** of a called party.

17. A network element according to claim 16, further comprising control means **(43)** for checking a subscriber information of said called party, stored in a subscriber data base **(81, 82)** and for controlling said storing means **(44)** so as to perform the storing operation based on said subscriber information.

18. A network element according to claim 17, wherein said control means **(43)** is arranged to transmit a restriction information to said calling party, if said subscriber information indicates that the called party is not subscribed to a caller picture presentation service.

19. A network element according to any one of claims 16 to 18, wherein said network element is a switching means **(4)** of said telecommunication network.

20. A subscriber terminal of a telecommunication network having at least one network element for routing calls, said subscriber terminal **(2, 6)** comprising:

a) camera means **(1)** for generating a caller picture;
b) display means **(7)** for displaying a received caller picture; and
c) transmitting means **(24)** for transmitting said generated caller picture to said at least one network element **(4)** at the beginning of a call.

21. A subscriber terminal according to claim 20, further comprising memory means **(22)** for storing said generated caller picture; and selecting means **(25)** for selecting a direct transmission operation in which said caller picture is generated and transmitted at the beginning of the call, or a memory operation in which said caller picture is generated and stored in said memory means **(22)**.

22. A subscriber terminal according to claim 21, further comprising switching means **(23)** for selectively connecting said transmitting means **(24)** to said camera means **(1)** or to said memory means **(22)** in accordance with a selection operation at said selection means **(25)**.

23. A subscriber terminal according to any one of claims 20 to 22, wherein said subscriber terminal is a mobile terminal **(2)**.

24. A subscriber terminal according to any one of claims 20 to 22, wherein said subscriber terminal is a terminal or device connected to a fixed lines telecommunications network.

25. A subscriber terminal according to claim 24, wherein said fixed lines telecommunications network is a PSTN, ISDN or a local area network.

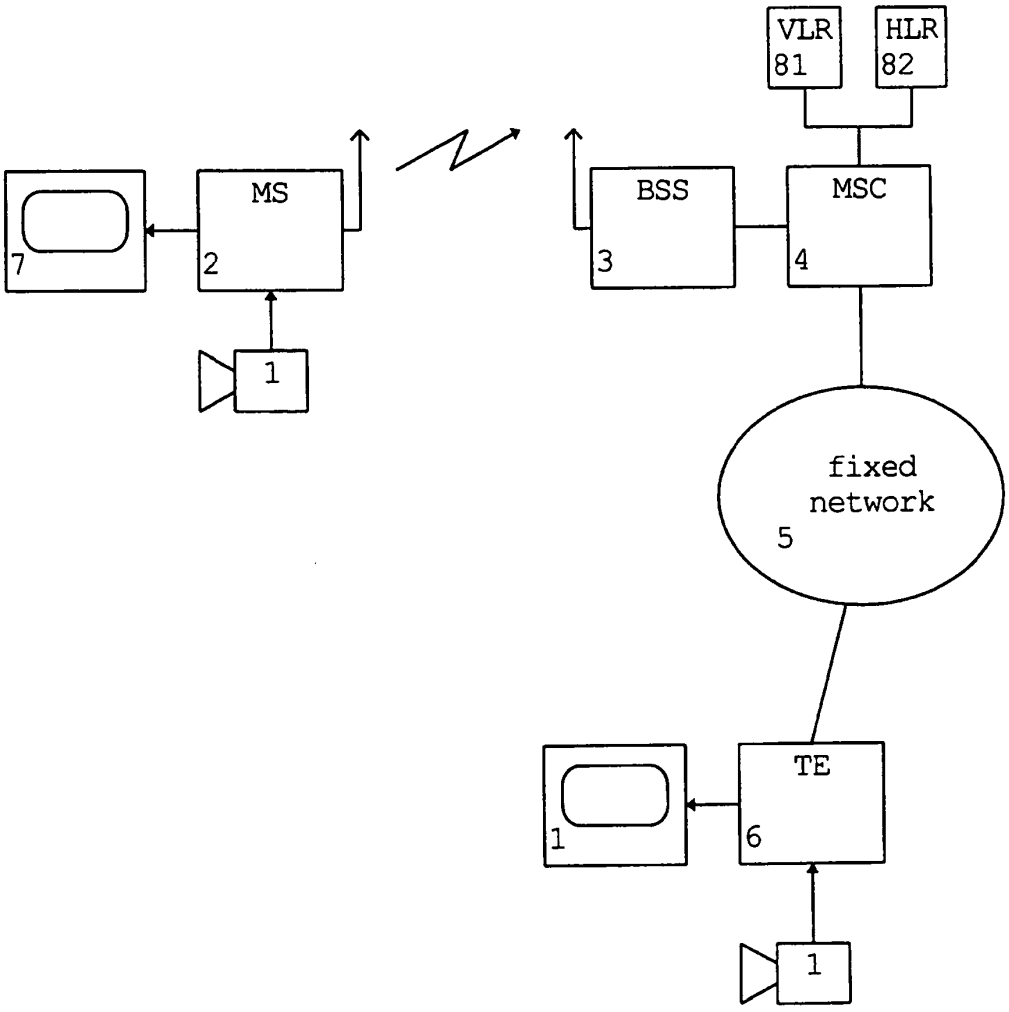


Fig. 1

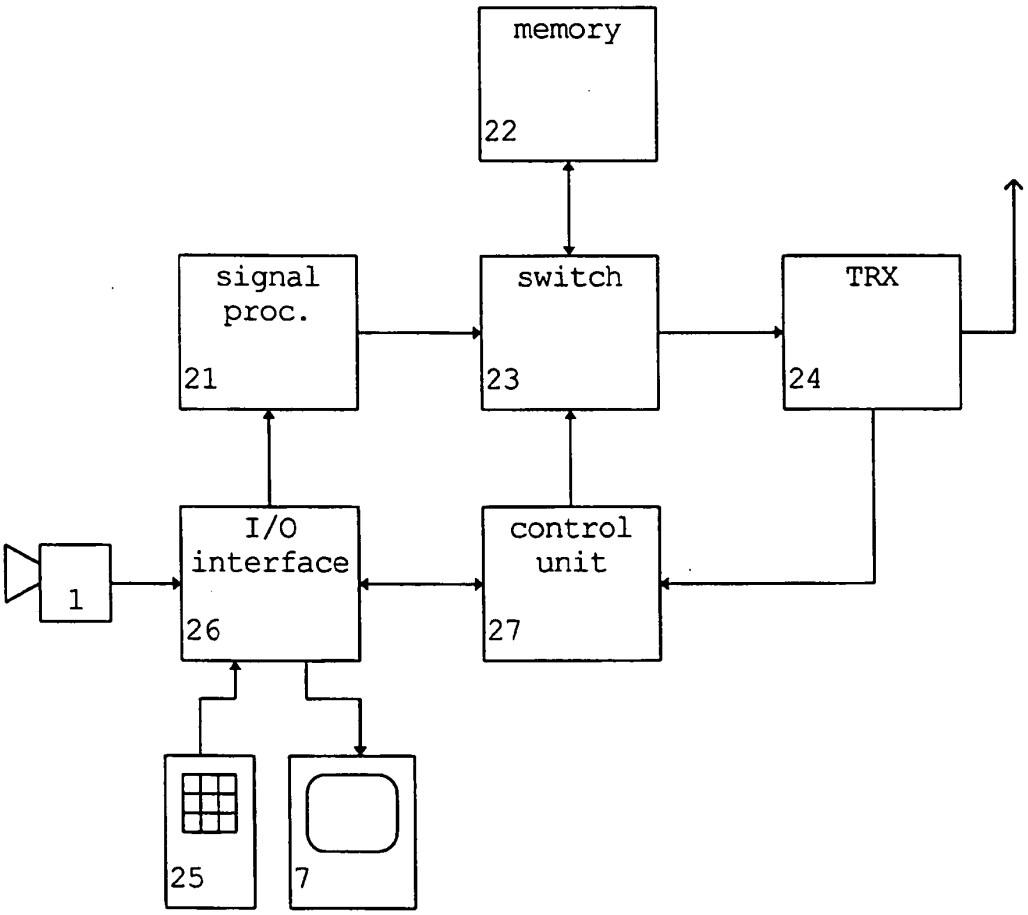

memory
22
signal proc.
21
switch
23
TRX
24
I/O interface
26
control unit
27
1
25
7

Fig. 2

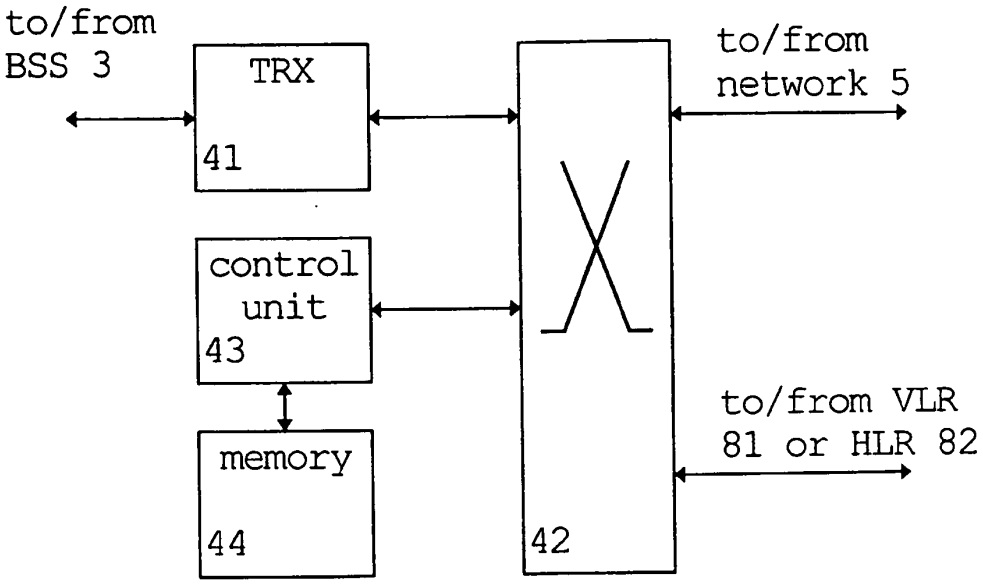

to/from
BSS 3
TRX
41
control
unit
43
memory
44
42
to/from
network 5
to/from VLR
81 or HLR 82

Fig. 3

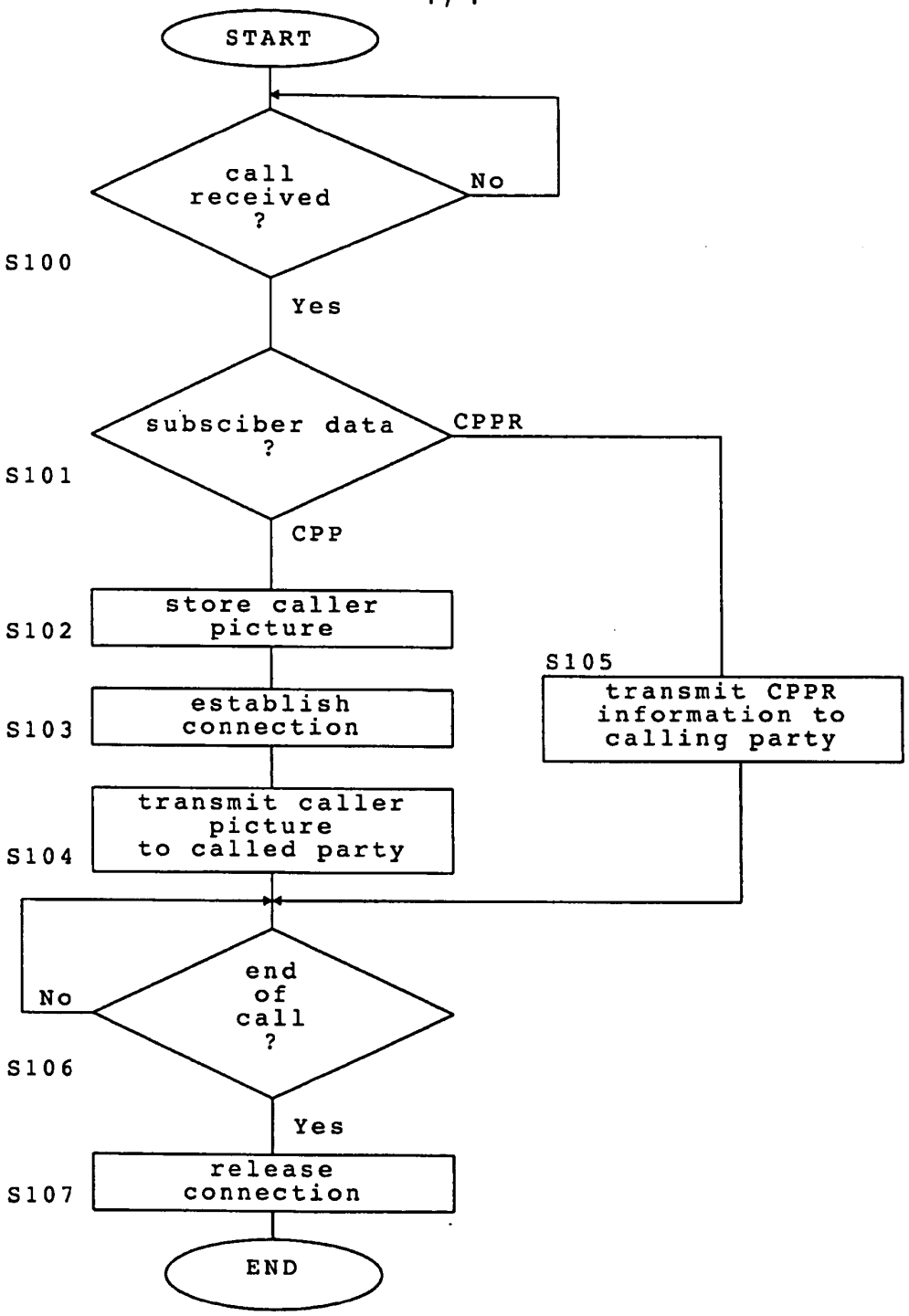

START
call received ?
No
S100
Yes
subsciber data ?
CPPR
S101
CPP
store caller picture
S102
S105
transmit CPPR information to calling party
establish connection
S103
transmit caller picture to called party
S104
end of call ?
No
S106
Yes
release connection
S107
END

Fig. 4

INTERNATIONAL SEARCH REPORT

Inter ...nal Application No
PCT/EP 99/04519

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/57

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 H04M

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 741 484 A (AT & T CORP) 6 November 1996 (1996-11-06) column 1, line 3 -column 3, line 43 column 5, line 10 - line 19	1,4-7, 12,16, 19-22, 24,25
X	EP 0 436 345 A (CANON KK) 10 July 1991 (1991-07-10) column 2, line 14 - line 49 column 4, line 7 - line 43	1,4-7, 12,16, 19-22, 24,25

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 March 2000	31/03/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Vaucois, X

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INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/EP 99/04519

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
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A	EP 0 474 555 A (CANON KK) 11 March 1992 (1992-03-11) column 3, line 28 -column 4, line 47 column 8, line 34 -column 10, line 51	1-25

Form PCT/ISA/210 (continuation ° >econd sheet) (July 1992)

EX1002 - Page 1012

INTERNATIONAL SEARCH REPORT

information on patent family members

Inter anal Application No
PCT/EP 99/04519

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		DE 69128506 T	23-04-1998
		EP 0809411 A	26-11-1997
		US 5309434 A	03-05-1994

Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 January 2001 (11.01.2001)

PCT

(10) International Publication Number
WO 01/03454 A1

(51) International Patent Classification[7]: H04Q 7/24

(21) International Application Number: PCT/IB00/00989

(22) International Filing Date: 30 June 2000 (30.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9915301.7 30 June 1999 (30.06.1999) GB

(71) Applicant *(for all designated States except US)*: NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: AHMAVAARA, Kalle [FI/FI]; Nokia Networks Oy, Keilalahdentie 4, FIN-02150 Espoo (FI).

(74) Agents: SLINGSBY, Philip, Roy et al.; Page White & Farrer, 54 Doughty Street, London WC1N 2LS (GB).

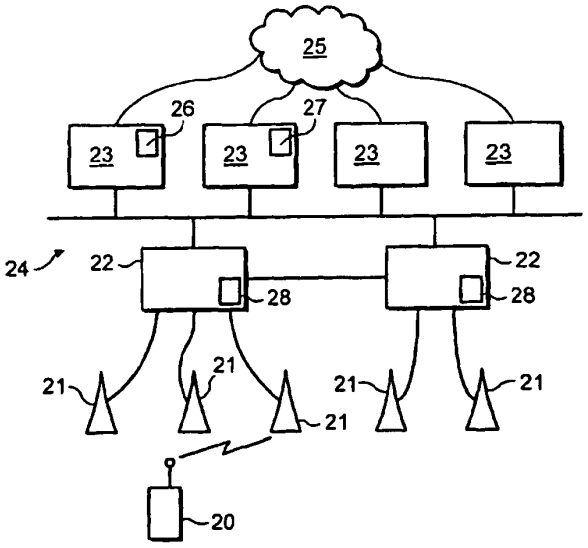
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SERVICE MANAGEMENT



(57) Abstract: A method of establishing a connection in a telecommunications system in which an intermediate network provides for communications between a user terminal and one or more of a plurality of serving network entities each capable of providing communications services to the user terminal by means of at least one telecommunications protocol, the method comprising the step of the intermediate network transmitting to the user terminal an indication of the serving network entities and the communications services provided by each one.

WO 01/03454 A1

SERVICE MANAGEMENT

This invention relates to managing services and overseeing mobility of a user in a telecommunication network. The invention is especially, but not exclusively, suitable for implementation in the proposed UMTS (Universal Mobile Telecommunications System) architecture.

Figure 1 shows generally the architecture proposed for UMTS. A mobile station (MS) 1 can communicate by radio with one or more base stations (BS) 2. Each base station is linked by an Iub interface 3 to a single radio network controller (RNC) 4. Each RNC can be linked to one or more BSs. An RNC can be linked to another RNC by an Iur interface 5. Each RNC is linked by an Iu interface 6 to a core network (CN) 7. The CN includes one or more serving nodes that can provide communication services to a connected mobile station, for example a mobile switching centre (MSC) or a serving GPRS (general packet radio service) support node (SGSN) 8. These units are connected by the Iu interface to the RNCs. The CN is also connected to other telecommunications networks 9 such as fixed line networks or other mobile networks to allow onward connection of communications outside the UMTS network. The CN also includes other units such as a home location register (HLR) 10 and a visitor location register (VLR) 11 which help to control access to the network. The BSs and the RNCs and their interconnections constitute a UMTS terrestrial radio access network (UTRAN).

A mobile station can communicate with a core network via an RNC and a base station connected to that RNC. In soft handover (macrodiversity), the mobile station can send traffic communications via more than one base station. Those base stations may be connected to the same RNC or to different RNCs. If the base stations are connected to different RNCs then those RNCs communicate directly with each other via the Iur interface to co-ordinate their actions and to combine signals received from the mobile station. One of those RNCs is designated as the serving

RNC and the others as drift RNCs. Communications between the user and the core network go via the serving RNC only. Thus, whether the mobile station is in soft handover or not its connection to the CN is through a single RNC. It can also arise in other circumstances than macrodiversity that a BS is controlled by a drift RNC, with communications going via serving a serving RNC to the core network.

In the core network each serving node such as an MSC or SGSN can provide a set of services to the mobile station. For example:

- An MSC can provide circuit switched (CS) communications, for example for speech, fax or non-transparent data services, and therefore has a link to other entities in the circuit switched domain such as other CS mobile networks such as GSM (Global System for Mobile Communications) and CS fixed wire networks such as conventional voice telephony networks.
- An SGSN can provide packet switched (PS) communications, for example for packet data protocol (PDP) contexts for internet protocol (IP) data transmission, and therefore has a link to other entities in the packet switched domain such as GPRS-equipped GSM networks and the internet.

The division of services between serving nodes is specified in the system specification and is strictly tied to the assumed network architecture. There may be other nodes than the MSC or SGSN providing overlapping or additional services.

It can be envisaged that in the future some services may be provided differently from the current arrangement. For example, speech services seem likely to migrate from the CS to the PS domain. In order to implement these changes to the network in the form described above is likely to cause substantial disruption. For example, to shift the provision of a fundamental service such as voice traffic to the PS domain may require routing hardware and software, as well as software in each mobile station, to be updated. This would cause great expense and inconvenience to network operators.

It would be desirable for there to be a way in which an operator can move a service previously executed by one type of network node to another type of network node with less disruption, or to introduce a new service via a new or an existing core network .

According to one aspect of the present invention there is provided a method of establishing a connection in a telecommunications system in which an intermediate network provides for communications between a user terminal and one or more of a plurality of serving network entities each capable of providing communications services to the user terminal by means of at least one telecommunications protocol, the method comprising the step of the intermediate network transmitting to the user terminal an indication of the serving network entities and the communications services provided by each one.

According to a second aspect of the present invention there is provided a telecommunications system comprising: a user terminal; a plurality of serving network entities each capable of providing communications services to the user terminal by means of at least one respective telecommunications protocol; an intermediate network providing for communications between a user terminal and one or more of the serving network entities, and being capable of transmitting to the user terminal an indication of the serving network entities and the communications services provided by each one.

Suitably, the user terminal selects the set of serving network entities which together support the set of services the user terminal wishes to use, and attaches to the serving network entities of the set.

Suitably the said indication is generated by the intermediate network. For this purpose the intermediate network may suitably store information defining the

available serving network entities and the service(s) capable of being provided by each one, preferably together with an identifier for each network entity.

The said indication may be transmitted to the user terminal during and/or after establishment by the user terminal of a connection with the intermediate network. In the latter case, the indication may suitably be transmitted in response to a mobility event of the mobile terminal, for example during or generally in consequence of a procedure of the intermediate network consequent on reallocation of equipment in the intermediate network serving the connection with the user terminal. That event may be a serving radio network controller relocation in, for example, a UMTS system or the like.

The intermediate network is suitably capable of adjusting the number of paging areas according to the number of serving network entities, for example with one paging area for each serving network entity. Alternatively, all, or at least more than one, of the serving network entities may use a common paging area.

The intermediate network is suitably capable of constituting a communication path between the user terminal and one or more of the network entities. The user terminal and one or more of the network entities are preferably capable of communicating via the intermediate network.

There may be a plurality of mobile stations, which are preferably operable in similar manner, whereby each mobile station can individually establish or register for communications with one or more serving network entities.

Suitably, for the user terminal an instance of a management process is established for each serving network entity with which that terminal is registered for informing the respective serving network of changes in the connection path to the respective terminal through the intermediate network. The said instance may be run on

processing apparatus local to the user terminal. On a change in the connection path to the mobile station through the intermediate network, each serving network entity may be informed of the change by means of the respective instance.

Suitably the intermediate network is capable of transmitting to a mobile station an indication of one or a plurality of serving network entities and the communications services provided by each one. Preferably, in order to receive a desired service a mobile station is capable of determining one of the serving network entities indicated as providing that service and attempting to establish a connection with that serving network entity via the intermediate network. Preferably, in consequence of the said indication of serving network entities and the communications services provided by each one, the system (most preferably the terminal) is capable of establishing a further instance of the management process for informing a respective serving network entity of changes in the connection path to a the said mobile station through the intermediate network. Alternatively, when a list of services is communicated to a terminal the terminal may already know which services are related to which serving nodes and consecutive to which management process. In that case if later the terminal needs to initialise a communication for a specific service then it may already be aware of which serving node it should contact, and thus suitably of which management process a request for such initialisation may be related to. In consequence of the said indication of serving network entities and the communications services provided by each one the system may suitably be capable of terminating an instance of the management process for informing a respective serving network entity of changes in the connection path to the said mobile station through the intermediate network.

The management process may be a mobility management process, suitably operable in accordance with a mobility management protocol, suitably a mobility management protocol of or for the Universal Mobile Telecommunications System or a derivative thereof.

The service(s) related to such management processes may, for example, be call control entities, session management entities, PDP (packet data protocol) entities, SMS (short message service) handling entities, voice-over-IP (internet protocol) entities, H.323 or H.324 entities, or supplementary service instances.

Some preferred features of all aspects of the invention will now be set out.

Suitably the user terminal is capable of communicating by radio and/or another medium with the intermediate network. The user terminal may be a unit that can be termed a mobile station, whether it is in fact mobile or immobile. The user terminal may be a mobile telephone.

The intermediate network is suitably operable according to the Universal Mobile Telecommunications System or a derivative thereof.

The intermediate network may be a radio access network, and is preferably a Universal Mobile Telecommunications System radio access network. The intermediate network is suitably capable of routing signals between the user terminal and one of the serving network entities, for example on the basis of (or in dependence on) a core network domain indicator. The intermediate network may include a Universal Mobile Telecommunications System radio network controller capable of performing the said routing.

Suitably at least one of the serving network entities is capable of providing for communications between the intermediate network and another telecommunications network. Each serving network entity may be a core network. Each serving network entity may include a home location register and/or a visitor location register. Suitably one or more of the serving network entities is capable of providing for circuit switched communications between the intermediate network and another telecommunications network. Suitably one or more of the serving network entities is capable of providing

for packet switched communications between the intermediate network and another telecommunications network.

The or each serving network entity may suitably but not necessarily be a serving network domain or serving network element.

The present invention will now be described by way of example with reference to the accompanying drawings, in which:

figure 1 is a schematic diagram of the currently-proposed architecture for a UMTS telecommunications system;

figure 2 is a schematic diagram of a modified architecture for a UMTS telecommunications system; and

figure 3 is a flow diagram illustrating the operation of a method in the system of figure 2.

The network shown in figure 2 is arranged so that instead of services being offered to a mobile station by a set of rigidly configured core network nodes, services can be offered to the user by a set of logical CN nodes. The services offered by each logical CN node can be reconfigured in a relatively straightforward manner. Furthermore, it is relatively easy to add additional CN nodes to introduce new services.

The network of figure 2 includes a mobile station 20, base stations 21 and RNCs 22. The interconnection of these units and the general aspects of their operation are suitably as for the UMTS system of figure 1.

The network of figure 2 also includes a plurality of core network entities 23 any of which may communicate with any of the RNCs 22 via a distributed communication arrangement 24. The core networks 23 can communicate with external telecommunications networks 25 such as other mobile networks, the internet and fixed line networks, depending on the capabilities of the respective core network. For

example, a core network may include a mobile switching centre (MSC) 26 for communications via voice or fax protocols or a serving GPRS (general packet radio service) support node (SGSN) 27 for data protocol communications. In a large network not all of the core networks 25 may be able to communicate with all of the RNCs 22, for geographical network configuration reasons.

The RNCs 22 include processing apparatus 28 for processing communications through the RNCs, handling control of the base stations 21 (e.g. controlling handovers), managing access of mobile stations into the system, managing mobility (e.g. location management or radio resource management) of mobile stations in the system between base stations, and other functions.

When a mobile station makes contact with the network it makes radio communication with a base station and thereby establishes an RRC (radio resource control) connection with the RNC to which that base station is connected. In the course of setting up that connection the UTRAN indicates to the mobile station the available CN nodes (domains) offering services within the service area controlled by the respective RNC. For each domain the UTRAN indicates to the MS the service(s) offered by that domain, together with an identifier for the domain, suitably a logical identifier such as a core network access number that may be used by the mobile station or other network entities to identify that core network in communications and allow routing to that network.

The MS is aware of which services it supports and for which of those services it requires a connection to the network. The MS can therefore select one or more appropriate CN domains for providing the required service(s). The MS attempts to connect to each selected domain so that it can be provided with a desired service from that domain.

For example, if the MS connects to the network requiring a circuit switched fax connection and a packet switched voice connection, the MS receives from the UTRAN a message indicating the available domains and the services offered/supported by each. The MS then selects one CN domain that is offering a fax service and one CN domain that is offering a packet switched service capable of carrying voice traffic. The MS then attempts to make a connection to each one of those domains. The domains may be the same or different.

The process is illustrated generally in figure 3.

The said core network access number can simply be an identifier that is generated by the RNC for use in its communications with the MS. The MS can use the core network access number to indicate to the RNC which core network it wishes to access but the subsequent forwarding of an access request message on to the relevant core network may be done by the RNC using a different, true identifier that is unknown to the MS. Thus, from the point of view of the MS the RNC transparently passes its communications on to the relevant core network. Once a core network accepts and establishes an attachment to an MS the MS can be informed of a true identifier for the core network to allow it to direct communications to the core network via another RNC if necessary. The RNC preferably has logic to allow it to direct communications to a suitable CN serving entity of the desired domain – for example randomly, on the basis of information determined by the RNC, on the basis of information given to the RNC by one or more of the serving node (e.g. their loads) or on the basis of information given to the RNC by the user equipment (UE) (e.g. the identity of the entity that previously handled the UE's communications and therefore may have some information on the UE). When such an entity has been selected the RNC may address that entity by the identifier of a specific entity given to the user equipment by the entity itself.

As the mobile station moves within the network the base station(s) and the RNC(s) serving it may change, as may the serving nodes in the core network. To cope with this the UMTS system provides for mobility management (MM) protocol instances which handle location updates within the network in idle mode. In connected mode (i.e. when an RRC connection exists between the mobile station and an RNC) handover procedures are used, in which a connection is switched from a former node to a new node; the same principle is used whether the changing node is the BS, RNC or serving CN. In the system of figure 2, on attaching to a domain a mobile station initiates a UMTS mobility management instance especially for that domain. Therefore, associated with each MS there is a MM instance for each CN domain to which that MS is attached. In principle each MM instance operates independently of the others, following the UTRAN paging area indication and making appropriate location updates to its respective CN domain. (In practice the MM instances may be somewhat linked by, for example, a common paging area). By this means, each CN domain to which the MS is attached can be kept independently updated of the mobile station's location so that it can route communications to the mobile station accordingly.

As the operator updates the network and offers different services through different CN domains this is handled automatically through by the connection arrangement described above. When the MS accesses the network, if the operator now offers a service through a different CN node than before the MS simply attaches to the new CN node that is indicated to the mobile as being capable of providing the desired service. Thus the above arrangement copes automatically with the addition of new CN domains to provide services and with adjustment of the functional split of services between CN domains.

The system is preferably also capable of accommodating changes in the attachment pattern of the MS even whilst it is connected to the network. If the mobile receives from the UTRAN a message indicating a change in the split of services between CN

nodes that affects the services for which the mobile station is attached then it suitably changes its pattern of attachment to meet with the new split of services. To meet the new split of service any of the following changes may be made, as appropriate:

1. Changing the arrangement for provision of a service from one CN domain to which the MS is already attached to another CN domain to which the MS is already attached. In this case the existing MM instance for that CN domain can also be updated to reflect the change in services being accessed through the respective CN domain.
2. Dropping the attachment for provision of a service from one CN domain and establishing an attachment for provision of that service from another CN domain to which the MS was not previously attached. In this case the existing MM instance for the dropped CN domain can be terminated and a new MM instance established for the newly attached CN domain.

This capability offers great flexibility to operators in the provision of new services or the reconfiguration of a network to provide existing services through new nodes. In particular, as services migrate from the CS domain to the PS domain the above arrangement provides the capacity for relatively straightforward reconfiguration of MS to CN connections from nodes that formerly provided a service in the CS domain to nodes that provide an equivalent service in the PS domain.

If the mobile station is informed of the availability of a service that is unknown to the mobile station then it can suitably ignore the availability of that service. By this means the system described above may be used to assist in version management – that is to assist compatibility between older and newer equipment in the system. Thus older mobile stations that are not compatible with newer services can cope with indications of the availability of services with which they are not compatible.

The applicant draws attention to the fact that the present invention may include any feature or combination of features disclosed herein either implicitly or explicitly or any generalisation thereof, without limitation to the scope of any of the present claims. In

view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the invention.

CLAIMS

1. A method of establishing a connection in a telecommunications system in which an intermediate network provides for communications between a user terminal and one or more of a plurality of serving network entities each capable of providing communications services to the user terminal by means of at least one telecommunications protocol, the method comprising the step of the intermediate network transmitting to the user terminal an indication of the serving network entities and the communications services provided by each one.

2. A method as claimed in claim 1, wherein in order to receive a desired set of services the mobile station determines a set of the serving network entities indicated as together providing that set of services and attempts to establish a connection with the serving network entities in the set via the intermediate network.

3. A method as claimed in claim 2, wherein the said indication is generated by the intermediate network.

4. A method as claimed in any preceding claim wherein the user terminal is capable of communicating by radio with the intermediate network.

5. A method as claimed in any preceding claim wherein the intermediate network is operable according to the Universal Mobile Telecommunications System or a derivative thereof.

6. A method as claimed in claim 5, wherein the serving network entities are core networks.

7. A method as claimed in any preceding claim, wherein the intermediate network is a radio access network.

8. A method as claimed in claim 7, wherein the intermediate network is a Universal Mobile Telecommunications System radio access network.

9. A method as claimed in any preceding claim, wherein the said indication is transmitted to the user terminal during the establishment of a connection between the user terminal and the intermediate network.

10. A method as claimed in any preceding claim, wherein the said indication is transmitted to the user terminal during establishment of a radio resource control connection between the user terminal and the intermediate network.

11. A method as claimed in any of claims 1 to 8, wherein said indication is transmitted to the user after establishment by the of a connection between the user terminal and the intermediate network.

12. A method as claimed in any of claims 1 to 8 or 11, wherein the said indication is transmitted to the user terminal during a procedure of the intermediate network consequent on reallocation of equipment in the intermediate network serving the connection with the user terminal.

13. A method as claimed in claim 11 as dependant directly or indirectly on claim 5, wherein the said indication is transmitted to the user terminal in consequence of a serving radio network controller relocation.

14. A method as claimed in any preceding claim, wherein the said indication is transmitted to the user terminal in consequence of a change in serving network entity.

15. A method as claimed in any preceding claim, wherein the intermediate network is capable of adjusting the number of paging areas according to the number of serving network entities.

16. A method as claimed in any preceding claim, wherein at least one of the serving network entities is capable of providing for communications between the terminal and another telecommunications network.

17. A method as claimed in any preceding claim, wherein at least one of the serving network entities is capable of providing for circuit switched communications between the terminal and another telecommunications network.

18. A method as claimed in any preceding claim, wherein at least one of the serving network entities is capable of providing for packet switched communications between the terminal and another telecommunications network.

19. A method as claimed in any preceding claim, wherein the intermediate network is capable of routing signals between the user terminal and one of the serving network entities.

20. A method as claimed in claim 19, wherein the intermediate network is capable of routing signals from the mobile station to a selected one of the serving network entities on the basis of a core network domain indicator.

21. A method as claimed in claim 19 or 20, wherein the intermediate network includes a Universal Mobile Telecommunications System radio network controller capable of performing the said routing.

22. A method as claimed in any preceding claim, comprising establishing for each user terminal for each serving network entity with which that terminal is registered an

instance of a management process for informing the respective serving network of changes in the connection path to the respective mobile station through the intermediate network, whereby on a change in the connection path to the mobile station through the intermediate network, each serving network entity may be informed of the change by means of the respective instance.

23. A method as claimed in claim 22, comprising the step of, in consequence of the said indication of serving network entities and the communications services provided by each one, establishing a further instance of the management process for informing a respective serving network entity of changes in the connection path to the mobile station through the intermediate network.

24. A method as claimed in claim 22, comprising the step of, in consequence of the said indication of serving network entities and the communications services provided by each one, terminating an instance of the management process for informing a respective serving network entity of changes in the connection path to the said mobile station through the intermediate network.

25. A method as claimed in claim 23 or 24, comprising the step of, in consequence of the said indication of serving network entities and the communications services provided by each one, modifying an instance of the management process for informing a respective serving network entity of changes in the connection path to a the said mobile station through the intermediate network.

26. A method as claimed in any of claims 22 to 25, wherein the management process is a mobility management process.

27. A method as claimed in claim 26, wherein the management process is operable in accordance with a mobility management protocol.

28. A telecommunications system comprising:

a user terminal;

one or more serving network entities each capable of providing communications services to the user terminal by means of at least one respective telecommunications protocol;

an intermediate network providing for communications between a user terminal and one or more of the serving network entities, and being capable of transmitting to the user terminal an indication of the serving network entities and the communications services provided by each one.

29. A telecommunications system as claimed in claim 28, comprising processing apparatus capable of for each user terminal establishing for each serving network entity with which that terminal is registered an instance of a management process for informing the respective serving network of changes in the connection path to the respective user terminal through the intermediate network, whereby on a change in the connection path to the user terminal through the intermediate network, each serving network entity may be informed of the change by means of the respective instance.

30. A method for establishing a connection substantially as herein described with reference to figures 2 and 3 of the accompanying drawings.

31. A method for managing communications substantially as herein described with reference to figures 2 and 3 of the accompanying drawings.

32. A telecommunications system substantially as herein described with reference to figures 2 and 3 of the accompanying drawings.

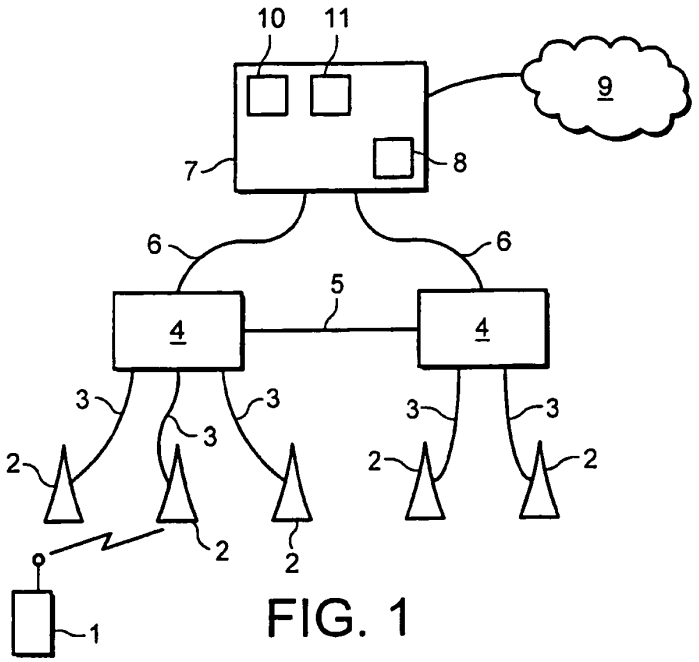

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FIG. 1

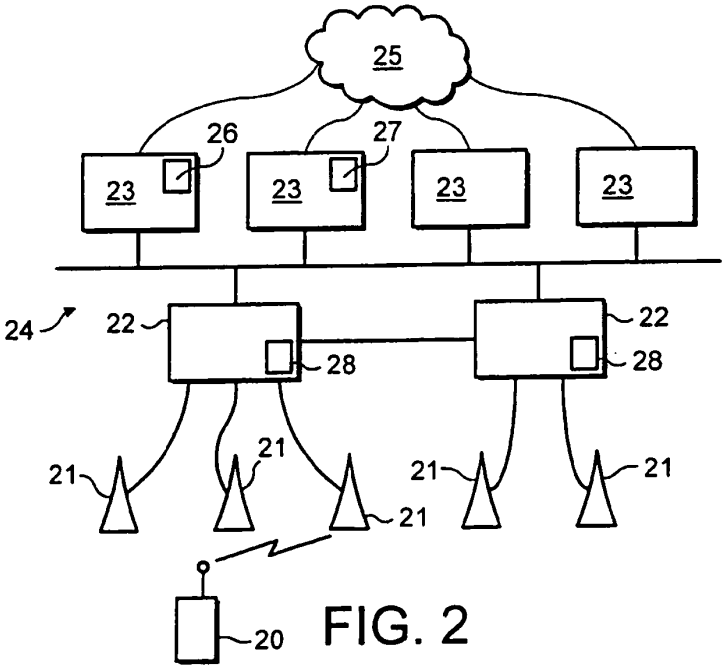

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FIG. 2

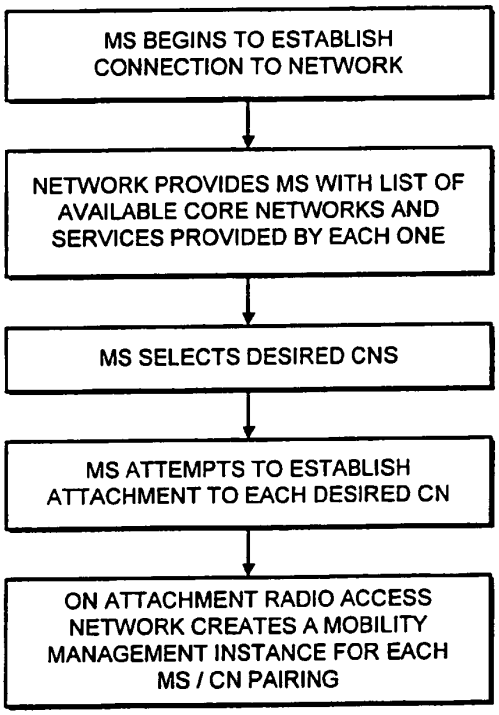

MS BEGINS TO ESTABLISH CONNECTION TO NETWORK
NETWORK PROVIDES MS WITH LIST OF AVAILABLE CORE NETWORKS AND SERVICES PROVIDED BY EACH ONE
MS SELECTS DESIRED CNS
MS ATTEMPTS TO ESTABLISH ATTACHMENT TO EACH DESIRED CN
ON ATTACHMENT RADIO ACCESS NETWORK CREATES A MOBILITY MANAGEMENT INSTANCE FOR EACH MS / CN PAIRING

FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 00/00989

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/24

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 data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 294 844 A (MOTOROLA INC) 8 May 1996 (1996-05-08) page 3, line 22 -page 4, line 25 claims 1,2	1,4,6,9, 17,28
A	BERRUTO E ET AL: "ARCHITECTURAL ASPECTS FOR THE EVOLUTION OF MOBILE COMMUNICATIONS TOWARD UMTS" IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS,US,IEEE INC. NEW YORK, vol. 15, no. 8, October 1997 (1997-10), page 1477-1486 XP000721279 ISSN: 0733-8716 the whole document	1-29

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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

"O" 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

"T" 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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 August 2000	04/09/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Pecci, R

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 00/00989

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	SCHIEDER A ET AL: "GRAN - A NEW CONCEPT FOR WIRELESS ACCESS IN UMTS" ISS. WORLD TELECOMMUNICATIONS CONGRESS. (INTERNATIONAL SWITCHING SYMPOSIUM),CA,TORONTO, PINNACLE GROUP, 21 September 1997 (1997-09-21), page 339-345 XP000704485 the whole document -----	1-29

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/IB 00/00989

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		DE 19581443 T	27-02-1997
		WO 9614719 A	17-05-1996
		FI 962789 A	03-09-1996
		JP 9507986 T	12-08-1997

Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 January 2001 (11.01.2001)

PCT

(10) International Publication Number
WO 01/03461 A1

(51) International Patent Classification[7]: H04Q 7/38

(21) International Application Number: PCT/EP99/04518

(22) International Filing Date: 30 June 1999 (30.06.1999)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **NOKIA NETWORKS OY** [FI/FI]; Keilalahdentie, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **KALL, Jan** [FI/FI]; Jupperinmetsä 2B, FIN-02730 Espoo (FI). **MUHONEN, Ahti** [FI/FI]; Nokia Telecommunications Oy, Keilalahdentie 4, FIN-02150 Espoo (FI). **SALONEN, Jouni** [FI/FI]; Nokia Telecommunications Oy, Keilalahdentie 4, FIN-02150 Espoo (FI). **HONKO, Harri** [FI/FI]; Nokia Telecommunications Oy, Keilalahdentie 4, FIN-02150 Espoo (FI).

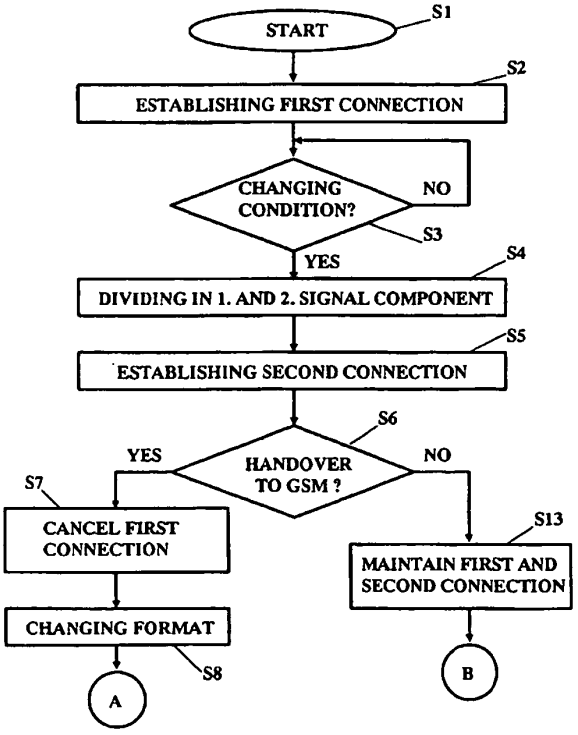
(74) Agents: **TRÖSCH, Hans-Ludwig** et al.; Tiedtke-Bühling-Kinne et al., Bavariaring 4, D-80336 München (DE).

(81) Designated States *(national)*: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,

[Continued on next page]

(54) Title: METHOD AND DEVICE FOR HANDLING A MULTIMEDIA CALL



(57) Abstract: The present invention proposes a method for performing a communication between two terminal equipments (TE1, TE2) via at least one communication network (NW1, NW2), said method comprising the steps of establishing (S2) a first connection for a communication signal (V/S) between the two terminal equipments, detecting (S3) a connection changing condition, and, if said connection changing condition is detected, dividing (S4) said communication signal at least into a first signal component (V) and a second signal component (S) and establishing (S5) at least one second connection, said first signal component being transmitted via the first connection and said second signal component being transmitted via the second connection. The present invention proposes also a corresponding device (100) and a corresponding system.

WO 01/03461 A1

NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

METHOD AND DEVICE FOR HANDLING A MULTIMEDIA CALL

FIELD OF THE INVENTION

The present invention relates to a method for performing a communication between two terminal equipments via at least one communication network and also relates to a corresponding device and a corresponding system. In particular, the present invention is directed to a method and a corresponding device and a corresponding system for handling a multimedia call in different communication networks.

BACKGROUND OF THE INVENTION

In recent and future communication systems the ability to perform a multimedia call becomes more and more important. An example of such a multimedia call is a videotelephony call. Such kind of communication requires e.g. high data transfer rates and a high quality of service (QoS) level. Therefore, specific services and equipment are to be defined.

Telecommunication systems and networks being adapted to perform a videotelephony call are for example the Integrated Services Digital Network (ISDN), General Packet Radio Service (GPRS) in the Global System for Mobile communication (GSM) or the Universal Mobile Telecommunications System (UMTS). Furthermore, in combination with a respective system, it is possible to use a circuit switched communication or a packet data communication.

For defining a multimedia communication several recommendations for example by the International Telecommunications Union (ITU) have been made, e.g. the

H.245, the H.324 and the like, which describe services, protocols, terminals etc. to be used for a multimedia call such as a videocall.

In the case of the above mentioned videocall, it is possible to transfer data between two terminals (mobile or fixed) via a communication network of one of the above mentioned types. The terminals or terminal equipments (such as mobile stations or videotelephones) can be in the same communication network or in different communication networks. The videocall is performed via a bi-directional connection between the two terminal equipments. Said connection initiated by one of said terminal equipments is for example an end-to-end H.324 connection which is carried for example on a UMTS data bearer.

In view of the high amount of data, the used network has to provide a corresponding high data transfer rate. Said data rate is also to be ensured for a data exchange between two different networks when the two terminal equipments are within respective different networks (for example UMTS -> ISDN, UMTS A -> UMTS B and the like).

However, there are some drawbacks. During a normal connection (e.g. packet data communication or circuit switched communication) between the two terminal equipments being in the same network such as a UMTS network, the quality of service (i.e. of the connection) can get worse and a good or even adequate communication can not be guaranteed. Moreover, when a handover is to be made for at least one of the terminal equipments from a network adapted to perform a videocall such as a UMTS network to a network with lower capacity (and therefore for example not able to perform a videocall) where such high data rates used for a multimedia call are not supported, the connection is interrupted. In the case that the lower capacity network

handed over to is able to perform a videocall, at least the quality of service is getting worse.

SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to provide a method and a corresponding device for handling a multimedia call such as a videocall in different communication networks, which are free from the above mentioned drawbacks. Furthermore, a corresponding device is to be provided.

According to the present invention, this object is achieved by a method for performing a communication between two terminal equipments via at least one communication network, said method comprising the steps of establishing a first connection for a communication signal between the two terminal equipments, detecting a connection changing condition, and, if said connection changing condition is detected, dividing said communication signal at least into a first signal component and a second signal component and establishing at least one second, said first signal component being transmitted via the first connection and said second signal component being transmitted via the second connection.

Furthermore, the present invention proposes a device for performing a communication between two terminal equipments via at least one communication network, said device comprising first establishing means for establishing a first connection for a communication signal between the two terminal equipments, detecting means for detecting a connection changing condition, dividing means for dividing said communication signal at least into a first signal component and a second signal component, if said detecting means detects said connection changing condition, and

second establishing means for establishing at least one second connection, said first signal component being transmitted via the first connection and said second signal component being transmitted via the second connection.

Moreover, the present invention proposes a system in which a communication between two terminal equipments is performed via at least one communication network, said system is adapted to establish a first connection for a communication signal between the two terminal equipments, detect a connection changing condition, and, if said connection changing condition is detected, divide said communication signal at least into a first signal component and a second signal component and establish at least one second connection, said first signal component being transmitted via the first connection and said second signal component being transmitted via the second connection.

Advantageous further developments of the present invention are as set out in the respective dependent claims.

According to the present invention, the proposed method and/or device and/or system allow to establish at least one second connection between the two terminal equipments or between a respective terminal equipment and a respective network, respectively. By using said second connection parallel to the first one, it is possible to transmit one component (for example a video component) of the original communication signal via the first connection and another component (for example a speech component) of the original communication signal via the second connection. Advantageously, the video component can use the complete capacity of the first connection which improves the quality and robustness according for example H.324. On the other hand, the speech component transmitted via the second connection is not affected by the video component which

also improves quality. Said second connection can be a connection similar to the first one (e.g. a UMTS multimedia call connection) or just a (lower capacity) speech call connection. It is also possible to use both connection as a data bearer and split and combine the data as it seems fit between the two connections.

Additionally, in case of a handover, in particular in a handover to a network with lower capacity or which is unable to perform a videocall (for example some GSM networks), by dropping the video component (i.e. the corresponding connection), the multimedia call or at least the speech call can be maintained. In case of a connection between e.g. a UMTS network and a GSM network each using different protocol types, the speech component can be easily transcoded by a corresponding element. At a handover back to the UMTS network, the multimedia call can be reestablished in the original way.

Preferred embodiments of the invention are described herein below in detail by way of example with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A, 1B and 1C show connection states between two terminals.

FIGS. 2A, 2B show connection paths with elements used in a communication according to the invention.

FIG. 3 is a flowchart illustrating a method for handling a communication according to the invention.

FIG. 4 is a flowchart illustrating a method for handling a communication according to the invention.

FIG. 5 is a flowchart illustrating a method for handling a communication according to the invention.

FIG. 6 is a block circuit diagram for illustrating a device for handling a communication according to the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

In FIG. 1A a connection state for a multimedia call in a most general case is shown. A first terminal equipment TE 1 is connected to a second terminal equipment TE 2 via a communication network NW 1. Said network is for example an UMTS network adapted to perform a multimedia communication. Through the connection a multimedia signal V/S (e.g. a videotelephony call) is transmitted between said terminal equipments.

FIG. 1B illustrates one implementation of the present invention. In this case, for example the quality of the communication connection within the network NW 1 is getting worse. Therefore the original multimedia signal V/S is divided into at least two components V and S each of which transmitted via a separate connection. The at least one new connection is established similar to the original connection. It is either of the same type (for example an UMTS multimedia call connection) or of a different type (for example a normal speech call connection). The selection of the connection type used for the second connection can be made subscriber specific, dependant on network resources available or fixed (i.e. always the same type such as the above mentioned UMTS connection).

The two signal components V and S can be of the same type (split and combine the data stream of the original signal V/S in accordance with network requirements), i.e. the

connections are used as similar data bearers. On the other hand, there can be formed different component types such as video and speech component.

Optionally, the first connection transmitting for example the video signal component V from the network NW 1 to the second terminal equipment TE 2 can be canceled depending on network resources.

The above described case is also possible when the two terminal equipments are within different networks both of them adapted to perform a multimedia call on the same level. It is obvious, that corresponding connections are to be established between the networks in such a case.

It is to be noted, that for deciding whether a second connection (or even more connections) is to be established e.g. because of a deterioration of quality the connection is to be monitored. This monitoring can be done either by the network (e.g. by a mobile switching center MSC) and/or by the terminal equipment. Also the decision of the establishment of said second connection can be made by either the network or the terminal equipment.

In FIG. 1C another implementation of the present invention is shown. Here, a case of a handover to a second network NW 2, i.e. the second terminal equipment TE 2 is moved into a coverage area of said second network, is described. The second network NW 2 is for example a GSM network which has not adequate resources for transmitting such a high amount of data as used in a multimedia call. Therefore, when recognizing this circumstances, after establishing the second connection and dividing the original multimedia signal V/S into the two components V and S, the first connection and hence the first (video) component is dropped. Only the second component S, for example the

speech component, is forwarded (or handed over) by the first network to the second user equipment. Here, in particular in a circuit switched type connection, when one component is dropped (e.g. the video component V), it can be necessary to notify this change in communication to the terminal equipments TE1, TE2 to guarantee an uninterrupted communication.

In this case, it is also possible that the format of the multimedia signal, i.e. the format of the second signal component S, is to be changed in accordance with the respective second network NW 2 such as a GSM network. For example, when the first network NW 1 uses H.324, the corresponding signal component S is to be transcoded for the second network NW 2.

In the above described cases (FIG. 1B, 1C), when the reason for the establishment of the second connection and the division of the multimedia signal V/S (i.e. a changing condition) is not present anymore, for example due to a back-handover from a GSM network to a UMTS network, the original connection state (one connection, one signal V/S) can be reestablished. However, it is also possible to maintain the two connections.

It should be noted, that it is also possible, e.g. in the case of a packet data transfer, that only a part of the data packets with corresponding contents will be transferred via the communication connection according to the present invention.

In the following, with reference to FIG. 2A and 2B, connection paths and specific network elements used therein in case of the above described handover are illustrated. It is to be noted, that here the paths are shown in the direction from the lower capacity network to the higher

capacity network. However, it is easy to understand that the same procedure is executed in the opposite direction.

In FIG. 2A one example of a connection according to the present invention is shown, in particular in case of a handover to a lower capacity network. This type of handover requires a videocodec/speech codec (encoder/decoder) adapter in the connection path. The situation before said handover is as shown in FIG. 1A. After the handover, as illustrated in FIG 2A, the connection is as follows. The signals are forwarded from a terminal equipment TE 1 via an advanced multirate speech coder AMR to a transcoder. The AMR is a new type of speech coder used for GSM systems, which is adapted to vary its coding rate in accordance with the data (speech) to be transmitted. The transcoder is adapted to encode and decode for example the speech signal into corresponding data formats. The data is then transmitted to a network element of the (second) network NW 2, for example to a mobile switching center MSC. Here, a pulse code modulation PCM is used as a coding method for transmitting data such as speech via the networks. One method used for coding is for example A-law. Then, the data is forwarded to another network NW 1 via a gateway 1. Said gateway is also a transcoder used for changing the format of the data from the PCM A-law format into another format, for example a H.324 format. Optionally, a further advanced multirate speech coder can be introduced. Via the network NW 2 (for example a network applicable according to H.324) data is transmitted to the called terminal equipment TE 2.

FIG. 2B shows a similar case to FIG. 2A. Here, a tandemfree operation is supported, i.e. the transcoder is within the network itself. In contrast to the above described case with reference to FIG. 2A, the gateway 2 simply adepts the AMR speech signal format to a H.324 format, which can be also correspond to an AMR.

As mentioned above, it is also possible to use the present invention in case of a deterioration of quality or to guarantee service continuity. For this application, it is for example requested to switch off the video connection or video channel V, i.e. the corresponding data bearer. The speech component S (AMR speech) is for example encapsulated in a H.223 multiplexing protocol data stream. In this case, it is possible to reach a lower bit error rate and a higher quality. Furthermore, also a dedicated speech service with AMR speech coding and the like can be requested.

With reference to FIG. 3, a method for performing a communication between the two terminal equipments TE1, TE2 according to the invention is described. When the procedure is started (step S1), first the first connection for the multimedia signal V/S between the two terminal equipments TE1, TE2 via the first communication network is established in step S2. When in step S3 a connection changing condition (e.g. because of a deterioration of quality or due to a handover, as described above) is detected, the process proceeds to step S4, otherwise said step S3 is repeated.

In step S4, after detection of said connection changing condition, the multimedia signal V/S is divided at least into a first signal component V and a second signal component S, which are in the case of a videotelephony call a video component and a speech component, respectively. Also, in step S5, at least one second connection is established, either on request by a respective terminal equipment TE 1, TE 2 or by the network itself. Now the first signal component V may be transmitted via the first connection and the second signal component S may be transmitted via the second connection.

In a step S6, it is decided, whether the changing condition detected in said detecting step S3 is a handover to a lower capacity network. If YES, in step S7 the first connection including the transmitted first signal component V (for example the video component as the component requiring the most resources) is canceled. Furthermore, in step S8, the format of the still transmitted signal component S may be changed or transcoded, if required.

With reference to FIG. 4, in the following the case is described where the changing condition concerning a handover is canceled. When detecting in step S9 that e.g. the handover to a lower capacity network is finished and a handover to a higher capacity network (at least at an adequate capacity level to perform a multimedia call) is performed, in step S10 the first connection canceled in said canceling step S7 is reestablished. This reestablishment can be initiated by a terminal equipment TE 1, TE 2 or by the network (for example by the mobile switching center MSC). Now, the multimedia communication can be performed via the first connection transmitting the first signal component V and the second connection transmitting the second signal component S, as described above. However, it is also possible to recombine both components V and S to the original multimedia signal V/S (step S11). Then the second connection can be canceled or still used to transmit one part of said multimedia signal V/S split thereof.

With reference to FIGS. 3 and 5, now the case is described where no handover is to be performed but the changing condition detected in said detecting step S3 is for example a lack of quality.

In the above mentioned case, in step S13, the multimedia communication is performed by maintaining the first and the

second connection transmitting the first and the second signal component V, S. Similar to the above described handover, when the canceling of the changing condition is detected in step S14 in FIG. 4 (i.e. the quality can be guaranteed again or because of a user request), in step S15 the original multimedia signal V/S is rebuilt from the first signal component V and the second signal component S. The second connection is canceled in step S16 the rebuilt multimedia signal V/S is again transmitted via the first connection. Optionally, the second connection can be maintained, as described above, for transmitting one signal part.

In FIG. 6, a device 100 (V/S call device) adapted to perform a handling of a multimedia call in accordance with the present invention is shown. For said multimedia call, the first connection for a multimedia signal V/S between the two terminal equipments TE1, TE2 via the network is established by a connection establishing means 110. When a detecting means 120 detects a connection changing condition such as a handover to a lower capacity network or a deterioration of quality, a dividing means 130 divides said multimedia signal V/S at least into a first signal component V (for example a video component) and a second signal component S (for example a speech component). The establishing means 110 establishes at least one second connection, wherein said first signal component V may be transmitted via the first connection and said second signal component S may be transmitted via the second connection.

Additionally, a canceling means 140 is adapted to cancel the first connection transmitting the first signal component V, for example in the case of a handover to a lower capacity network NW2 as described above. Then the communication is performed only via the second connection transmitting the second signal component S.

A reestablishing means 150 is adapted to reestablish the first connection canceled by said canceling means 140, when said changing condition is dropped (detected for example by said detecting means 120). Now the communication may be performed via the first connection transmitting the first signal component V and the second connection transmitting the second signal component S. It is also possible, that the original multimedia signal V/S is rebuilt by a rebuilding means 160 from the first and the second signal component V and S. In this case, said communication may be performed via the first and second connection both transmitting one part of the multimedia signal V/S (for example split). Another solution is to cancel the second connection by said canceling means 140. Then the multimedia call is only performed via the first connection transmitting the rebuilt multimedia signal V/S.

In the case of a handover, when the lower capacity network uses for example a different protocol type, a changing means 170 is used for changing or transcoding the respective communication signal (for example the speech component S) from one format into the respective other format used in the respective networks NW 1, NW 2.

It should be noted, that the device 100 can be part of the corresponding networks and or of the terminal equipments.

As mentioned above, it is possible to maintain both parallel connections even if the changing condition is dropped. However, it should be mentioned, that this solution increases costs as more resources are required. Therefore, in general the second connection is only activated if required (low quality, preparation of handover or the like) and canceled when not needed anymore.

A user performing a call using the present invention will be charged according to the number (and/or capacity) of the currently established connections. However, when a connection or connections are for example handed over from one network (e.g. NW1) to another network (e.g. NW2), it is obvious that charging will be stopped in the first network and started in the second network handed over to. Conditions for the charge can be subscriber specific or according to usual network negotiations.

It may be possible to enhance current in-band negotiation protocols to handle the above described parallel call feature according to the present invention. The data bearer should be able to carry H.245 signaling.

The parallel (speech call) connection can be established for example before, during or after a handover, e.g. to a lower capacity network. Furthermore, the present invention can be used in a handover within for example one UMTS network (intra-UMTS handover), in a user initiated handover or in a user initiated change of connection type (bearer re-negotiation).

In particular, when the present invention is used in a packet data multimedia communication for example in a H.323 system, it is very easy to implement. Since in a H.323 system each multimedia signal component (e.g. speech and video) has own separate bearers (in uplink and downlink direction), a diversion of the components or even a switch off of one component (i.e. of the corresponding bearers) is easy to perform. This allows an improvement of quality or a continuation of the multimedia call, for example only by speech, when a lack of capacity of the used network as a changing condition occurs (e.g. due to a handover or other reasons, as described above). When the changing condition is dropped (e.g. handover back to the higher capacity

network or the like), it is also easy to reestablish the original communication paths only by switching on the previously cancelled bearers.

The present invention proposes a method for performing a communication between two terminal equipments TE1, TE2 via at least one communication network NW1, NW2, said method comprising the steps of establishing S2 a first connection for a communication signal V/S between the two terminal equipments, detecting S3 a connection changing condition, and, if said connection changing condition is detected, dividing S4 said communication signal at least into a first signal component V and a second signal component S and establishing S5 at least one second, said first signal component being transmitted via the first connection and said second signal component being transmitted via the second connection. The present invention proposes also a corresponding device 100 and a corresponding system.

It should be understood that the above description and accompanying figures are merely intended to illustrate the present invention by way of example only. The preferred embodiments of the present invention may thus vary within the scope of the attached claims.

CLAIMS

1. A method for performing a communication between two terminal equipments (**TE1, TE2**) via at least one communication network (**NW1, NW2**),

said method comprising the steps of:

establishing (**S2**) a first connection for a communication signal (**V/S**) between the two terminal equipments (**TE1, TE2**),

detecting (**S3**) a connection changing condition, and,

if said connection changing condition is detected, dividing (**S4**) said communication signal (**V/S**) at least into a first signal component (**V**) and a second signal component (**S**) and

establishing (**S5**) at least one second connection, said first signal component (**V**) being transmitted via the first connection and said second signal component (**S**) being transmitted via the second connection.

2. A method according to claim 1, wherein said changing condition is a reduction of quality of said first connection.

3. A method according to claim 1, wherein said changing condition is a handover.

4. A method according to claim 1, further comprising the steps of:

canceling (**S7**) the first connection transmitting the first signal component (**V**), and

maintaining the communication via the second connection transmitting the second signal component (**S**).

5. A method according to claim 4, further comprising the steps of:

reestablishing (S10) the first connection canceled in said canceling step (S7), when said changing condition is dropped (S9), and

performing the communication via the first connection transmitting the first signal component (V) and the second connection transmitting the second signal component (S).

6. A method according to claim 4, further comprising the steps of:

reestablishing (S10) the first connection canceled in said canceling step (S7), when said changing condition is dropped (S9),

rebuilding (S11) the communication signal (V/S) from the first signal component (V) and the second signal component (S), and

performing the communication via the first connection transmitting the communication signal (V/S) rebuilt in said rebuilding step (S11).

7. A method according to claim 1, further comprising the steps of:

maintaining (S13) the communication via the first and the second connection transmitting the first and the second signal component (V, S),

rebuilding (S15) the communication signal (V/S) from the first signal component (V) and the second signal component (S),

canceling (S16) the second connection, and

transmitting the rebuilt communication signal (V/S) via the first connection.

8. A method according to claim 1, wherein said communication signal (V/S) is a videotelephony signal.

9. A method according to claim 8, wherein said first signal component (V) is a video signal component and said second signal component (S) is a speech component.

10. A method according to claim 3, wherein said handover is performed when at least one of said terminal equipments (TE1, TE2) leaves a communication area of a first communication network (NW1) and enters a communication area of a second communication network (NW2).

11. A method according to claim 10, wherein communication signals of a first format are used in said first communication area (NW1) and communication signals of a second format are used in said second communication area (NW2),

said method further comprising the step of

changing (S8) the communication signal (V/S) or the first signal component (V) or the second signal component (S) from one of said first or second format into the respective other of the first or second format.

12. A method for performing a packet data multimedia communication between two terminal equipments (TE1, TE2) via at least one communication network (NW1, NW2),

said method comprising the steps of:

establishing at least a first connection and a second connection for communication signal components (V, S) between the two terminal equipments (TE1, TE2),

detecting a connection changing condition, and,

if said connection changing condition is detected, canceling one of said at least first and the second connections transmitting one communication signal component (V).

13. A method according to claim 12, wherein said changing condition is a reduction of quality of said first connection.

14. A method according to claim 12, wherein said changing condition is a handover.

15. A method according to claim 14, further comprising the steps of:

reestablishing the connection canceled in said canceling step, when said changing condition is dropped, and

performing the communication via the at least first and second connections transmitting the communication signal components (V, S).

16. A device for performing a communication between two terminal equipments (TE1, TE2) via at least one communication network (NW1, NW2),

said device (100) comprising:

first establishing means (110) for establishing a first connection for a communication signal (V/S) between the two terminal equipments (TE1, TE2),

detecting means (120) for detecting a connection changing condition,

dividing means (130) for dividing said communication signal (V/S) at least into a first signal component (V) and a second signal component (S), if said detecting means (120) detects said connection changing condition, and

second establishing means (110) for establishing at least one second connection, said first signal component (V) being transmitted via the first connection and said second signal component (S) being transmitted via the second connection.

17. A device (100) according to claim 16, wherein said changing condition is a reduction of quality of said first connection.

18. A device (100) according to claim 16, wherein said changing condition is a handover.

19. A device (100) according to claim 16, comprising canceling means (140) for canceling the first connection transmitting the first signal component (V), said communication being maintained via the second connection transmitting the second signal component (S).

20. A device according to claim 19, comprising reestablishing means (150) for reestablishing the first connection canceled by said canceling means (140), when said changing condition is dropped, said communication being performed via the first connection transmitting the first signal component (V) and the second connection transmitting the second signal component (S).

21. A device (100) according to claim 19, comprising reestablishing means (150) for reestablishing the first connection canceled by said canceling means (140), when said changing condition is dropped, and rebuilding means (160) for rebuilding the communication signal (V/S) from the first and the second signal component (V, S), said communication being performed via the first connection transmitting the communication signal (V/S) rebuilt by said rebuilding means (160).

22. A device according to claim 16, wherein the communication is maintained via the first and the second connection transmitting the first and the second signal component (V, S),
said device (100) comprising

rebuilding means (160) for rebuilding the communication signal (V/S) from the first and the second signal component (V, S),

canceling means (140) for canceling the second connection, said communication being performed via the first connection transmitting the communication signal (V/S) rebuilt by said rebuilding means (160).

23. A device according to claim 16, wherein said communication signal (V/S) is a videotelephony signal.

24. A device according to claim 23, wherein said first signal component (V) is a video signal component and said second signal component (S) is a speech component.

25. A device according to claim 18, wherein said handover is performed when at least one of said terminal equipments (TE1, TE2) leaves a communication area of a first communication network (NW1) and enters a communication area of a second communication network (NW2).

26. A device according to claim 25, wherein communication signals of a first format are used in said first communication area (NW1) and communication signals of a second format are used in said second communication area (NW2),

said device (100) comprising

changing means (170) for changing the communication signal (V/S) or the first signal component (V) or the second signal component (S) from one of said first or second format into the respective other of the first or second format.

27. A device for performing a packet data multimedia communication between two terminal equipments (TE1, TE2) via at least one communication network (NW1, NW2),

said device comprising:

establishing means for establishing at least a first connection and a second connection for communication signal components (V, S) between the two terminal equipments (TE1, TE2),

detecting means for detecting a connection changing condition, and

canceling means for canceling one of said at least first and the second connections transmitting one communication signal component (V).

28. A device according to claim 27, wherein said changing condition is a reduction of quality of said first connection.

29. A device according to claim 27, wherein said changing condition is a handover.

30. A device according to claim 27, further comprising:

reestablishing means for reestablishing the connection canceled by said canceling means, when said changing condition is dropped, said packet data communication being performed via the at least first and second connections transmitting the communication signal components (V, S).

31. A system in which a communication between two terminal equipments (TE1, TE2) is performed via at least one communication network (NW1, NW2),

said system is adapted to:

establish (S2) a first connection for a communication signal (V/S) between the two terminal equipments (TE1, TE2),

detect (S3) a connection changing condition, and,

if said connection changing condition is detected, divide (S4) said communication signal (V/S) at least into a

first signal component (V) and a second signal component (S) and

establish (S5) at least one second connection, said first signal component (V) being transmitted via the first connection and said second signal component (S) being transmitted via the second connection.

32. A system according to claim 31, wherein said changing condition is a reduction of quality of said first connection.

33. A system according to claim 31, wherein said changing condition is a handover.

34. A system according to claim 31, further adapted to:

cancel (S7) the first connection transmitting the first signal component (V), and

maintain the communication via the second connection transmitting the second signal component (S).

35. A system according to claim 34, further adapted to:

reestablish (S10) the canceled first connection, when said changing condition is dropped (S9), and

perform the communication via the first connection transmitting the first signal component (V) and the second connection transmitting the second signal component (S).

36. A system according to claim 34, further adapted to:

reestablish (S10) the first connection canceled in said canceling step (S7), when said changing condition is dropped (S9),

rebuild (S11) the communication signal (V/S) from the first signal component (V) and the second signal component (S), and

perform the communication via the first connection transmitting the communication signal (V/S) rebuilt in said rebuilding step (S11).

37. A system according to claim 31, further adapted to:

maintain (S13) the communication via the first and the second connection transmitting the first and the second signal component (V, S),

rebuild (S15) the communication signal (V/S) from the first signal component (V) and the second signal component (S),

cancel (S16) the second connection, and

transmit the rebuilt communication signal (V/S) via the first connection.

38. A system according to claim 31, wherein said communication signal (V/S) is a videotelephony signal.

39. A system according to claim 38, wherein said first signal component (V) is a video signal component and said second signal component (S) is a speech component.

40. A method according to claim 33, wherein said handover is performed when at least one of said terminal equipments (TE1, TE2) leaves a communication area of a first communication network (NW1) and enters a communication area of a second communication network (NW2).

41. A method according to claim 40, wherein communication signals of a first format are used in said first communication area (NW1) and communication signals of a second format are used in said second communication area (NW2),

said system is adapted to

change (S8) the communication signal (V/S) or the first signal component (V) or the second signal component

(S) from one of said first or second format into the respective other of the first or second format.

42. A system for performing a packet data multimedia communication between two terminal equipments (TE1, TE2) via at least one communication network (NW1, NW2),

said system being adapted to:

establish at least a first connection and a second connection for communication signal components (V, S) between the two terminal equipments (TE1, TE2),

detect a connection changing condition, and,

if said connection changing condition is detected, cancel one of said at least first and the second connections transmitting one communication signal component (V).

43. A system according to claim 42, wherein said changing condition is a reduction of quality of said first connection.

44. A system according to claim 42, wherein said changing condition is a handover.

45. A system according to claim 44, further adapted to:

reestablish the connection canceled in said canceling step, when said changing condition is dropped, and

perform the communication via the at least first and second connections transmitting the communication signal components (V, S).



FIG. 1A



FIG. 1B

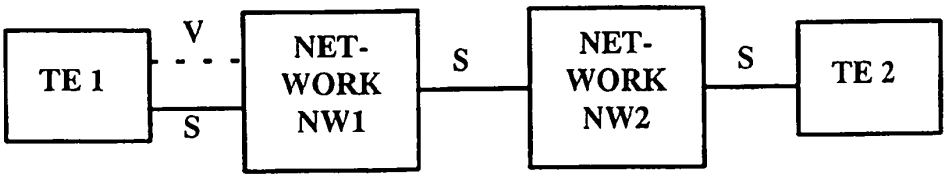


FIG. 1C

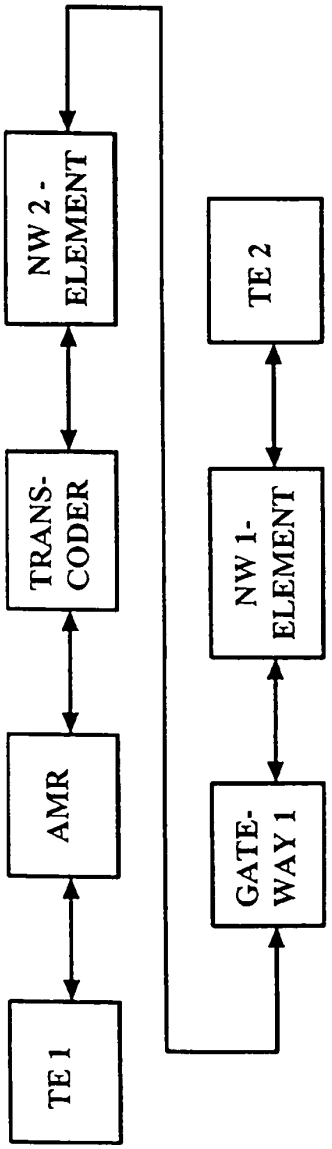

TE 1
AMR
TRANS-CODER
NW 2 - ELEMENT
GATE-WAY 1
NW 1-ELEMENT
TE 2

FIG. 2A

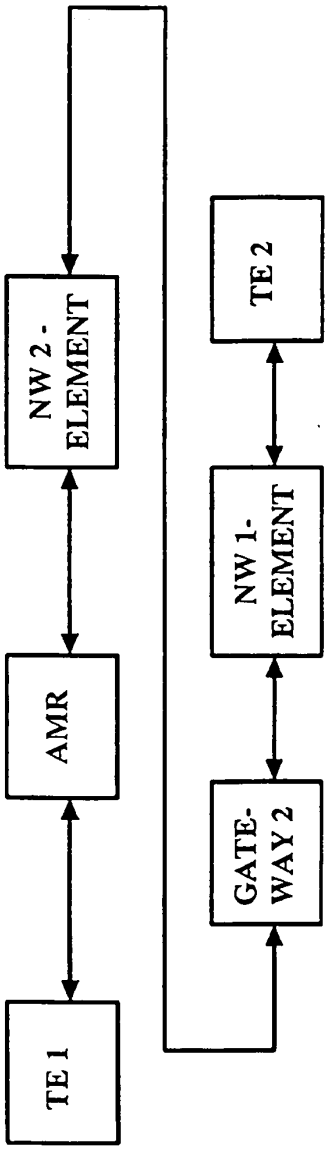

TE 1
AMR
NW 2 - ELEMENT
GATE-WAY 2
NW 1-ELEMENT
TE 2

FIG. 2B

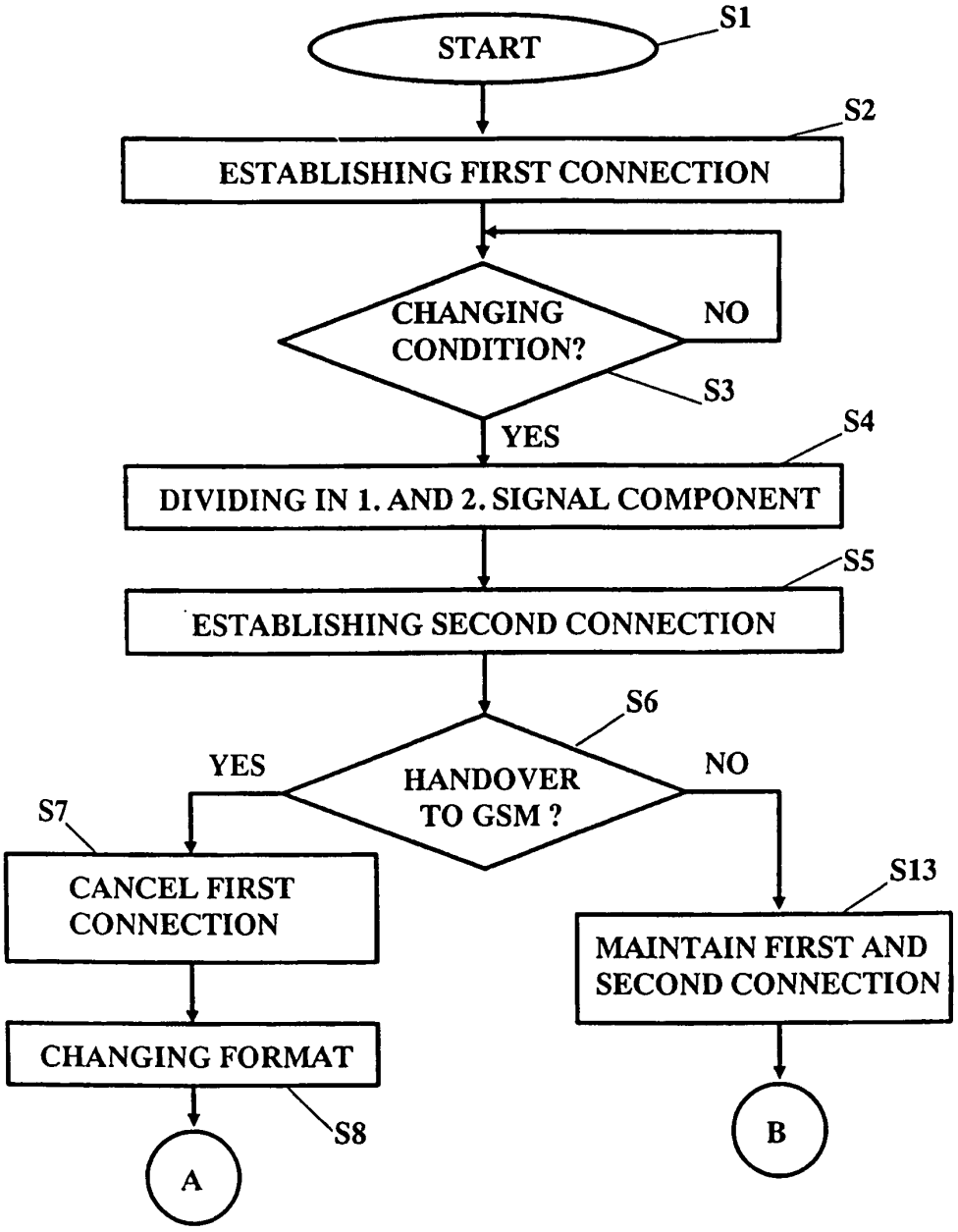

START
S1
ESTABLISHING FIRST CONNECTION
S2
CHANGING CONDITION?
NO
S3
YES
S4
DIVIDING IN 1. AND 2. SIGNAL COMPONENT
ESTABLISHING SECOND CONNECTION
S5
S6
HANDOVER TO GSM ?
YES
NO
S7
CANCEL FIRST CONNECTION
CHANGING FORMAT
S8
A
S13
MAINTAIN FIRST AND SECOND CONNECTION
B

FIG.3

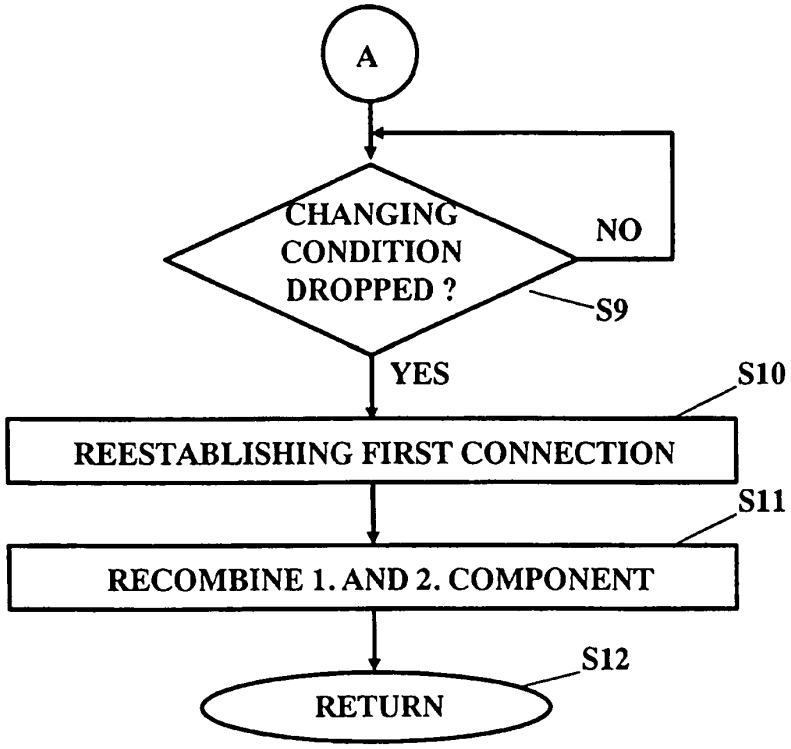

A
CHANGING CONDITION DROPPED ?
NO
S9
YES
S10
REESTABLISHING FIRST CONNECTION
S11
RECOMBINE 1. AND 2. COMPONENT
S12
RETURN

FIG.4

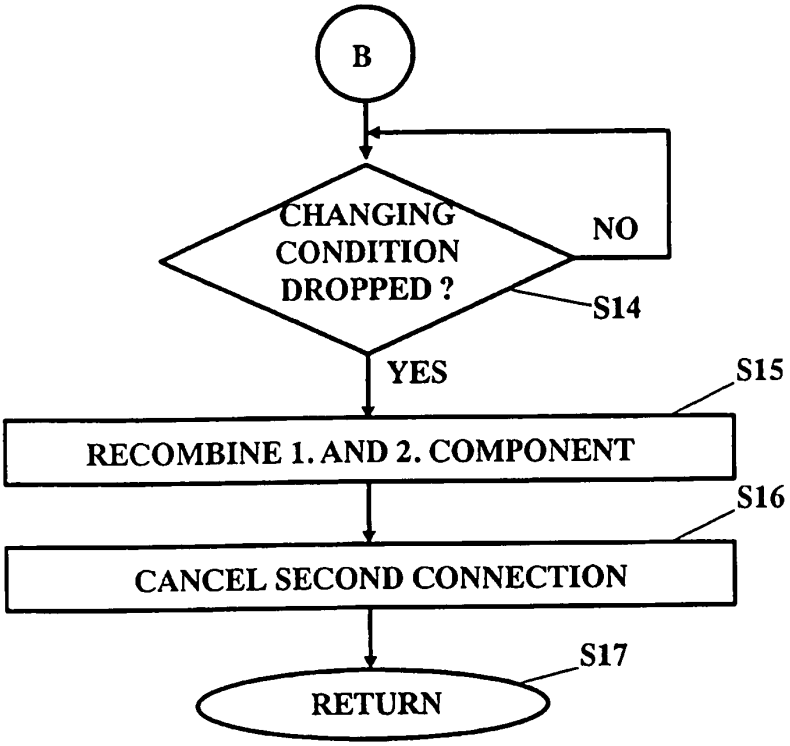

B
CHANGING CONDITION DROPPED ?
NO
S14
YES
S15
RECOMBINE 1. AND 2. COMPONENT
S16
CANCEL SECOND CONNECTION
S17
RETURN

FIG.5

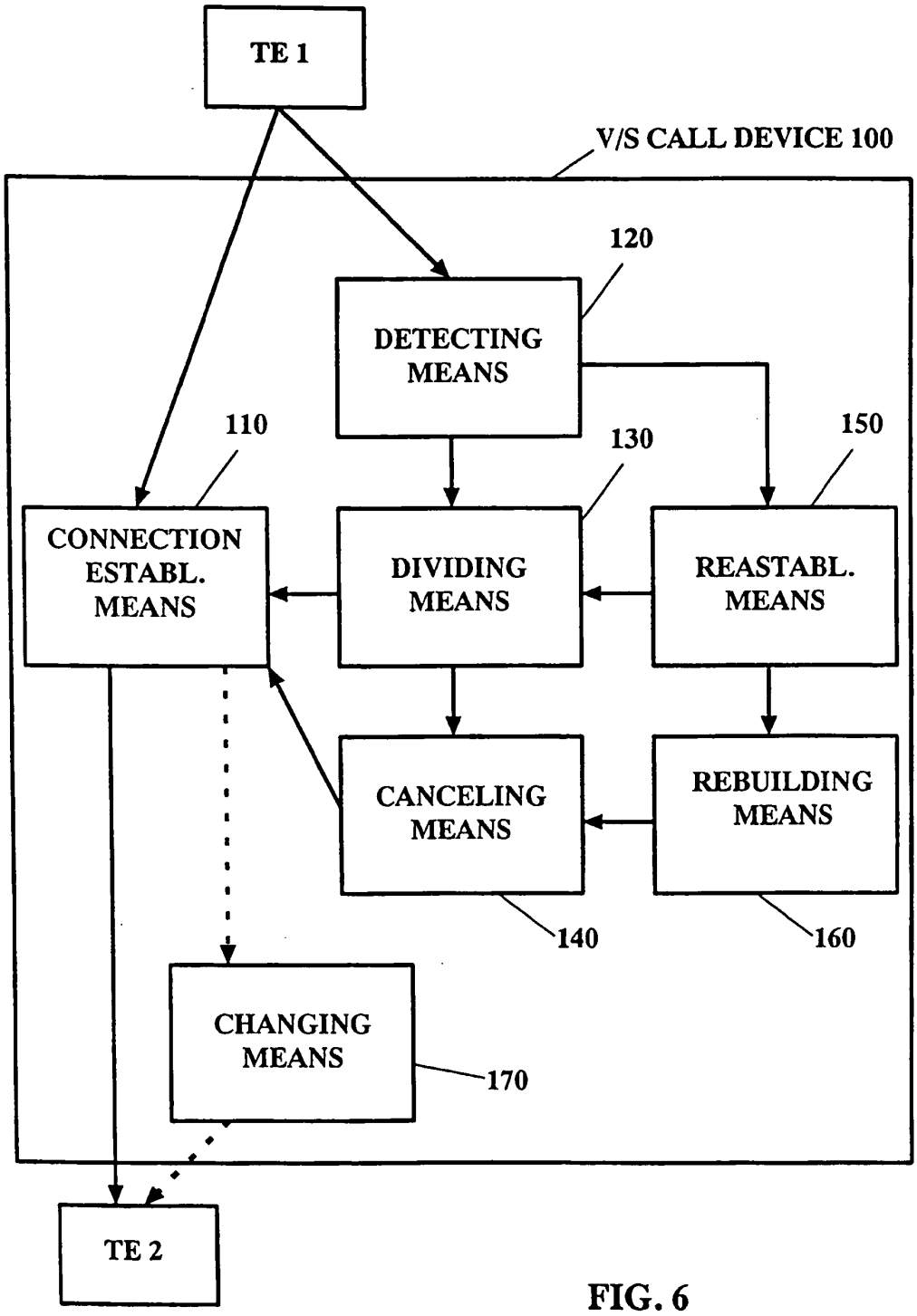

TE 1
V/S CALL DEVICE 100
120
DETECTING MEANS
110
130
150
CONNECTION ESTABL. MEANS
DIVIDING MEANS
REASTABL. MEANS
CANCELING MEANS
REBUILDING MEANS
140
160
CHANGING MEANS
170
TE 2

FIG. 6

INTERNATIONAL SEARCH REPORT

Inter. nal Application No
PCT/EP 99/04518

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38

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 data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 841 763 A (NOKIA MOBILE PHONES LTD) 13 May 1998 (1998-05-13) column 11, line 47 -column 12, line 5 column 13, line 6 - line 22 column 14, line 24 - line 32 column 14, line 48 - line 51 column 15, line 1 - line 17 column 21, line 34 - line 36; claim 42 — -/—	1,8,9, 12,16, 19,23, 24,27, 31,34, 38,39,42

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* 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

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"O" 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

"T" 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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 February 2000	28/02/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Rothlübbers, C

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Intern nal Application No
PCT/EP 99/04518

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 09810 A (MOTOROLA INC) 13 March 1997 (1997-03-13) page 3, line 9 - line 17 page 4, line 21 - line 31 page 5, line 16 - line 27 page 7, line 17 - line 21	1,2,12, 13,16, 17,27, 28,31, 32,42,43
E	WO 99 52307 A (ERICSSON TELEFON AB L M) 14 October 1999 (1999-10-14) page 4, line 17 - line 19 page 6, line 5 - line 17 page 7, line 9 - line 12 page 29, line 15 - line 23	1,2,8,9, 12,13, 27,28, 42,43

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

...formation on patent family members

Intern... ...al Application No
PCT/EP 99/04518

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		EP 0847641 A	17-06-1998
WO 9952307 A	14-10-1999	AU 3857199 A	25-10-1999

Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 March 2001 (22.03.2001)

PCT

(10) International Publication Number
WO 01/20938 A1

(51) International Patent Classification[7]: H04Q 7/38

(21) International Application Number: PCT/EP00/09100

(22) International Filing Date:
13 September 2000 (13.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9921706.9 14 September 1999 (14.09.1999) GB

(71) Applicant *(for all designated States except US)*: NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: AHMAVAARA, Kalle [FI/JP]; Nokia Japan Co Ltd, 2-13-5, Nagata-cho, Chiyoda-ku, Tokyo 100-0014 (JP).

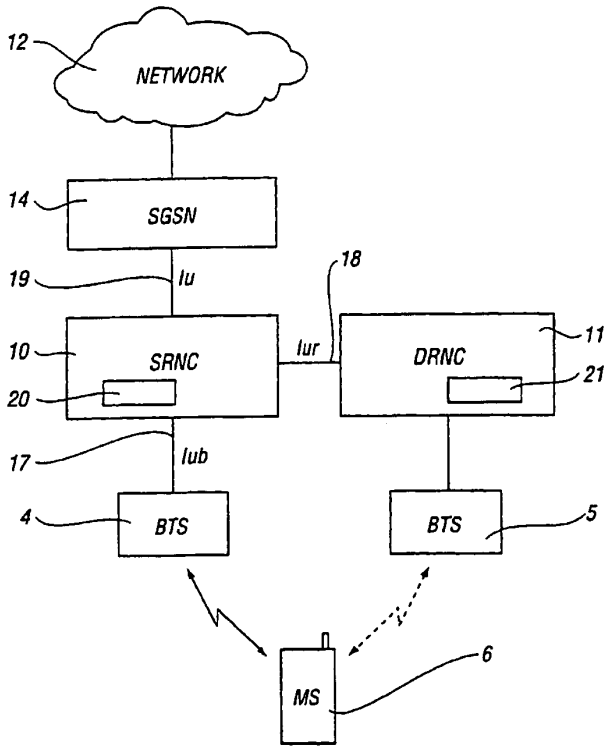
(74) Agents: RUUSKANEN, Juha-Pekka et al.; Page White & Farrer, 54 Doughty Street, London WC1N 2LS (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European

[Continued on next page]

(54) Title: RELOCATION IN A COMMUNICATION SYSTEM



(57) Abstract: The present invnetion relates to relocation of a protocol termination point in a communication system comprising a first protocol termination point, a second protocol termination point and control means for relocating a first protocol from the first protocol termination point to the second protocol termination point. A protocol initialization unit that contains predefined information of the first termination point is defined by means of the first protocol. The protocol initialization unit is subsequently transferred from the first termination point to the second termination point by means of a second protocol. The second termination point is initialized based on the received protocol initialization unit.

WO 01/20938 A1

patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *With international search report.*

Relocation in a communication system

Field of the Invention

The present invention relates to relocation in a communication system and in particular, but not exclusively, to relocation of a protocol termination point.

Background of the Invention

Communication networks typically operate in accordance with a given standard which sets out what the elements of the network are permitted to do and how that should be achieved. The communication in the networks follows predefined rules which are referred to in the following as protocols. The protocols to be used are defined in the associated standard. The protocols can be used for controlling various events and functionalities in a connection provided through the communications network. Several protocols may be simultaneously in an active state for providing control of a connection. During an ongoing i.e. active connection a protocol is having a termination point in the network element controlling the connection. For example, a protocol may have termination points in a telephone terminal and in a network controller controlling the connection.

A communication network is a cellular radio network consisting of cells. In most cases the cell can be defined as a certain area covered by one or several base transceiver stations (BTS) serving mobile stations (MS) via a radio interface and connected to a base station subsystem (BSS). Several cells cover a larger area, and form the coverage area of a cellular

radio network. The cell (or group of cells) and thus the mobile station (MS) or similar user equipment (UE) within one of the cells of the system can be controlled by a node providing controller functionality, for example by a radio network controller (RNC) or a mobile switching center (MSC). The controller can be connected further to a gateway or linking node, for example a gateway GPRS support node (GGSN) or gateway mobile switching center (GSMC), linking the cell to the other parts of the communication system and/or other communication networks, such as to a PSTN (Public Switched Telecommunications Network) or to a data network, such as to a X.25 based network or to a TCP/IP (Transmission Control Protocol/Internet Protocol) based network.

The mobile station MS may be controlled by only one controller at time. However, the MS may also be simultaneously controlled by several controller nodes. This may occur e.g. when the cells overlap or in so called soft handoff mode, where the MS may be in communication with two base stations and those base stations may be connected to different controllers, or when one controller is controlling another controller controlling the MS. One controller of the plurality of controllers in the system can be defined as a serving (main) controller whereas the others may act as secondary controllers. The responsibility of controlling a connection between the mobile station and the network may change during an ongoing connection. It is therefore necessary to relocate at least part of functionalities associated with the connection such that the connection will not become disconnected and/or that the quality of the connection remains in an acceptable level. It is to be appreciated that in addition or as an alternative to relocating functionalities of the controller node, the

functionality to be relocated may also be located in any other of the network elements, for example in the base station, base station subsystem, in the gateway and so on.

When relocation is decided to be performed, the serving controller or another node of the communication system may initiate the necessary proceeding for replacing one or several of the network nodes with a new corresponding node or nodes.

In case of an active i.e. ongoing connection, one of the features that should to be relocated is the state of a protocol termination point. Although it is not always necessary, in a usual case the status of the protocol termination point at the new "replacing" network element or node should be such that it may take over the functions of the old "replaced" network node. At the present the parameters which need to be transferred have to be defined also in the protocols which are used to convey the information from the old termination point to the new termination point. For example, if parameters of a Radio Resource Control (RRC) or Medium Access Control (MAC) or Radio Link Control (RLC) protocols are to be relocated in a system that would use radio network subsystem application part (RNSAP) for communication between the network controller nodes, this would mean that a lot of "external" parameters would have to be defined for the RNSAP. This would increase the complexity of the RNSAP. In addition, if several additional parameters of a protocol are to be defined for the another protocol, it makes these two different protocols very dependent on each other. The independent evolution of them would thus become more difficult to manage.

Summary of the Invention

It is an aim of the embodiments of the present invention to address one or several of the above problems.

According to one aspect of the present invention, there is provided a method in a communication system for relocating a protocol termination point, comprising:

defining a protocol initialization unit containing predefined information of a first termination point of a first protocol by the first protocol;

transferring the protocol initialization unit from the first termination point to a second termination point by a second protocol; and

initializing the second termination point based on the protocol initialization unit.

According to another aspect of the present invention there is provided a communication system, comprising:

a first protocol termination point;

a second protocol termination point;

control means for relocating a first protocol from the first protocol termination point to the second protocol termination point, said control means being arranged to form a protocol initialization unit containing predefined information of the first protocol at the first protocol termination point;

communication path based on a second protocol between the first and the second termination points for transferring the protocol initialization unit; and

control means for initializing the second protocol termination point based on the protocol initialization unit.

According to a still another aspect of the present invention there is provided a network element for use in a communication network, comprising:

a protocol termination point;

control means for relocating a first protocol from the protocol termination point to another protocol termination point, said control means being arranged to form a protocol initialization unit containing predefined information of the first protocol at the protocol termination point; and

interface to said other protocol termination point based on a second protocol for transferring the protocol initialization unit from the first termination point by means of the second protocol.

According to a still another aspect of the present invention there is provided a network element for use in a communication network, comprising:

a protocol termination point of a first protocol;

interface to another protocol termination point for receiving a protocol initialization unit containing predefined information of the first protocol at said other termination point, wherein the interface is based on a second protocol; and

control means for initializing the protocol termination point based on the received protocol initialization unit.

According to a more specific embodiment, the protocol initialization unit may contain state information of the first protocol termination point.

The first termination point may also be located at a first network element of the communication system and the second

termination point may be located at a second network element of the communication system. The second network element may, upon receiving the protocol information unit, generate and transmit a response to the first network element by means of the second protocol.

The protocol initialization unit may be encapsulated in a message transmitted between the first termination point and the second termination point. The protocol initialization unit may also be transparent for the second protocol.

The protocol initialization unit may be transmitted via a network element of a core network of the communication system. This may be accomplished by means of a radio access network application part (RANAP) protocol. According to an embodiment, the protocol initialization unit may be transmitted directly between the termination points. This may be accomplished by means of a radio network subsystem application part (RNSAP) protocol.

The protocol initialization unit may contain information of at least one further protocol. According to an embodiment at least one further protocol initialization unit may be defined containing predefined information of a further protocol by the further protocol, whereafter the further protocol initialization unit is transferred from the first termination point to the second termination point. The further protocol initialization unit may be transferred between the termination points by a protocol that is different to the second protocol.

The parameters of the second termination point may be set into a state that is relatively similar to the state of parameters

of the first termination point before or at the time the relocation procedure was initiated during the initialization procedure.

The embodiments of the invention provide several advantages. One of the benefits is that a need for defining a great number of parameters of one protocol in another protocol is avoided. This provides clear benefits in updating and maintenance of the protocols.

Brief Description of Drawings

For better understanding of the present invention, reference will now be made by way of example to the accompanying drawings in which:

Figure 1 shows a schematic diagram of a cellular radio network system in which embodiments of the invention can be implemented;

Figure 2 shows the hierarchy of various elements of the network of Figure 1;

Figure 3 shows two possible interfaces between network nodes; and

Figure 4 is a flow chart for operation in accordance with one embodiment.

Description of Preferred Embodiments of the Invention

Reference will be first made to Figure 1 in which three cells 1,2,3 of a cellular telecommunications network are shown. Each cell 1,2,3 is served by a respective base transceiver station (BTS) 4',4,5. Each base transceiver station (BTS) is arranged to transmit signals to and receive signals from the mobile

EX1002 - Page 1081

stations (MS) 6 located in the cell associated with the given base transceiver station. Likewise, each mobile station 6 is able to transmit signals to and receive signals from the respective base transceiver station 4',4,5, and also able to move from the coverage area of one cell to the coverage area of another cell, e.g. from cell 2 to cell 3.

The exemplifying cellular telecommunications network will be described in more detail in the following by using the terminology of a proposed Universal Mobile Telecommunications System (UMTS) standard. However, it is to be appreciated that the invention is not restricted to UMTS but can be implemented in any standard. Examples of these include, without any intention to restrict the possible communication systems to these, any of the code division multiple access (CDMA) based systems or any of the time division multiple access (TDMA) based systems or any of the frequency division multiple access (FDMA) based systems or any hybrids thereof.

Reference is now made to Figure 2 which shows the hierarchy of a cellular communication system. As can be seen, the mobile station 6 is in wireless communication with one of the base stations. Typically a number of mobile stations will be in communication with each base station although only one mobile station is shown in Figure 2 for clarity. A first base station 4 is connected to a first network controller, which in Figure 2 is a serving radio network controller SRNC 10. Again, more than one base station is usually connected to each controller 10 although only one is shown for clarity. Typically more than one controller is also provided in a network. The SRNC 10 is connected to other elements of the network 12 via a suitable

linking or gateway apparatus, such as a serving GPRS (General Packet radio Service) Support Node (SGSN) 14.

The SRNC 10 is arranged to control the base station, either directly or through an intermediate node (not shown). The controller 10 passes on data to be transmitted to the mobile station by the base station. The controller 10 will also receive from the base station data which the base station has received from the mobile station. The implementation of the communication between the base station, the mobile station and the controller is known, and will thus not be discussed in detail herein. It is sufficient to note that the interface may comprise channels in both uplink and downlink directions. The data may be sent between the mobile station and the controller in any suitable format. The messages sent from the mobile stations may include information identifying the mobile station (for instance, MS ID and/or IMSI (Mobile Station Identity and/or International Mobile Subscriber Identity, respectively)).

In addition to the serving controller (RNC 10), the cellular telecommunications system of Figure 2 includes another controller RNC 11 controlling the base station 5 of cell 3 of Figure 2. It is, again, noted that the second controller may also control more than one base station. The second controller may also sometimes be referred to as a drift controller (DRNC). The SNRC 10 and DRNC 11 may communicate with each other over an open Iur interface 18 established between them.

Figure 2 illustrates one possible relocation situation wherein the mobile station MS 6 or similar user equipment communicates firstly via the BTS 4 over a radio interface designated by a

solid line and then switches to communicate via a new BTS 5, as designated by the dashed radio interface. According to one possibility the change from one base station to another may occur after the mobile station 6 has moved into the service or illumination area of the second base station 5. However, it is to be appreciated that in addition to the movement of the mobile station, there are also other possible reasons for triggering the relocation of the connection to another base station or to another network element, such as network optimization, load balancing, hardware congestion, connection quality improvement, fault in the system or base station and so on.

In order to ensure a proper operation of the system and to avoid disconnecting a possibly ongoing call, at least some of the functionalities of the network elements have to be relocated for the connection. For example, when a SRNC functionality is to be located from a first RNC to a second RNC some protocol termination points of an ongoing connection (such as RRC, RCL and/or MAC protocols) need to be changed from the first RNC to the second RNC.

Before explaining an embodiment for the relocation in more detail, a brief explanation will given of the protocol termination point with reference to Figure 3 showing a block diagram of the source RNC 10 and the target RNC 11. The exemplifying protocol termination point is illustrated to comprise a radio resource control (RRC) protocol. However, it is to be appreciated that the described RRC protocol is only an example, and that the embodiments can be implemented for any other protocol used for a connection in a communication system as well. These other protocols include, without any

restriction to these, medium access control (MAC) protocol, radio link control (RLC) protocol and packet data convergence protocol (PDCP).

The SRNC 10 and DRNC 11 each are provided with a Radio Resource Controller functionality RRC 24 and 26, respectively. When the MS 6 is communication with the controller 10, the RRC protocol has its other termination point correspondingly at the controller 10, while the other termination point is at the mobile station. However, should the controller change, the termination point of the RRC protocol should also be changed correspondingly. More precisely, the new controller 11 should be provided with a similar termination point functionality using similar parameters as the previous controller had. These functionalities will be controlled by a control unit 20 at the source controller 10 and by a control unit 21 at the target controller 11.

Figure 3 shows further an Iur interface 18 between the DRNC 10 and the SRNC 11. For example, a RNSAP (Radio Network Subsystem Application Part) protocol can be used for the direct signalling between the two RNCs. A RANAP (Radio Access Network Application Part; in the control plane) protocol can used for L3 (Layer 3) signalling over the Iu interface between the RNCs and an appropriate element 14 of the core network 14. The core network element 14 can be e.g. a mobile switching center or a serving GPRS support node.

A reference will now be made to the flow chart of Figure 4 showing in more detail an embodiment for moving the required state information of a protocol termination point from one termination point at a first network element (NE) to another

termination point in a second network element. As illustrated by step 30, the protocol termination point is to be moved between the termination points during an active state of the protocol between the servicing network controller and the mobile station. After the relocation procedures are initiated at step 32, the "old" protocol termination point in the source network element produces at step 34 a special protocol data unit (PDU) containing predefined necessary protocol parameters for initialization of the second termination point before relocation of the connection. The PDU is passed at step 36 to the new termination point with help of a second protocol. The second protocol is used for signaling between the different network elements or nodes. The passed information can be transparent to the second protocol used for the transmission of the PDU. Examples of the protocols which may be used for the transmission of the PDU will be discussed in more detail later in this specification. The new termination point receives the PDU and it is initialized at step 38 based on the information received from the old termination point. After the initialization procedure the termination point will be relocated at step 40 to the new network element and the operation of the system continues as before except that the protocol termination point of the active protocol is now situated in the new network element.

In other words, an explicit protocol message will be passed between the old termination point and the new termination point of a protocol in case of relocation of the protocol termination point. The specified PDU (or message) is used within a protocol peer between the old and the new termination point of the protocol. In a preferred embodiment a single protocol defines the information to be transferred between the

protocol peers and the information to be transmitted within one peer. By means of this it is possible to avoid a need for defining a great number of parameters of one protocol in another protocol. For example, by the embodiment described in the following about 100 RRC parameters in the RANAP protocol are avoided.

Referring again to Figure 3, a more detailed example of the relocation procedure will now be given in context of relocating a radio interface L3 protocol (i.e. a radio resource control; RRC) protocol from a first or source controller (e.g. RNC 10 of Figure 3) to a second or target controller (e.g. RNC 11 of Figure 3). The exemplifying RRC protocol is known, and is not described in more detail. It is sufficient to note that the RRC provides common controlling and signaling over the air interface between the serving RNC and the mobile station and that the RRC can be shared with circuit switched traffic and packet switched traffic.

The control unit 20 of the first (source) RNC 10 produces the special protocol initialization unit which in this instance will be referred to as a RRC PDU. The RRC PDU contains all such predefined RRC parameters that have to be known by the new termination point in order to receive and continue the connection. These parameters may include information concerning e.g. one or several of the following: radio bearer(s), transport channel(s), radio link(s) and their physical channels, capability information as well as user equipment capabilities and measurements being reported by the user equipment and so on. According to a preferred embodiment the RRC PDU contains all such RRC parameters that are required by the termination point at the target RNC to start the RRC

protocol in a relatively similar state and conditions that existed in the old termination point.

According to an embodiment the generated RRC PDU can be transferred from the first RNC to the second RNC by means of a RNSAP (Radio Network Subsystem Application Part) over an open interface Iur 18 provided between the first controller 10 and the second controller 11. The termination point at the second RNC receives the RRC PDU and subsequently decodes the received RRC PDU. The termination point 26 is initialized based on the received and decoded information. The initialization procedure can be controlled by the control unit 21.

According to another embodiment the PDU is firstly moved from the source RNC 10 to the core network (CN) 14 over an Iu interface 19 by a RANAP (Radio Access Network Application Part) message 'RELOCATION REQUIRED' and subsequently from the core network to the target RNC 11 by an Iu RANAP message 'RELOCATION REQUEST'.

The RRC PDU can be encapsulated within a message in the second protocol as there is no need for the contents of the RRC PDU to be visible for the functionality of the second protocol, such as to the RANAP or the RNSAP. The encapsulation of protocol messages transparently to a message of another protocol is a known technique and will thus not be discussed in more detail herein

It should be appreciated that the status of any other protocol, such as the MAC protocol or RLC protocol referred to above, could also be conveyed by the RRC protocol. In more general terms, a protocol may "collect" required information

EX1002 - Page 1088

for several protocols and generate a PDU containing required information for all or at least more than one of the protocols to be relocated. According to an embodiment a separate or further protocol initialization unit PDU is used for each of the protocols to be relocated or at least some of the protocols to be relocated. The different protocol initialization units can be transferred between the termination point by protocols that are different to each other.

It should also be appreciated that some embodiments do not require an identical or relatively similar protocol termination point at the old and the new network element. However, it is preferred that the information included in the protocol initialization unit is such that that the functionalities of the communication system may continue without disconnecting the user equipment from the communication system.

According to one possibility the termination point is not relocated from a network element or node to another node but within the node.

It is noted that in some embodiments of the invention, the relocation of some or all functionalities may also be triggered even in such conditions where the communication could continue without any relocation proceedings, e.g. in order to optimize the operation of the system or balance the load distribution in the system. In addition, the mobile station 6 of Figure 2 may be in communication with both controllers 10 and 11. Furthermore, it may not be necessary to relocate the entire protocol or all protocols used for a

connection, but instead only a part of the information concerning the protocols is transmitted between the network elements. For example, a user plane communication may be enabled via the Iur interface 18 of Figure 2, whereby the mobile station 6 within the service area of the controller 11 could still be controlled by the old servicing controller 10 via the controller 11.

According to a further embodiment the initialization is a bi-directional process. In other words, instead of only transmitting information from the first network element (node) to the second element, the new network element may send a respond to the first element or accomplish a transmission to a further network element. The respond may include a message such as "unable to initialize", "overload", "all parameters not received" and so on. Upon receiving the response, the first network element may modify its state and/or take some other actions towards the new termination point. For example, transmit modified parameter or parameters, or use different transmission route, or try to relocate the connection to another network element.

It should also be appreciated that whilst embodiments of the present invention have been described in relation to a connection between the network nodes and a mobile station, embodiments of the present invention are applicable to any other suitable type of connections terminating to one node. It should also be appreciated that base stations can sometimes be referred to as node B.

There are also other possible reasons for initiating the relocation procedure that movement of the mobile station into a new service area. For example, the network element in

question may become overloaded or a failure in the system of the network element itself may force the system to relocate at least a part of the functionalities, network optimization, load balancing and so on.

The exemplifying embodiments of the invention have discussed protocols terminated to a network controller. Embodiments of the present invention can be applicable to other network elements as well where applicable.

It is also noted herein that while the above describes one exemplifying embodiment of the invention, there are several variations and modifications which may be made to the disclosed solution without departing from the scope of the present invention as defined in the appended claims.

Claims

1. A method in a communication system for relocating a protocol termination point, comprising:

defining a protocol initialization unit containing predefined information of a first termination point of a first protocol by the first protocol;

transferring the protocol initialization unit from the first termination point to a second termination point by a second protocol; and

initializing the second termination point based on the protocol initialization unit.

2. A method according to claim 1, wherein the protocol initialization unit contains state information of the first protocol termination point.

3. A method according to claim 1 or 2, wherein the first termination point is located at a first network element of the communication system and the second termination point is located at a second network element of the communication system.

4. A method according to claim 3, wherein the second network element, upon receiving the protocol information unit, generates and transmits a response to the first network element by means of the second protocol.

5. A method according to any of the preceding claims, wherein the protocol initialization unit is encapsulated in a message transmitted between the first termination point and the second termination point by the second protocol.

6. A method according to any of the preceding claims, wherein the protocol initialization unit is transparent for the second protocol.

7. A method according to any of the preceding claims, wherein the protocol initialization unit is transmitted via a third network element between the termination points.

8. A method according to claim 7, wherein the transmission is based on a radio access network application part (RANAP) protocol.

9. A method according to any of claims 1 to 6, wherein the protocol initialization unit is transmitted by a direct connection between the termination points.

10. A method according to claim 9, wherein the transmission is based on a radio network subsystem application part (RNSAP) protocol.

11. A method according to any of the preceding claims, wherein the predefined information of the first protocol comprise one or several parameters of a radio resource control protocol (RRC), medium access control protocol (MAC), radio link control protocol (RLC), and/or packet data convergence protocol (PDCP).

12. A method according to any of the preceding claims, wherein the protocol initialization unit contains information of at least one further protocol.

13. A method according to any of the preceding claims, comprising steps of:

defining at least one further protocol initialization unit containing predefined information of a further protocol by the further protocol; and

transferring the further protocol initialization unit from the first termination point to the second termination point.

14. A method according to claim 13, wherein the further protocol initialization unit is transferred between the termination points by a protocol that is different to the second protocol.

15. A method according to any of the preceding claims, wherein at least one of the termination points is located at one of the following: a base station controller, a radio network controller, a base station, a gateway.

16. A method according to any of the preceding claims, wherein the step of initializing the second termination point comprises setting the parameters of the second termination point into a state that is similar to the parameters of the first termination point before or at the time the relocation procedure was initiated.

17. A communication system, comprising:

a first protocol termination point;

a second protocol termination point;

control means for relocating a first protocol from the first protocol termination point to the second protocol termination point, said control means being arranged to form a

protocol initialization unit containing predefined information of the first protocol at the first protocol termination point;

communication path based on a second protocol between the first and the second termination points for transferring the protocol initialization unit; and

control means for initializing the second protocol termination point based on the protocol initialization unit.

18. A communication system according to claim 17, wherein the protocol initialization unit contains state information of the first protocol termination point.

19. A communication system according to claim 17 or 18, wherein the control means for relocating are arranged to encapsulate the protocol initialization unit into a message to be transmitted from the first termination point to the second termination point.

20. A communication system according to any of claims 17 to 19, wherein the first termination point is located at a first network element of the communication system and the control means for relocating are arranged in connection with the first network element.

21. A communication system according to any of claims 17 to 20, wherein the second termination point is located at a second network element of the communication system and the control means for initializing are arranged in connection with the second network element.

EX1002 - Page 1095

22. A communication system according to any of the claims 17 to 21, wherein the protocol initialization unit contains information of at least one further protocol.

23. A network element for use in a communication network, comprising:

a protocol termination point;

control means for relocating a first protocol from the protocol termination point to another protocol termination point, said control means being arranged to form a protocol initialization unit containing predefined information of the first protocol at the protocol termination point; and

interface to said other protocol termination point based on a second protocol for transferring the protocol initialization unit from the first termination point by means of the second protocol.

24. A network element according to claim 23, wherein the network element comprises a controller of a cellular communication network.

25. A network element according to claim 23 or 24, wherein the control means for relocating are arranged to encapsulate the protocol initialization unit into a message to be transmitted from the first termination point by means of the second protocol.

26. A network element according to any of claims 23 to 25, wherein the protocol initialization unit contains information of at least one further protocol.

27. A network element for use in a communication network, comprising:

a protocol termination point of a first protocol;

interface to another protocol termination point for receiving a protocol initialization unit containing predefined information of the first protocol at said other termination point, wherein the interface is based on a second protocol; and

control means for initializing the protocol termination point based on the received protocol initialization unit.

28. A network element according to claim 27, wherein the network element comprises a controller of a cellular communication network.

1/3

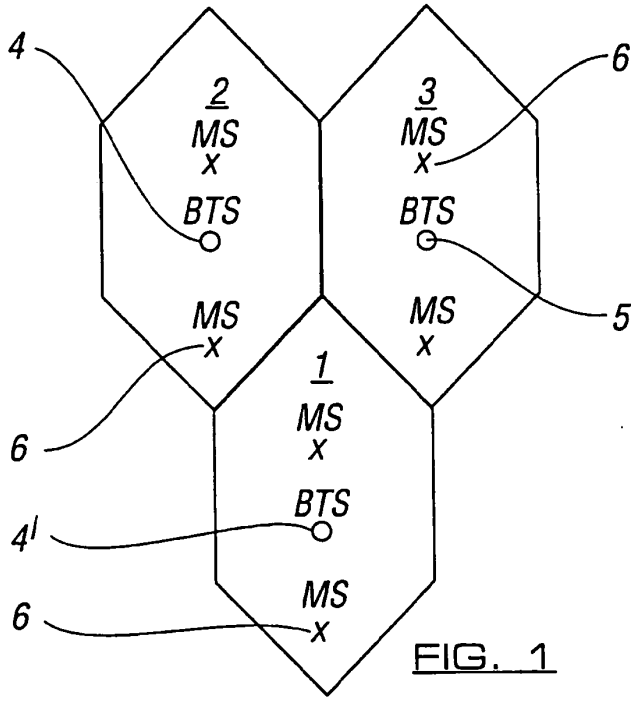

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FIG. 1

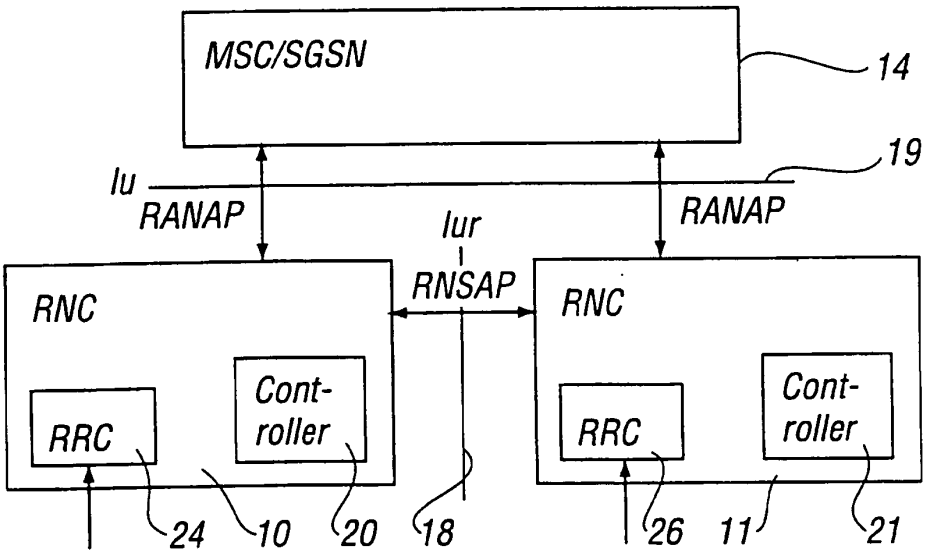

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FIG. 3

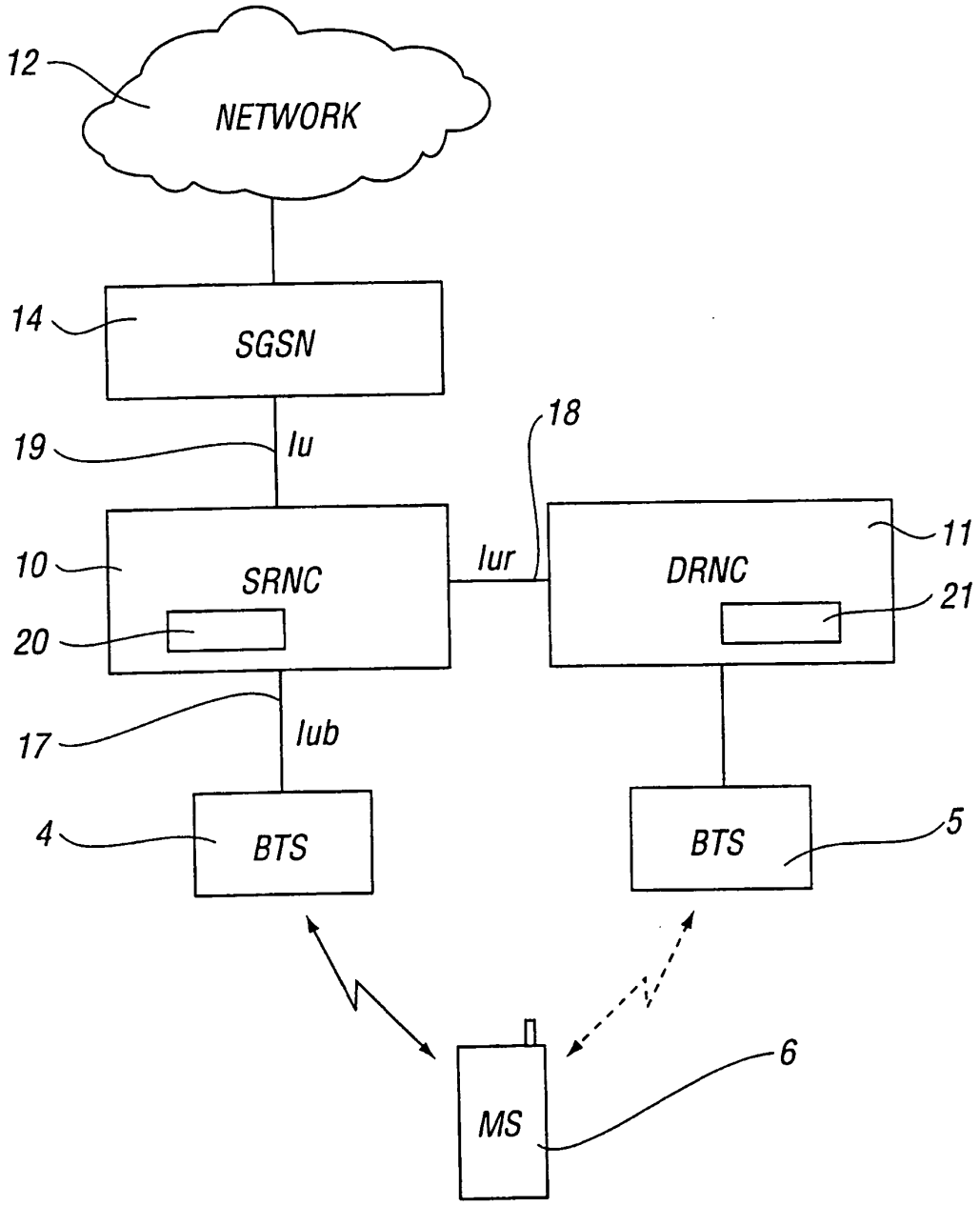

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NETWORK
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SGSN
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FIG. 2

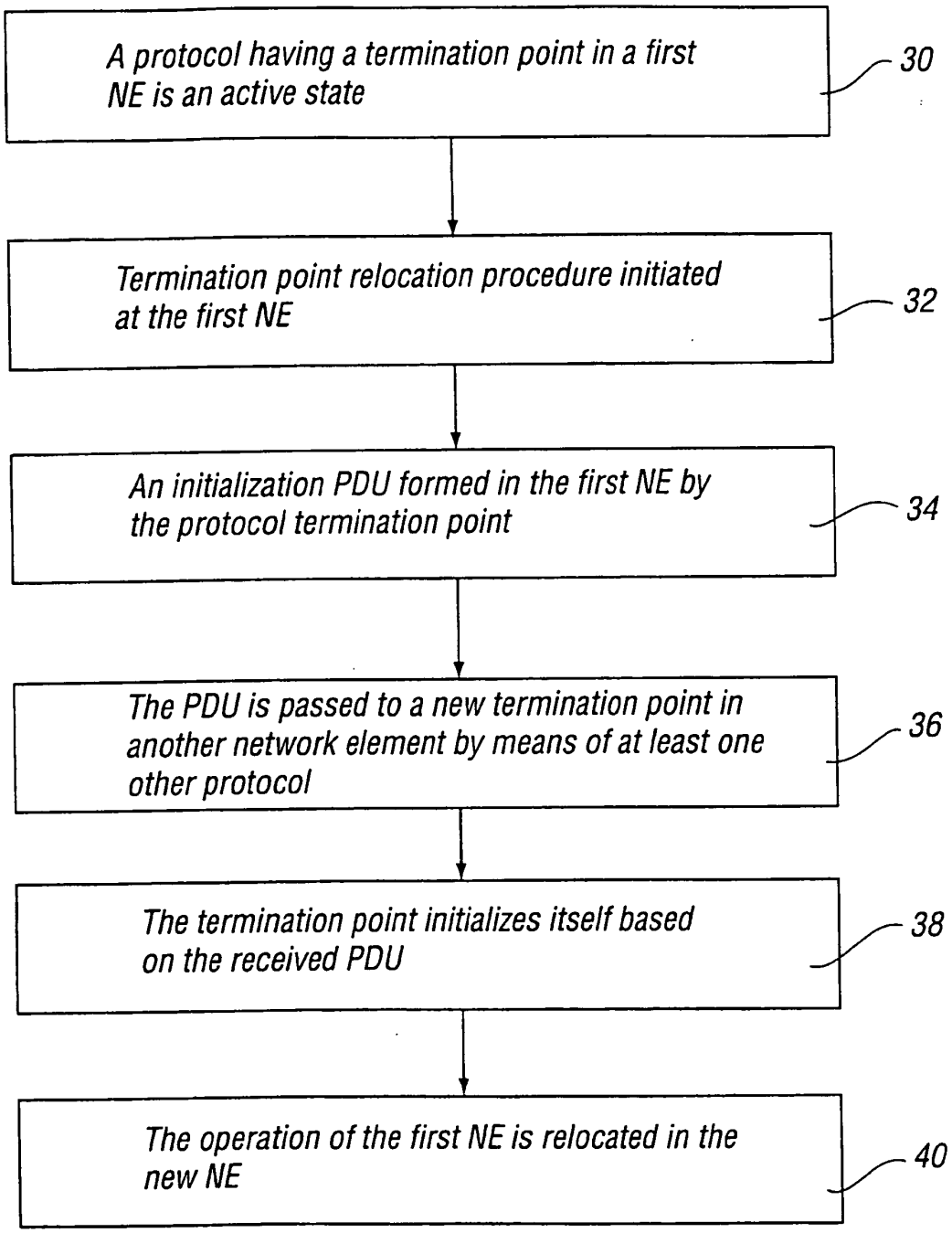

A protocol having a termination point in a first NE is an active state
30
Termination point relocation procedure initiated at the first NE
32
An initialization PDU formed in the first NE by the protocol termination point
34
The PDU is passed to a new termination point in another network element by means of at least one other protocol
36
The termination point initializes itself based on the received PDU
38
The operation of the first NE is relocated in the new NE
40

FIG. 4

INTERNATIONAL SEARCH REPORT

Interna al Application No
PCT/EP 00/09100

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38

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 data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 898 438 A (NOKIA MOBILE PHONES LTD) 24 February 1999 (1999-02-24) column 4, line 18 -column 5, line 22 column 8, line 1 - line 8 column 10, line 7 -column 11, line 49 figure 7 ---	1-3,5,7, 9,15-21, 23-25, 27,28
A	CH 682 867 A (ASCOM TECH AG) 30 November 1993 (1993-11-30) column 7, line 19 -column 10, line 20 --- -/--	1,3,15, 17,20, 21,23, 24,27,28

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 December 2000	12/12/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Coppieters, S

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INTERNATIONAL SEARCH REPORT

Intern: al Application No
PCT/EP 00/09100

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 99 51051 A (NOKIA TELECOMMUNICATIONS OY ;AHMAVAARA KALLE (FI)) 7 October 1999 (1999-10-07) page 3, line 4 - line 17 page 4, line 14 -page 6, line 20 claims 1,14 -----	1-3,5-7, 9,11-28

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interna al Application No
PCT/EP 00/09100

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0898438 A	24-02-1999	FI 973425 A	21-02-1999
		AU 7045198 A	08-03-1999
		BR 9811247 A	18-07-2000
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		FI 990988 A	30-04-1999
		WO 9909774 A	25-02-1999
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		AU 3149699 A	18-10-1999
		BR 9909307 A	21-11-2000

Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
10 May 2001 (10.05.2001)

PCT

(10) International Publication Number
WO 01/33885 A1

(51) International Patent Classification[7]: H04Q 7/38

(21) International Application Number: PCT/FI00/00955

(22) International Filing Date:
2 November 2000 (02.11.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
19992369 2 November 1999 (02.11.1999) FI

(71) Applicant *(for all designated States except US)*: **NOKIA MOBILE PHONES LTD.** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **AHMAVAARA, Kalle** [FI/FI]; Hakaniemenranta 18 D 62, FIN-00530 Helsinki (FI). **VIALEN, Jukka** [FI/FI]; Tyrskykuja 3 B 13, FIN-02320 Espoo (FI).

(74) Agent: **BERGGREN OY AB**; P.O. Box 16, FIN-00101 Helsinki (FI).

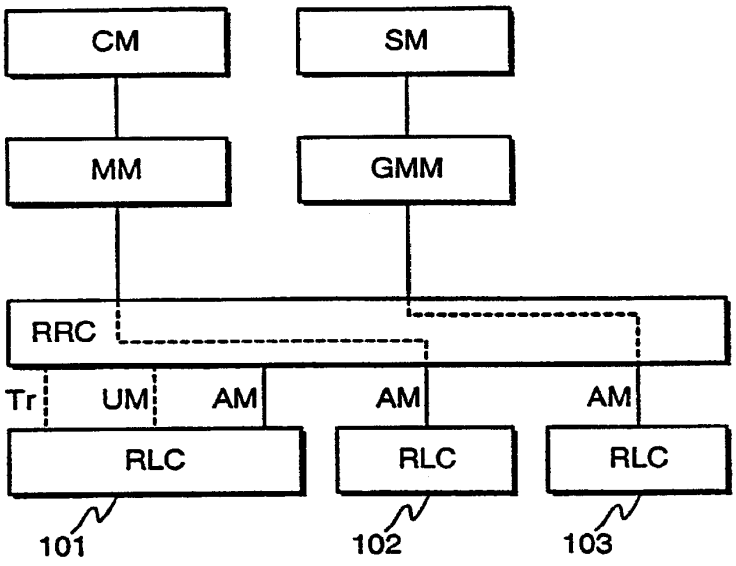
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A SIGNALLING METHOD



(57) Abstract: The invention relates to methods for transmission of signalling data in cellular telecommunication networks. According to the invention, multiple radio bearers can be allocated for transferring signalling traffic, but all higher layer signalling is in any case taken through the RRC protocol. In the inventive method, MM and higher layer messages are sent using RRC DIRECT TRANSFER messages, but a separate RLC entity is set up for RRC DIRECT TRANSFER messages. In various embodiments of the invention, separate radio bearers can be set up for individual CN domains and/or upper layer protocols and/or for a group of RRC messages.

WO 01/33885 A1

A signalling method

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to methods for transmission of signalling data in cellular telecommunication networks. Especially, the invention is related to such a method as specified in the preamble of the independent method claim.

2. Description of Related Art

The current concept of a signalling radio bearer in the UMTS system (universal mobile telecommunication system) defines that there is only one radio bearer for signalling traffic between the cellular network and a mobile communication means. Both the RRC (radio resource control) and higher protocol layers use the same radio bearer, i.e. the same RLC (radio link control) entity. In some implementations it is possible to have two RLC entities for signalling traffic, one entity for unacknowledged mode transfer and one entity for acknowledged mode transfer. However, there is currently no means to treat these entities separately for example for setup, reconfiguration or release. The signalling radio bearer, sometimes called the signalling link, is set up during the RRC connection establishment procedure. In some implementations, it is even possible that the radio bearer service is actually provided by the PDCP layer. In this case the PDCP will run in transparent mode for signalling traffic.

Higher layer messages, such as MM (mobility management) or CM (connection management) layer messages are carried between a mobile communication means and the network in a RRC DIRECT TRANSFER message payload. The protocol stack is illustrated in figure 1. Figure 1 shows an example of a partial protocol stack of a circuit switched core network (CN) domain, which protocol stack comprises connection management (CM) and mobility management (MM) protocol layers, and an example of a protocol stack of a packet switched core network domain, which protocol stack comprises session management (SM) and packet switched domain mobility management (PMM) protocol layers. Both of these protocol stacks communicate with the RRC (radio resource control) layer, which handles the transmission of the higher layer protocol messages in a RRC DIRECT TRANSFER MESSAGE payload. The radio link control protocol can be set up to provide

unacknowledged or acknowledged data transmission service. Each RLC instance is configured by RRC to operate in one of three modes: transparent mode (Tr), unacknowledged mode (UM) and acknowledged mode (AM). The transparent and unacknowledged mode are used by some of the RRC signalling procedures Majority of RRC signalling procedures including the Direct Transfer procedure utilize acknowledged mode transfer. The service that the RLC layer provides to upper layers is called radio bearer (RB). A radio bearer with the corresponding Iu bearer comprises a radio access bearer (RAB).

The problems with the prior art solution used at the time of writing this patent application are mainly related to priority control of signalling traffic. A problem can arise for example in a case, when a very long higher layer message is passed to RLC layer which buffers the message, and when a time critical RRC message also needs to be sent. In this situation, the RLC layer transmits the buffered messages first before transmitting more recent messages, which results in a delay of the time critical RRC message. Currently there are no mechanisms allowing priorization of more recent messages over those messages waiting in RLC transmission buffer. It is also possible that higher layer signalling such as MM and CM will need some prioritization means between the various higher layer protocols.

At the time of writing this patent application, a requirement has recently been identified which may finally require that several signalling radio bearers can be set up so that different QoS (quality of service) parameters can be used for different types of signalling. One solution for this requirement has been proposed. According to this solution, MM and higher layer signalling is carried over the air interface like any user traffic, in a separate radio bearer. This solution creates some problems related to integrity control function - which is defined as a RRC layer function - and to the existing procedures in Iu interface.

Figure 2 illustrates protocol stack configuration for signalling transfer according to a recently proposed solution. According to this solution, signalling traffic of MM and other higher layer protocols are transmitted directly using PDCP services. In this solution, only function that would be required from PDCP layer is the integrity protection. According to the solution, either one user plane radio bearer is used for all higher layer signalling protocols or a separate user plane radio bearer is allocated for each higher layer protocol stack. In the example of figure 2 each CN domain employs a different radio access bearer (RAB) for signalling between UE and each CN domain. According to this solution, priority control between MM and RRC

messages can be handled in RLC/MAC using normal radio bearer/logical channel priority control mechanisms.

This proposal has some disadvantages. For example, the proposed solution increases the complexity of the MM and PMM protocol implementations, since primitive interfaces are needed not only for the RRC protocol, but for the PDCP protocol as well. The proposed solution would also be an addition to current PDCP functions and change radically the basic function of PDCP as a packet service dependent sublayer. This would add complexity to the implementations of the PDCP protocol. Further, since PDCP is only intended for transmission of user plane traffic, in the proposed solution UE-CN signalling would be treated like user plane traffic, which implies that some modifications will most probably be needed also to the current Iu interface specifications. Further, in the proposed solution integrity protection needs to be implemented in two places: in PDCP layer for MM and higher layer signalling and in RRC layer for RRC signalling. As a consequence, the complexity of PDCP protocol increases and an additional header field is needed in PDCP data payload data units (PDU), since the integrity function requires a counter value to be transmitted with each piece of integrity protected data for use by the integrity protection algorithm.

SUMMARY OF THE INVENTION

An object of the invention is to realize a signalling method, which alleviates the aforementioned problems of prior art. A further object of the invention is to provide a method for transmission of control signalling, which allows determining of quality of service levels for different signalling traffic streams. A still further object of the invention is to provide the aforementioned objects of the invention, without adding complexity in the protocol layers above the RRC protocol layer.

The objects are reached by setting up at least two signalling radio bearers for transmission of signalling traffic, and specifying rules for routing of higher layer signalling to the signalling radio bearers.

The method according to the invention is characterized by that, which is specified in the characterizing part of the independent method claim. The network element according to the invention is characterized by that, which is specified in the characterizing part of the independent claim directed to a network element. The mobile communication means according to the invention is characterized by that, which is specified in the characterizing part of the independent claim directed to a

mobile communication means. The dependent claims describe further advantageous embodiments of the invention.

According to the invention, at least two signalling radio bearers are set up for transmission of signalling traffic and the cellular network configures how the signalling of higher layer protocols is mapped to said signalling radio bearers. Multiple radio bearers can be allocated for transferring signalling traffic, but all higher layer signalling is in any case taken through the RRC protocol.

In the inventive method, MM and higher layer messages are sent using RRC DIRECT TRANSFER messages, but separate RLC entities can be set up for RRC DIRECT TRANSFER messages. In various embodiments of the invention, separate radio bearers can be set up for individual CN domains and/or upper layer protocols and/or for a group of RRC messages.

Routing of messages to signalling bearers can advantageously be performed on the basis of CN domain identity information contained in every RRC DIRECT TRANSFER data unit. In embodiments, in which separate radio bearers are set up for different upper layer protocols or different groups of upper layer protocols, the routing of RRC DIRECT TRANSFER data units is advantageously performed on the basis of examination of the contents of data units and interpreting, with which protocol each data unit is associated.

The inventive method provides integrity protection of MM and higher layer messages as a consequence of the transmission of the messages in RRC DIRECT TRANSFER messages. The inventive method allows controlling of priority between MM and higher layer messages and RRC messages in the radio interface by adjusting the QoS parameters of bearers used to transfer the messages.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described in more detail in the following with reference to the accompanying drawings, of which

Figure 1 illustrates protocol stack configuration for signalling transfer according to prior art,

Figure 2 illustrates protocol stack configuration for signalling transfer according to another solution of prior art,

Figure 3 illustrates protocol stack configuration for signalling transfer according to an advantageous embodiment of the invention,

Figure 4 illustrates RRC signalling related to radio bearers,

Figure 5 illustrates a method according to an advantageous embodiment of the invention,

Figure 6 illustrates an example of the structure of a radio network controller according to an advantageous embodiment of the invention, and

Figure 7 illustrates an example of the structure of a mobile communication means according to an advantageous embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A. A FIRST GROUP OF ADVANTAGEOUS EMBODIMENTS OF THE INVENTION

Figure 3 illustrates protocol stack configuration for signalling transfer according to an advantageous embodiment of the invention. This figure illustrates the example case that a separate radio bearer is reserved for each CN domain. In figure 3, each radio bearer is represented by a RLC entity corresponding to the radio bearer. Figure 3 illustrates, that signalling from the circuit switched CN domain (CM, MM) is transmitted via a second RLC entity 102, while signalling from the packet switched CN domain (SM, PMM) is transmitted via a third RLC entity 103, while a first RLC entity is used for transmission of the rest of RRC messages.

According to the invention, the RRC protocol can use one or more signalling radio bearers (SRB) i.e. RLC entities for transmission of signalling traffic between the network and the mobile communication means, i.e. UE (user equipment). In other words, the signalling link between a UE and a RNC (radio network controller) can comprise one or more signalling radio bearers.

The UE can be commanded to use only one signalling radio bearer for all signalling. An additional signalling radio bearer can be set up and the RRC layer and the UE can be configured to send all RRC DIRECT TRANSFER messages using this additional signalling radio bearer. Further, more than one signalling radio bearers can be set up by the network. Preferably, the network makes the decisions about the configuration of the signalling radio bearers. Different rules for using the more than one signalling radio bearers can be used in different embodiments of the invention.

For example, in an advantageous embodiment of the invention, separate signalling radio bearers are used for each CN domain protocol stack. Such an embodiment is illustrated in figure 3. In such an embodiment, the RRC layer can route the RRC DIRECT TRANSFER messages to correct radio bearer by checking the CN domain identification information in the data units comprising the messages.

As a second example, in an advantageous embodiment of the invention, separate signalling radio bearers are used for each higher layer protocol. In such an embodiment, the RRC layer can route the RRC DIRECT TRANSFER messages to correct radio bearer by checking the NAS (network access stratum) protocol discriminator information in the data units comprising the messages.

As a third example, in an advantageous embodiment of the invention, separate signalling radio bearers are used for various predefined groups of higher layer protocols. In such an embodiment, the RRC layer can route the RRC DIRECT TRANSFER messages to correct radio bearer by checking the NAS (network access stratum) protocol discriminator information in the data units comprising the messages. In such an embodiment, each signalling radio bearer carrying higher level protocol signalling has a corresponding predefined set of NAS protocol discriminators.

The invention is not limited to these rules for deciding about the usage of the signalling radio bearers, since other types of rules can as well be used. For example, the decision of which signalling radio bearer to use for any given message can in an embodiment of the invention based on the PDU size. In such an embodiment, the length of each message is checked, and the bearer to be used is selected at least partly on the basis of the result of this checking.

In a further advantageous embodiment of the invention, the routing is based on a Quality of Service parameter attached to the higher layer protocol data. In such an embodiment, higher layer protocols may add a QoS parameter to single messages, to plurality of messages, or for example to all messages in order to ensure, that the messages are routed via a signalling radio bearer fulfilling the desired QoS level. In such an embodiment, the RRC layer can route the RRC DIRECT TRANSFER messages to correct signalling radio bearer by checking the additional QoS class information from the data units comprising the messages. There can be for example a predefined set of QoS classes for higher layer signalling messages, for example two QoS classes, or the number of QoS classes can be decided by the network. Preferably, for each QoS class a separate radio bearer is set up. An example of this

QoS class separation could be the short message service (SMS) which could use lower priority than other signalling.

The functionality for performing the decisions about the number of signalling radio bearers and about the rules for dividing traffic to these signalling radio bearers can be implemented in many different network elements of a radio access network (RAN). Preferably, the network element performing the decisions about the number of signalling radio bearers and about the rules for dividing traffic to these signalling radio bearers is the radio network controller (RNC).

In a further embodiment of the invention, the rules to be used can be selected out of a predefined set of rules by using the number of signalling radio bearers. In this embodiment, each possible amount of signalling radio bearers is associated with a predefined set of rules.

In a further advantageous embodiment of the invention, one of the signalling radio bearers can be defined as a master signalling radio bearer. This radio bearer is set up only in the RRC connection establishment procedure and released only in the RRC connection release procedure. This master SRB would be used as the prior art signalling bearer. Such an embodiment ensures, that all signalling bearers are not released in error during the RRC connection, since the master SRB in this embodiment cannot be controlled by radio bearer control messages.

B. A SECOND GROUP OF ADVANTAGEOUS EMBODIMENTS OF THE INVENTION

In an advantageous embodiment of the invention, the messages used for controlling radio bearers are used for controlling the signalling radio bearers as well. The messages are the RRC CONNECTION SETUP, RADIO BEARER RECONFIGURATION, RADIO BEARER RELEASE, and RADIO BEARER SETUP messages. The usage of the messages is described in the following with reference to figure 4. In the prior art, these messages are only used to control the user-plane radio bearers, not signalling. More details of the prior art use of these messages and a description of the other messages of the RRC protocols can be found in the RRC protocol specifications of the UMTS system. Figure 4 illustrates four RRC layer procedures, namely RRC connection establishment, radio bearer setup, radio bearer reconfiguration, and radio bearer release procedures. The RRC connection establishment procedure initiates the RRC connection between the mobile communication means and the network, while the other three of these four

procedures listed here are used to control single radio bearers and may or may not occur during the lifetime of a RRC connection. Figure 4 shows signalling between a mobile communication means (UE, user equipment) and the radio access network (UTRAN, UMTS terrestrial radio access network).

The RRC connection establishment procedure is initiated by the UE, which sends 300 a RRC CONNECTION REQUEST message to the radio access network. The radio access network responds to the message by sending a RRC CONNECTION SETUP message, which comprises information about various parameters about the RRC connection to be established. The UE finishes the RRC connection establishment procedure by sending 310 a RRC CONNECTION SETUP COMPLETE message.

The radio bearer setup procedure is initiated by the network, which sends 320 a RADIO BEARER SETUP message to the UE. The message comprises information about various parameters of the radio bearer about to be established. The UE responds to the message by sending 325 a RADIO BEARER SETUP COMPLETE message.

The radio bearer reconfiguration procedure is initiated by the network, which sends 330 a RADIO BEARER RECONFIGURATION message to the UE. The message comprises information about new values of parameters for the radio bearer or bearers affected. The UE responds to the message by sending 335 a RADIO BEARER RECONFIGURATION COMPLETE message.

The radio bearer release procedure is initiated by the network, which sends 340 a RADIO BEARER RELEASE message to the UE. The message comprises information identifying the bearer to be released. The UE responds to the message by sending 335 a RADIO BEARER RELEASE COMPLETE message.

According to an advantageous embodiment of the invention, the setting up and configuration of all the signalling radio bearers is done during the RRC connection establishment procedure. This can advantageously be effected by adding information about the signalling radio bearers to be established to the RRC CONNECTION SETUP message. One advantageous example of the organization of such information is presented later in this application.

In one advantageous embodiment of the invention, only one signalling radio bearer is set up and configured during the RRC connection establishment procedure. In

such an embodiment, further signalling radio bearers can be set up and configured later during the RRC connection, if need for that arises.

In an advantageous embodiment of the invention, the radio access network can set up additional Signalling Radio Bearers during the RRC connection and configure how the higher layer signalling is mapped into the new and existing signalling radio bearers. This can advantageously be effected by adding information about the signalling bearers to be established to the RADIO BEARER SETUP message. One advantageous example of the organization of such information is presented later in this application.

In an advantageous embodiment of the invention, the radio access network can re-configure the mapping between higher layer signalling and any existing signalling radio bearer during the RRC connection. This can advantageously be effected by adding information about the signalling bearers to be reconfigured to the RADIO BEARER RECONFIGURATION message. One advantageous example of the organization of such information is presented later in this application.

In an advantageous embodiment of the invention, the radio access network can release any signalling radio bBearers during the RRC connection and reconfigure the mapping between higher layer signalling and any remaining signalling radio bearers. This can advantageously be effected by adding information about the signalling bearers to be released and the new reconfiguration information to the RADIO BEARER RELEASE message. One advantageous example of the organization of such information is presented later in this application.

The following paragraphs and tables show examples according to various advantageous embodiments of the invention about how information pertaining to signalling radio bearers can be presented in the referred messages.

In the RRC CONNECTION SETUP message, the information about signalling radio bearers can be presented among the radio bearer information elements as shown in the following table. Note that for clarity, the following table lists only radio bearer (RB) information elements of the message.

RB information elements Information Element	*Range*
Signalling Radio Bearer information	0 to <MaxSRBCount>
RB identity	
Signalling Radio Bearer type	
RB mapping info	
SRB mapping info	

The parameter "Signalling Radio Bearer information" indicates the number of signalling radio bearers. The other four parameters are then repeated the indicated number of times. The parameter "RB identity" identifies the radio bearer. The purpose of the "Signalling Radio Bearer Type" information element is to indicate the RLC parameters needed for the Signalling Radio Bearer. Advantageously, each possible value of "Signalling Radio Bearer Type" information element refers to a predefined set of parameters. The parameter "RB mapping info" indicates, as in prior art, details about multiplexing RLC frames to physical layer channels. The parameter "SRB mapping info" indicates how various protocol messages are mapped to the particular SRB. The parameter "MaxSRBCount" defines the maximum number of signalling radio bearers.

In the RADIO BEARER RECONFIGURATION message, the SRB information can be represented by a "SRB mapping info" parameter among the RB information elements. The parameter is optional, and only present if the particular radio bearer is a signalling radio bearer.

In the RADIO BEARER RELEASE message, the SRB information can be represented by a "SRB mapping info" parameter among the RB information elements. The parameter is optional, and only present if the particular radio bearer is a signalling radio bearer.

In the RADIO BEARER SETUP message, the SRB information can be represented by a "SRB mapping info" parameter among the new RB information elements, if the particular new RB is to be a SRB, and by a "SRB mapping info" parameter among information elements for other radio bearers affected by the message, if the

particular other RB is a SRB. These parameters are optional, and only present if the particular radio bearer is a signalling radio bearer.

In one advantageous embodiment of the invention, the allowed values of "SRB mapping info" parameter i.e. information element range from 0 to 7 with the following meanings:

0	all RRC signalling
1	all RRC signalling except RRC Direct Transfer messages
2	all RRC Direct Transfer messages
3	RRC Direct Transfer messages with specified CN Domain Identities
4	RRC Direct Transfer messages carrying NAS message with the specified PD
5	only the specified RRC messages
6-7	reserved for future use

If the value is 3, 4, or 5, then also information elements describing details of correspondingly CN domain identities, NAS PD information, and RRC message types are present.

C. A THIRD GROUP OF ADVANTAGEOUS EMBODIMENTS OF THE INVENTION

Figure 5 illustrates a method according to an advantageous embodiment of the invention. Figure 5 illustrates a method for transmission of signalling data in a cellular telecommunication system between the cellular network and a mobile communication means. According to the example of figure 5, the method comprises steps of setting up 200 of at least two signalling radio bearers for transmission of signalling traffic, and configuring 201 of how the signalling of higher layer protocols is mapped to said signalling radio bearers.

According to an advantageous embodiment of the invention, the method further comprises the step of routing 210 of signalling traffic data units via said at least two signalling radio bearers according to predefined rules.

In a further advantageous embodiment of the invention, said predefined rules are set by a network element of a radio access network of the cellular telecommunication system.

In a still further advantageous embodiment of the invention, said predefined rules are set by a radio network controller.

According to an advantageous embodiment of the invention, in said step of routing 210, signalling from different core network domains is routed 210a via separate signalling radio bearers.

According to a further advantageous embodiment of the invention, in said step of routing 210, signalling of a higher layer protocol is routed 210b via a signalling radio bearer specific to said higher layer protocol.

According to a still further advantageous embodiment of the invention, in said step of routing 210, signalling traffic of a predefined group of higher layer protocols is routed 210c via a signalling radio bearer corresponding to said predefined group.

According to a still further advantageous embodiment of the invention, in said step of routing, signalling traffic of higher layer protocols is routed via a signalling radio bearer based on a Quality of Service parameter attached to the higher layer protocol data.

In a further advantageous embodiment of the invention, said setting up and configuration of said signalling radio bearers is performed during the RRC connection establishment procedure.

In an even further advantageous embodiment of the invention, the method comprises steps of setting up of a further signalling radio bearer during the RRC connection, and configuring the mapping of higher layer signalling to said further signalling radio bearer and previously existing signalling radio bearers.

In an even further advantageous embodiment of the invention, the method comprises the step of reconfiguring the mapping of higher layer signalling to said signalling radio bearers.

In an even further advantageous embodiment of the invention, the method comprises the step of releasing a signalling radio bearer.

D. A FOURTH GROUP OF ADVANTAGEOUS EMBODIMENTS OF THE INVENTION

Figure 6 illustrates the functional structure of a typical radio network controller 400 of a cellular telecommunications network using as an example the structure of a

RNC of a UMTS radio network utilizing WCDMA (wideband code division multiple access) transmission method. The invention is not limited to the UMTS system, but can be used in other similar systems as well.

The radio network controller 400 comprises a switching fabric unit (SFU) 450 to which several control processor units can be connected. Multiplexing units (MXU) 440 can be used between a number of processor units and the SFU to map the low bit rate data flows from the processor units into the high bit rate data flows of the SFU input ports. The network interface units (NIU) 410 handle the physical layer connections to different interfaces, such as Iub interface toward Node B elements, Iur interface towards other RNCs, and the Iu interface towards core network nodes. The operations and maintenance unit (OMU) 430 contains the RNC configuration and fault information and can be accessed from external operations and maintenance center. The signalling units (SU) 420 implement all the control and user plane protocols required in the RNC. Accordingly, the invention can be implemented in a RNC in the signalling units 420. The invention can be implemented using means 460 comprising software executed in the processors of the signalling units, which software causes the signalling units to perform according to the invention.

In an advantageous embodiment of the invention, a network element of a radio access network of a cellular telecommunication system is provided. According to the embodiment, the network element is arranged to set up at least two signalling radio bearers for transmission of signalling traffic and to configure how the signalling of higher layer protocols is mapped to said signalling radio bearers.

In a further advantageous embodiment of the invention, the network element is a radio network controller.

Figure 7 illustrates roughly the functional structure of a typical mobile communication means (UE) 500. The UE comprises a user interface (UI) 550, a control unit 540, a DSP unit 530, an RF unit 520, and an antenna 510. The RF unit handles the radio frequency processing of received and transmitted signals and converts the received signals to digital form. The DSP unit handles physical layer processing such as interleaving, channel coding, multiplexing, and segmentation. The DSP unit 530 can also implement a part of or all of layer 2 radio protocols such as the MAC, RLC, and PDCP protocols. Layer 3 protocols such as the RRC, MM, and CM protocols and typically also a part of layer 2 protocols are implemented in the control unit 540. Accordingly, the invention can be implemented in a UE in the control unit 540. The invention can be implemented using means 560

comprising software executed in the processor of the control unit, which software causes the control unit to perform according to the invention.

According to a further advantageous embodiment of the invention, a mobile communication means for a cellular telecommunication system is provided According to the embodiment, the mobile communication means is arranged to route radio resource control protocol messages to at least two signalling radio bearers as instructed by the cellular telecommunication system.

E. FURTHER CONSIDERATIONS

The present invention has several advantages. For example, the inventive solution retains the beneficial aspects of the prior art solutions described previously, while retaining the present specifications as unmodified as possible. Further, the inventive approach allows keeping of integrity protection in one protocol layer only, i.e. in RRC. The inventive method avoids the prior art problem of increasing the complexity of the PDCP protocol.

The inventive method is at the time of writing this patent application fully compatible with the present solutions regarding CND domain concepts and routing of higher layer signalling messages from or to CN domains based on CN domain identification information. The inventive method also requires no changes to Iu interface specifications.

The inventive method also allows prioritization between different types of signalling, such as between RRC signalling and higher layer signalling. The inventive method further allows the use of different QoS parameters for different types of signalling. Further, the inventive solution will also allow usage of different integrity algorithm for NAS (network access stratum) and AS (access stratum) signalling, if that would be later required. This can be effected by allocating separate bearers for these signalling flows, and applying a bearer specific integrity algorithm for the bearers.

In the present application the term signalling is intended to cover transmission of messages of various protocols controlling various aspects of the functioning of the cellular telecommunication systems, i.e. other transmissions than payload data transmissions.

The term higher layer protocol is in this application and particularly in the accompanying claims intended to cover the Radio Resource Control protocol and

any other layer 3 protocol acting between the mobile station and the radio access network and all layer 3 or higher layer signalling protocols between the mobile station and core network, such as for example the Mobility Management, Call Control, and Session Management protocols.

The invention is applicable in so called third generation mobile cellular systems, such as the UMTS system (universal mobile telecommunication system) and corresponding systems. The various message names such as the RRC DIRECT TRANSFER message name are intended to be examples only, and the invention is not limited to using the message names recited in this specification.

In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the invention. While a preferred embodiment of the invention has been described in detail, it should be apparent that many modifications and variations thereto are possible, all of which fall within the true spirit and scope of the invention.

Claims

1. Method for transmission of signalling data in a cellular telecommunication system between the cellular network and a mobile communication means, **characterized** in that in the method, at least two signalling radio bearers are set up for transmission of signalling traffic and the cellular network configures how the signalling of higher layer protocols is mapped to said signalling radio bearers.

2. A method according to claim 1, **characterized** in that the method comprises the step of

- routing of signalling traffic data units via said at least two signalling radio bearers according to predefined rules.

3. A method according to claim 2, **characterized** in that

said predefined rules are set by a network element of a radio access network of the cellular telecommunication system.

4. A method according to claim 3, **characterized** in that

said predefined rules are set by a radio network controller.

5. A method according to claim 1, **characterized** in that

said setting up and configuration of said signalling radio bearers is performed during the RRC connection establishment procedure.

6. A method according to claim 1, **characterized** in that

the method comprises steps of

- setting up of a further signalling radio bearer during the RRC connection, and

- configuring the mapping of higher layer signalling to said further signalling radio bearer and previously existing signalling radio bearers.

7. A method according to claim 1, **characterized** in that

the method comprises the step of reconfiguring the mapping of higher layer signalling to said signalling radio bearers.

8. A method according to claim 1, **characterized** in that

the method comprises the step of releasing a signalling radio bearer.

9. A method according to claim 2, **characterized** in that

in said step of routing, signalling from different core network domains is routed via separate signalling radio bearers.

10. A method according to claim 2, **characterized** in that

in said step of routing, signalling of a higher layer protocol is routed via a signalling radio bearer specific to said higher layer protocol.

11. A method according to claim 2, **characterized** in that

in said step of routing, signalling traffic of a predefined group of higher layer protocols is routed via a signalling radio bearer corresponding to said predefined group.

12. A method according to claim 2, **characterized** in that

in said step of routing, signalling traffic of higher layer protocols is routed via a signalling radio bearer based on a Quality of Service parameter attached to the higher layer protocol data.

13. A network element of a radio access network of a cellular telecommunication system, **characterized** in that

the network element is arranged to set up at least two signalling radio bearers for transmission of signalling traffic and to configure how the signalling of higher layer protocols is mapped to said signalling radio bearers.

14. A network element according to claim 13, **characterized** in that the network element is a radio network controller.

15. A mobile communication means for a cellular telecommunication system **characterized** in that

it is arranged to route radio resource control protocol messages to at least two signalling radio bearers as instructed by the cellular telecommunication system.

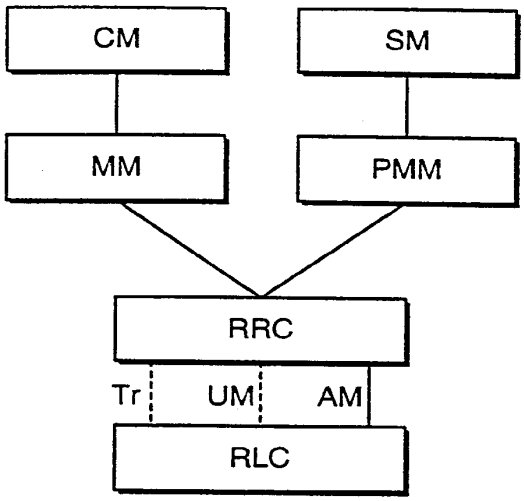


Fig. 1
PRIOR ART

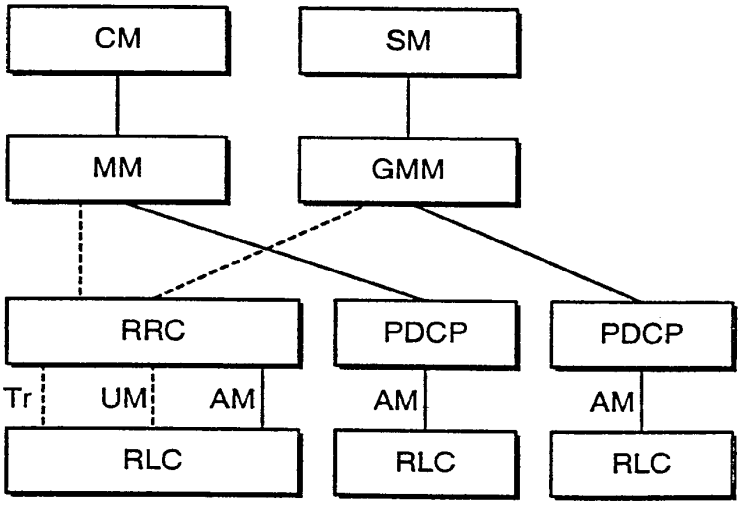


Fig. 2
PRIOR ART

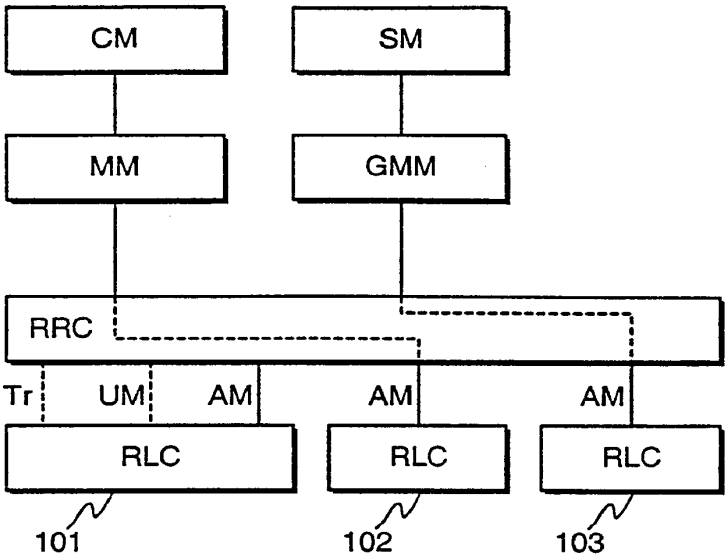


Fig. 3

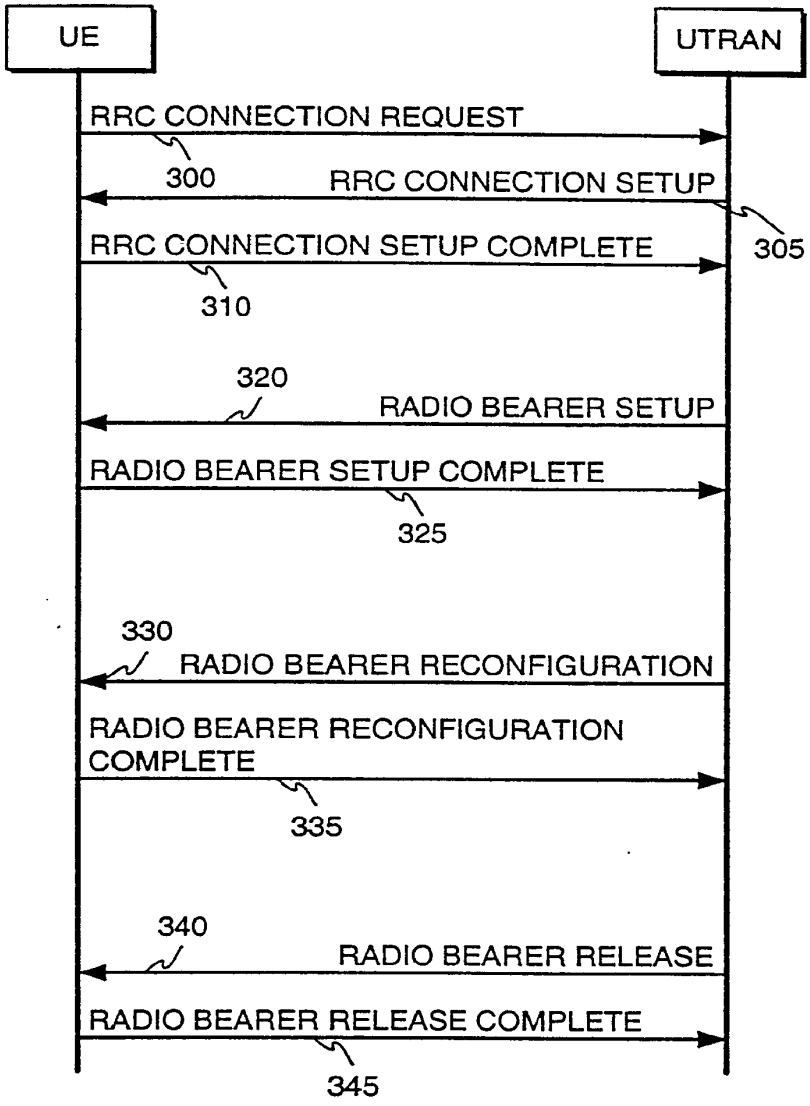

UE
UTRAN
RRC CONNECTION REQUEST
300
RRC CONNECTION SETUP
305
RRC CONNECTION SETUP COMPLETE
310
320
RADIO BEARER SETUP
RADIO BEARER SETUP COMPLETE
325
330
RADIO BEARER RECONFIGURATION
RADIO BEARER RECONFIGURATION COMPLETE
335
340
RADIO BEARER RELEASE
RADIO BEARER RELEASE COMPLETE
345

Fig. 4

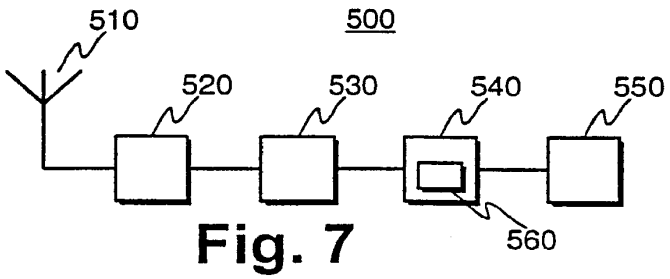

510
500
520
530
540
550
560

Fig. 7

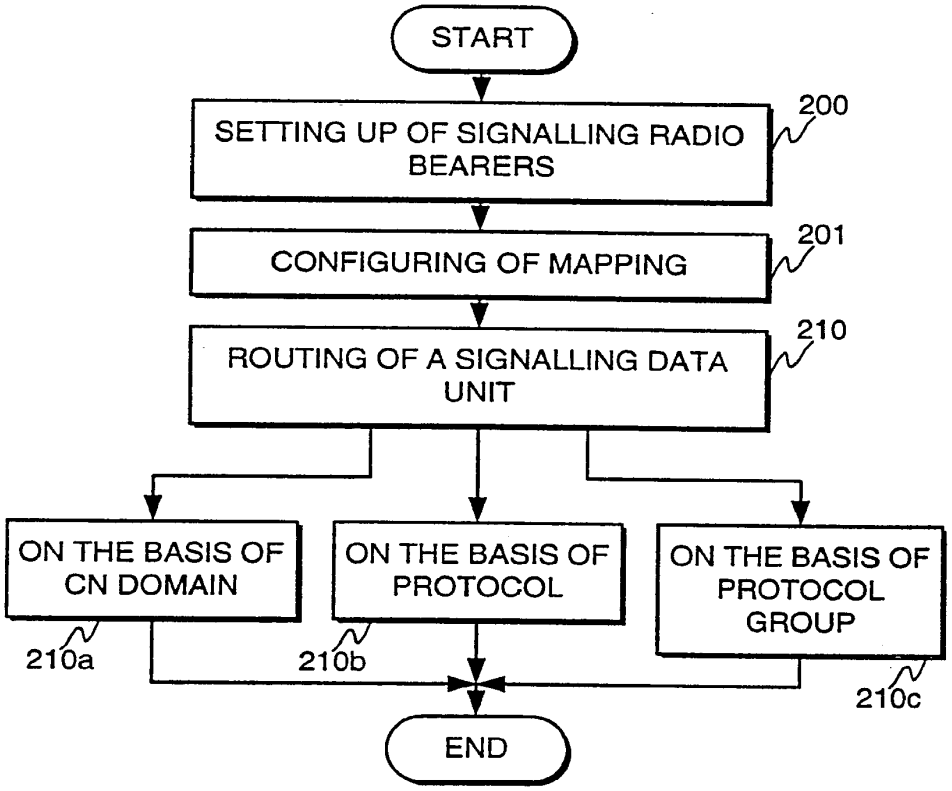

START
SETTING UP OF SIGNALLING RADIO BEARERS
200
CONFIGURING OF MAPPING
201
ROUTING OF A SIGNALLING DATA UNIT
210
ON THE BASIS OF CN DOMAIN
ON THE BASIS OF PROTOCOL
ON THE BASIS OF PROTOCOL GROUP
210a
210b
210c
END

Fig. 5

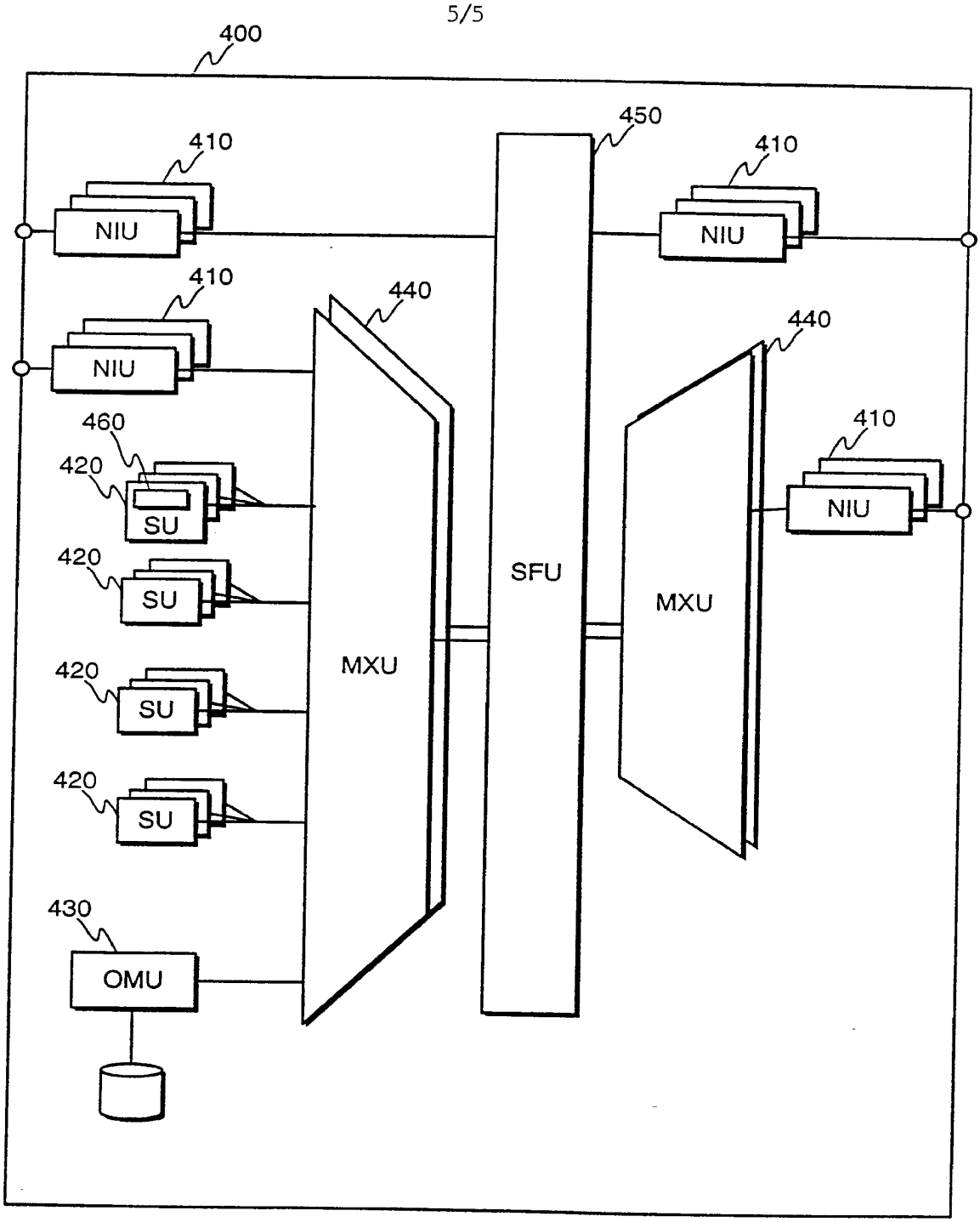

400
410
NIU
450
410
NIU
410
NIU
440
440
460
420
SU
420
SU
420
SU
420
SU
MXU
SFU
MXU
410
NIU
430
OMU

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 00/00955

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: 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)

IPC7: H04Q

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9939528 A1 (NOKIA TELECOMMUNICATIONS OY), 5 August 1999 (05.08.99), abstract ---	1-15
A	GB 2312810 A (GPT LIMITED), 6 November 1997 (06.11.97), page 2, line 5 - page 3, line 23 ---	1-15
A	WO 9315583 A1 (GPT LIMITED), 5 August 1993 (05.08.93), abstract --- --------	1-15

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* 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 application or patent but published on or after the international filing date
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"O" 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
"T" 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
"Y" 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	Date of mailing of the international search report
15 February 2001	16 -02- 2001
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Stefan Hansson/JAn Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1998)