

HAVERSTOCK & OWENS LLP
162 North Wolfe Road
Sunnyvale, CA 94086
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Customer No.: 28960

MAIL STOP PATENT APPLICATION
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Anticipated Classification of this Application:
Class: _____ Subclass: _____
Prior Application: 13/899,303
Examiner: Tu X. Nguyen
Art Unit: 2649

TRANSMITTAL OF FILING UNDER 37 C.F.R. § 1.53(b)

Sir:

This is a request for filing a Continuation application under 37 C.F.R. § 1.53(b), of pending prior application Serial No. 13/899,303 filed on May 21, 2013, of Vasudevan Ganesan, for **TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS**

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this New Application and the documents referred to are attached are being electronically transmitted to the **United States Patent and Trademark office, Alexandria, Virginia** via EFS-Web on July 22, 2015

Jonathan O. Owens
(Name of Person E-Filing)

/Jonathan O. Owens/
Signature

1. Copy of Prior Application as Filed Which is Attached

I hereby verify that the attached papers are a true copy of what is shown in my records to be the above identified prior application, including the oath or declaration originally filed. The copy of the papers of prior application as filed which are attached are as follows: 10 page(s) of specification; 3 page(s) of claims; 1 page(s) of abstract; and 2 page(s) of drawings. The original of declaration, combined with power of attorney 4 page(s), the original Assignment 2 page(s), and Power of Attorney and Revocation of Prior Powers of Attorney 1 page(s) as filed May 21, 2013 in U.S. Patent Application Serial No. 13/899,303. A copy of the Declaration, as filed in U.S. Patent Application Serial No. 13/899,303, is also hereto attached.

2. Amendments

 X Cancel in this application original claims 1-16 of the prior application before calculating the filing fee.

 X A preliminary amendment is enclosed, including changes to the specification, claims, and remarks.

3. Fee Calculation (37 C.F.R. § 1.16)

FEE CALCULATION			Basic Fee	280.00
			Search Fee	600.00
			Examination fee	720.00
			Total	\$1,600.00
Application Siz Fee	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$270.00 (\$135 for small entity) for each additional 50 sheets or fraction thereof.		Fee = \$270.00	
Claims	Number Filed	Number Extra	Rate	0.00
Total Claims	9 - 20 =	0	\$80.00	0.00
Independent Claims	2 - 3 =	0	\$420.00	0.00
Multiple Dependent claim(s), if any			\$780.00	
			Filing Fee Calculation	\$1,600.00

4. X Applicant is entitled to small entity status

50% reduction

TOTAL FEES \$800.00

5. Drawings
2 Sheets of drawings are enclosed.
X Formal.
6. Relate Back-35 U.S.C. § 120
X The specification has been amended by inserting before the first line the sentence:
– This Patent Application is a continuation application of co-pending U.S. Patent Application No. 13/899,303, filed on May 21, 2013, and entitled “TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS,” which is a continuation application of U.S. Patent Application No. 13/168,585, filed on June 24, 2011, and entitled “TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS,” which is a continuation application of U.S. Patent No. 7,991,399, filed on January 6, 2005, and entitled “TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS,” which claims benefit under 35 USC 119(e) of the filing date of U.S. provisional application number 60/534,466, filed on January 6, 2004, entitled “Radiotelephone With Automatic Switching Between Cellular And Wi Fi Networks Using Wi-Fi Signal Strength Values.”;The content of all of the above is incorporated herein by reference in its entirety.–
7. Inventorship Statement
(a) With respect to the prior co-pending U.S. application from which this application claims benefit under 35 U.S.C. § 120 the inventor(s) in this application is (are):
X the same.
(b) The inventorship for all the claims in this application is:
X the same.
8. Fee Payment Being Made At This Time
X By e-Filer via RAM
9. Method of Payment of Fees
X E-Filer via RAM charge Credit Card the amount of \$ 800.00
10. Authorization To Charge Additional Fees
X The Commissioner is hereby authorized to charge any fees or credit any overpayment during the pendency of this application to Account No. 08-1275.
11. Power of Attorney
X The power of attorney in the prior application is to: Jonathan O. Owens HAVERSTOCK & OWENS LLP, 162 North Wolfe Road, Sunnyvale, CA 94086.
a. X The power appears in the original papers as filed on May 21, 2013. A copy is attached.
b. X Address all future communications to: HAVERSTOCK & OWENS LLP
ATTN: Jonathan O. Owens
162 North Wolfe Road
Sunnyvale CA, 94086
12. Maintenance of Codependency of Prior Application
X This application is a continuation of co-pending Serial No. 13/899,303 filed on May 21, 2013.
13. X Incorporation by Reference
The entire disclosure of the prior application(s), from which a copy of the oath of declaration is supplied under Box 1, is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference.

I hereby declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: July 22, 2015

By: /Jonathan O. Owens/
Name: Jonathan O. Owens
Registration No.: 37,902

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	HAVA-00505
		Application Number	
Title of Invention	TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor 1					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Vasudevan		Ganesan			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Cupertino	State/Province	CA	Country of Residence i	US	
Mailing Address of Inventor:						
Address 1		19500 Pruneridge Ave., #6111				
Address 2						
City	Cupertino	State/Province	CA			
Postal Code	95014	Country i	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.						
Add						

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence Information of this application.			
Customer Number	28960		
Email Address	jowens@hollp.com	Add Email	Remove Email

Application Information:

Title of the Invention	TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS		
Attorney Docket Number	HAVA-00505	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter			
Total Number of Drawing Sheets (if any)	2	Suggested Figure for Publication (if any)	
Filing By Reference :			

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	HAVA-00505
		Application Number	
Title of Invention	TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS		

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	28960		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the application number blank.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	13899303	2013-05-21
Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13899303	Continuation of	13168585	2011-06-24
Prior Application Status	Patented	Remove	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number		HAVA-00505	
		Application Number			
Title of Invention		TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13168585	Continuation of	11031498	2005-01-06	7991399	2011-08-02
Prior Application Status		Remove			
Application Number		Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)
11031498		Claims benefit of provisional		60534466	2004-01-06
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	HAVA-00505
		Application Number	
Title of Invention	TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS		

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant 1			Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
Clear			
☒ Assignee	☐ Legal Representative under 35 U.S.C. 117	☐ Joint Inventor	
☐ Person to whom the inventor is obligated to assign.		☐ Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor :			
If the Applicant is an Organization check here. ☒			
Organization Name	Vasu Networks Corporation		
Mailing Address Information:			
Address 1	19500 Pruneridge Ave. #6208		
Address 2			
City	Cupertino	State/Province	CA
Country ⁱ	US	Postal Code	95014
Phone Number		Fax Number	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	HAVA-00505
		Application Number	
Title of Invention	TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS		
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.				
Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
				Remove
If the Assignee or Non-Applicant Assignee is an Organization check here.				☐
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				Add

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications				
Signature	/Jonathan O. Owens/		Date (YYYY-MM-DD)	2015-07-22
First Name	Jonathan	Last Name	Owens	Registration Number
				37902
Additional Signature may be generated within this form by selecting the Add button.				Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	HAVA-00505
		Application Number	
Title of Invention	TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS		

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	Group Art Unit:
	)	
Vasudevan Ganesan	)	Examiner:
	)	
Application No.: Not yet available	)	
	)	
Filed: Herewith	)	PRELIMINARY AMENDMENT
	)	
For: TELEPHONE WITH AUTOMATIC	)	
SWITCHING BETWEEN	)	162 North Wolfe Road
CELLULAR AND VOIP	)	Sunnyvale, California 94086
NETWORKS	)	(408) 530-9700
	)	
	)	Customer No. 28960

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENTS

Prior to an examination on the merits please amend the subject application as follows:

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

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Specification:

Please amend the paragraph at Page 1, lines 5-9 as follows:

This Patent Application is a continuation application of co-pending U.S. Patent Application No. 13/899,303, filed on May 21, 2013, and entitled “TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS,” which is a continuation application of U.S. Patent Application No. 13/168,585, filed on June 24, 2011, and entitled “TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS,” which is a continuation application of U.S. Patent No. 7,991,399, filed on January 6, 2005, and entitled “TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS,” which ~~The present application~~ claims benefit under 35 USC 119(e) of the filing date of U.S. provisional application number 60/534,466, filed on January 6, 2004, entitled “Radiotelephone With Automatic Switching Between Cellular And Wi Fi Networks Using Wi-Fi Signal Strength Values.”; ~~the~~ The content of all of the above ~~which~~ is incorporated herein by reference in its entirety.

Amendments to the Claims:

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

Claims 1-16 (canceled).

17. (new) A mobile communication device comprising:
 - a cellular communication module adapted to communicate with a wireless cellular network;
 - a Wi-Fi communication module adapted to communicate with an access point associated with a Wi-Fi network using a VoIP protocol; and
 - a switching circuit to switch operation between the cellular communication module and the Wi-Fi communication module, wherein if a Wi-Fi signal monitor detects that a Wi-Fi signal level is equal to or greater than a third predefined threshold value V_{th3} , a previously established VoIP communication continues without switching.
18. (new) The mobile communication device of claim 17, wherein said tear-down signal causes the cellular communication module to go into a sleep mode.
19. (new) The mobile communication device of claim 17, wherein upon activation of the timer, the network switching circuit causes the Wi-Fi communication module to change state from a sleep mode to an active mode.
20. (new) The mobile communication device of claim 19, further comprising:
 - a timer; and
 - a Wi-Fi signal monitor; wherein if the Wi-Fi signal monitor detects that a first Wi-Fi signal level is greater than a first predefined threshold value V_{th1} , the timer is activated to establish a first time window of a first predefined size T_1 , wherein if during T_1 the Wi-Fi signal monitor detects that a second Wi-Fi signal level is equal to or greater than V_{th1} , at the expiration of the first time window, the switching circuit sends a tear-down signal to the cellular communication module and a link-up signal to the Wi-Fi communication module, wherein said tear-down signal causes the cellular communication module to discontinue handling a previously established cellular communication and wherein said

link-up signal causes the Wi-Fi communication module to handle the previously established cellular communication via a VoIP network.

21. (new) The mobile communication device of claim 17, wherein if the Wi-Fi signal monitor detects that the Wi-Fi signal level is below a second predefined threshold value V_{th2} , the timer is activated to establish a second time window of a second predefined size T_2 , wherein V_{th3} is smaller than V_{th2} .
22. (new) The mobile communication device of claim 21 wherein if during time window T_2 , the Wi-Fi signal monitor detects that the Wi-Fi signal level is smaller than V_{th3} , upon expiration of time window T_2 , the timer unit is activated to establish a third time window of a third predefined size T_3 , where T_3 is smaller than T_2 , wherein if during time window T_3 the Wi-Fi signal monitor detects that the Wi-Fi signal level is smaller than V_{th3} , the switching circuit sends a tear-down signal to the Wi-Fi communication module and a link-up signal to the cellular communication module, wherein said tear-down signal causes the Wi-Fi communication module to discontinue handling a previously established VoIP communication and wherein said link-up signal causes the cellular communication module to handle the previously established VoIP communication via a cellular network.
23. (new) The mobile communication device of claim 22 wherein at the expiration of the predefined time period T_2 , the network switching circuit causes the cellular communication module to change state from a sleep mode to an active mode.
24. (new) A method comprising:
 - detecting a first Wi-Fi signal level;
 - activating a timer to establish a first time window of a first predefined size T_1 if the detected first Wi-Fi signal level is greater than a first predefined threshold value V_{th1} ;
 - detecting a second Wi-Fi signal level during the first time window; and
 - automatically switching a communication in progress via a cellular wireless network to a communication via a VoIP network if the second detected Wi-Fi signal level is equal to or greater than V_{th1} .

25. (new) The method of claim 24, further comprising:
- detecting a third Wi-Fi signal level;
 - establishing a second time window of a second predefined size T_2 if the third detected Wi-Fi signal level falls below a second predefined threshold value V_{th2} ;
 - detecting a fourth Wi-Fi signal level during the second time window; and
 - continuing a VoIP communication without change if the fourth detected Wi-Fi signal level is equal to or greater than a third predefined threshold value V_{th3} , wherein V_{th3} is smaller than V_{th2} .

REMARKS

This case is a continuation application of U.S. Patent Application No. 13/899,303, filed on May 21, 2013, which is a continuation application of U.S. Patent Application No. 13/168,585, filed on June 24, 2011, which is a continuation application of U.S. Patent No. 7,991,399, filed on January 6, 2005 which claims benefit under 35 U.S.C. § 119(e) of the filing date of U.S. provisional application number 60/534,466, filed on January 6, 2004. The applicants respectfully request further examination and reconsideration in view of the above preliminary amendment. By this preliminary amendment, Claims 1-16 have been canceled and new Claims 17-25 have been added. Accordingly, after the above preliminary amendment, Claims 17-25 are now pending.

Applicants respectfully submit that the claims, as amended, are now in a condition for allowance, and allowance at an early date would be appreciated. Should the Examiner have any questions or comments, they are encouraged to call the undersigned at (408) 530-9700 to discuss the same so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,
HAVERSTOCK & OWENS LLP

Dated: July 22, 2015

By: /Jonathan O. Owens/

Jonathan O. Owens

Reg. No.: 37,902

Attorneys for Applicant

TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS

CROSS-REFERENCES TO RELATED APPLICATIONS

5 **[0001]** The present application claims benefit under 35 USC 119(e) of the filing date of U.S. provisional application number 60/534,466, filed on January 6, 2004, entitled “Radiotelephone With Automatic Switching Between Cellular And Wi Fi Networks Using Wi-Fi Signal Strength Values”, the content of which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

10

[0002] A small portion of the radio frequency (RF) spectrum is assigned to each communications carrier. The assigned spectrum, therefore, must be used efficiently in order to allow the maximum number of frequency users to have access to this spectrum. Multiple access modulation techniques have been developed to provide optimum utilizing of the RF spectrum. Examples of such modulation techniques include time division multiple access (TDMA), frequency division multiple access (FDMA), and code division multiple access (CDMA).

15

[0003] There is a wide variance in the performance of wireless networks. A conventional wireless cellular network, covers a relatively large geographical area but provides a relatively low bandwidth. Such wireless networks use regulated portions of the radio spectrum and are shared by many users. The infrastructure costs of wireless networks are relatively high due to the size and complexity of the cellular network equipment.

20

[0004] Other wireless networks, such as CDMA2000-EV-DO/DV networks, offer higher bandwidth and enhanced data services, such as web browsing. However, these networks also pack many users into a relatively small portion of the regulated spectrum. Other types of radio networks are adapted to improve spectral efficiency with increased and smaller coverage areas. For example, an IEEE 802.11x (or Wi-Fi) network may transmit at speeds up to 11 Mbps using a Direct Sequence Spread Spectrum (DSSS) mode or at speeds up to 54 Mbps using an Orthogonal Frequency Division Multiplexing (OFDM) mode.

25

[0005] An access point conforming to an IEEE 802.11x (e.g., IEEE 802.11b) network may cover an area of a few hundred feet in diameter. Each such access point is connected to a larger network (e.g., Internet). In order to cover larger geographical areas, a relatively large number of IEEE 802.11x network access points and a relatively large wire-line back haul networks are required. In part, due to the back haul costs, the resulting IEEE 802.11x based network may thus be more expensive to set up and operate than a similarly based wireless network. In other words, many tradeoffs often exist between and among the coverage areas, the maximum bit-rates, and the costs associated with different types of wireless networks.

[0006] Demand for high bandwidth and quality of service (QoS) associated with mobile communication devices with full roaming capability is on the rise. One known communication device includes a cellular communication module adapted to enable communication using wireless cellular networks as well as a Wi-Fi communication module adapted to enable communication using a Voice over IP (VoIP) protocol. In such devices, to change the communication mode from cellular to VoIP or vice versa, the user has to manually change the device's setting by, e.g., pressing one ore more keys.

[0007] In yet other communication devices known to be under development, to switch the communication mode from, for example, cellular to VoIP, the cellular network first detects the position of the mobile communication device to determine whether the mobile communication device is in a Wi-Fi area. If it so detects, the cellular network sends a switching signal to the mobile communication device to enable the communication to continue the communication using the VoIP protocol. However, obtaining and maintaining accurate position of many mobile communication devices concurrently poses a challenging task. Consequently, in such systems, the switching of the call from cellular to VoIP or vice versa may result in the loss of the call.

BRIEF SUMMARY OF THE INVENTION

[0008] In accordance with the present invention, a mobile communication device is configured so as to automatically switch a communication that is already in progress using a wireless cellular network (hereinafter alternatively referred to as cellular network) to a wireless Voice over IP (VoIP) network or vice versa. The mobile communication devices is adapted to include, in part, a cellular communication module, a first antenna adapted to receive and transmit data between the mobile communication module and a cellular network,

a Wireless Fidelity (Wi-Fi) communication module, a second antenna adapted to receive and transmit data between the Wi-Fi communication module and a VoIP network, a signal monitoring circuit, and a switching circuit adapted to switch an existing in-progress communication between the cellular communication module and the Wi-Fi communication module. The second antenna and associated circuitry are maintained in on-states continuously to monitor and detect Wi-Fi signals.

[0009] If the mobile communication device is in an in-progress (i.e., pre-established) communication via its cellular communication module and through a cellular network, and the Wi-Fi antenna system detects a Wi-Fi signal having a first predefined level (strength), a timer disposed in the mobile communication device is activated to establish a first time window of a first predefined size. If the Wi-Fi signal level detected during the first time window remains equal to or greater than the first predefined level, at the expiration of the first time window, the switching circuit causes the in-progress communication to be switched from its cellular communication module to its Wi-Fi communication module and through a VoIP network without losing the in-progress communication.

[0010] In some embodiments, upon activating the timer, the Wi-Fi communication module is caused to change state from a sleep mode, during which the Wi-Fi communication module consumes relatively small amount of power, to a stand-by mode during which the Wi-Fi communication module consumes an intermediate amount of power. Subsequently, before the communication is switched to the Wi-Fi communication module, the Wi-Fi communication module is caused to be placed in a full active mode, during which the Wi-Fi communication module consumes an amount of power larger than the intermediate amount of power.

[0011] If the mobile communication device is in a pre-established communication via its Wi-Fi communication module and through a VoIP network, and the Wi-Fi antenna system detects that the level of the received Wi-Fi signal is below a second predefined value, the timer is activated to establish a second time window of a second predefined size. If the Wi-Fi signal level detected during the second time window is equal to or greater than a third predefined value, the pre-established communication via the Wi-Fi communication module is maintained without any change. If the Wi-Fi signal level detected during the second time window is less than the third predefined value, the timer is reset and reactivated to establish a third time window of a third size. If the Wi-Fi signal level detected during the third time window is less than the third predefined value, at the expiration of the third time window, the

switching circuit causes the in-progress communication to be switched from its Wi-Fi communication module to its cellular communication module and through a cellular network without losing the in-progress communication.

5 [0012] In some embodiments, upon activating the timer to establish the second time window, the cellular communication module is caused to change state from a sleep mode, during which the cellular communication module consumes relatively small amount of power, to a stand-by mode during which the cellular communication module consumes an intermediate amount of power. Subsequently, before the communication is switched to the Wi-Fi communication module, the cellular communication module is caused to be placed in a
10 full active mode, during which the cellular communication module consumes an amount of power larger than the intermediate amount of power.

[0013] In some embodiments, the Wi-Fi communication module is adapted to communicate with an access point of a Wi-Fi local area network using an 802.11x wireless protocol, and the cellular communication module is adapted to communicate with a base station of a wireless
15 cellular network using any one of GSM, CDMA, or CDMA2000 protocols.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Figure 1 is a simplified high-level block diagram of a mobile communication device, in accordance with one embodiment of the present invention.

20 [0015] Figure 2 shows Wi-Fi signal threshold level and timing window used to determine whether to switch a communication from the cellular communication module to the Wi-Fi communication module of the communication device of Figure 1, in accordance with one embodiment.

[0016] Figure 3 shows Wi-Fi signal threshold levels and timing windows used to determine
25 whether to switch a communication from the Wi-Fi communication module to the cellular communication module of the communication device of Figure 1, in accordance with one embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0017] In accordance with the present invention, a mobile communication device is configured so as to automatically switch an existing communication from a wireless cellular network (hereinafter alternatively referred to as cellular network) to a wireless Voice over IP (VoIP) network, or to switch an existing communication from a VoIP network to a cellular network. It is understood that the Wireless Fidelity (Wi-Fi) signals, as defined, for example, in IEEE 802.11x standards or other equivalent standards may be used to communicate with a Voice over IP (VoIP) network. The mobile communication device is adapted to include, in part, a cellular communication module, a first antenna adapted to receive and transmit data between the mobile communication module and a cellular network, a Wi-Fi communication module, a second antenna adapted to receive and transmit data between the Wi-Fi communication module and a VoIP network, a signal monitoring circuit, and a switching circuit adapted to switch an existing in-progress communication between the cellular communication module and the Wi-Fi communication module. The second antenna and associated circuitry are maintained in on-states continuously to monitor and detect Wi-Fi signals.

[0018] It is understood the wireless cellular network includes, in part, a multitude of base stations. Each such base station is adapted to communicate with the mobile communication device when the mobile communication device is located within the coverage area of the base station via RF signals carried over cellular network. It is also understood that each such coverage area is defined by an area centered at the base station and having a radius of, e.g., several miles. It is further understood that a Wi-Fi network may include, in part, a multitude of access points. Each such access point is adapted to communicate with the mobile communication device, when the mobile communication device is located within the coverage area of the access point, via VoIP packets. It is also understood that the mobile communication device may also include blocks adapted for computation and thus be a communication/computation device.

[0019] If the mobile communication device is in an in-progress (i.e., pre-established) communication via its cellular communication module and through a cellular network, and the Wi-Fi antenna system detects a Wi-Fi signal having a first predefined level (strength), a timer disposed in the mobile communication device is activated to establish a first time window of a first predefined size. If the Wi-Fi signal level detected during the first time window remains equal to or greater than the first predefined level, at the expiration of the

first time window, the switching circuit causes the in-progress communication to be switched from its cellular communication module to its Wi-Fi communication module and through a VoIP network without losing the in-progress communication.

[0020] In some embodiments, upon activating the timer, the Wi-Fi communication module is caused to change state from a sleep mode, during which the Wi-Fi communication module consumes relatively small amount of power, to a stand-by mode during which the Wi-Fi communication module consumes an intermediate amount of power. Subsequently, before the communication is switched to the Wi-Fi communication module, the Wi-Fi communication module is caused to be placed in a full active mode, during which the Wi-Fi communication module consumes an amount of power larger than the intermediate amount of power.

[0021] If the mobile communication device is in a pre-established communication via its Wi-Fi communication module and through a VoIP network, and the Wi-Fi antenna system detects that the level of the received Wi-Fi signal is below a second predefined value, the timer is activated to establish a second time window of a second predefined size. If the Wi-Fi signal level detected during the second time window is equal to or greater than a third predefined value, the pre-established communication via the Wi-Fi communication module is maintained without any change. If the Wi-Fi signal level detected during the second time window is less than the third predefined value, the timer is reset and reactivated to establish a third time window of a third size. If the Wi-Fi signal level detected during the third time window is less than the third predefined value, at the expiration of the third time window, the switching circuit causes the in-progress communication to be switched from its Wi-Fi communication module to its cellular communication module and through a cellular network without losing the in-progress communication.

[0022] In some embodiments, upon activating the timer to establish the second time window, the cellular communication module is caused to change state from a sleep mode, during which the cellular communication module consumes relatively small amount of power, to a stand-by mode during which the cellular communication module consumes an intermediate amount of power. Subsequently, before the communication is switched to the Wi-Fi communication module, the cellular communication module is caused to be placed in a full active mode, during which the cellular communication module consumes an amount of power larger than the intermediate amount of power.

[0023] FIG. 1 is a simplified high-level block diagram of a mobile communication device 100, in accordance with one embodiment of the present invention. Mobile communication device 100, which is adapted to automatically switch communication between cellular and VoIP networks, is shown as including, in part, a cellular communication module (hereinafter alternatively referred to as cellular module) 3 coupled to a cellular antenna 1, a Wi-Fi communication module (hereinafter alternatively referred to as Wi-Fi module) 4 coupled to a Wi-Fi antenna 2, an audio/video amplifier 5, a network switch unit 6, a timer unit 7, a Wi-Fi signal level monitor 8, a microphone 20, a speaker 21, and a display monitor 22. Mobile communication device 100 is adapted to establish and maintain communication via either a cellular module 3, through a wireless network (not shown), and/or via Wi-Fi module 4, through a VoIP network (not shown). Cellular module 3 further includes a transceiver 30 adapted to transmit signal to and receive signal from a cellular network. Wi-Fi module 4 further includes a transceiver 32 adapted to transmit signal to and receive signal from a VoIP network. Depending on the level of detected Wi-Fi signal emitted from a Wi-Fi access point, a call initially established via cellular module 3 may be switched to be handle by Wi-Fi module 4, or a call initially established via Wi-Fi module 4 may be switched to be handled by cellular module 3.

[0024] Assume that mobile communication device 100 is in communications with a cellular network and is entering the coverage area of a Wi-Fi access point adapted to transmit and receive Wi-Fi signals. As is known, a Wi-Fi access point may be used to gain access to a VoIP network. Wi-Fi antenna 2 together with Wi-Fi module 4 and Wi-Fi signal monitor 8 continuously monitor for to detect Wi-Fi signals. If a detected Wi-Fi signal level is greater than a predefined threshold value V_{th1} , Wi-Fi signal level monitor 8 activates timer 7 via signal line 10 and sends a wake-up signal to network switch unit 6 via signal line 12, thereby to change the state of network switch unit 6 from a sleep mode, during which network switch unit consumes relatively small power, to a stand-by mode, during which network switch unit consumes an intermediate amount of power. Network switch unit 6, in turn, supplies wake-up switching signals to cellular module 3 via signal line 15 and to Wi-Fi module 4 via signal line 13. This causes phone cellular module 3 and Wi-Fi module 4 to activate their respective switching modules. The detected Wi-Fi signal level may be determined, for example, by taking multiple samples of the incoming Wi-Fi signal(s) and computing a signal level from these samples. In one embodiment, an average of the amplitudes/phases of the sampled signals may be used to detect the Wi-Fi signal level.

[0025] If the detected Wi-Fi signal level is greater than V_{th1} , timer unit 7 is activated to establish a first time window of a first predefined size T_1 , as shown in Figure 2. During time window T_1 , Wi-Fi antenna 2 together with Wi-Fi module 4 and Wi-Fi signal monitor 8 continue to monitor and detect the level of received Wi-Fi signal. If the Wi-Fi signal level detected during time window T_1 remains equal to or greater than V_{th1} , at the expiration of time window T_1 , timer unit 7 sends a cellular tear-down signal and a Wi-Fi link-up signal to the network switch unit 6 via signal line 11. In response, network switch unit 6 sends the tear-down signal to cellular module 3 via signal line 15, and sends the link-up signal to Wi-Fi module 4 via signal line 13. Network switch unit 6 also instructs audio/video amplifier 5, via signal line 14, to generate an audio/video alert signal. The generated audio alter signal is subsequently reproduced by speaker 21 via signal line 18, and the generated video alert signal is subsequently reproduced by display monitor 22 via signal line 23. The audio/video alert tones are adapted to notify the mobile communication device user of a network switch from cellular to Wi-Fi.

[0026] Cellular module 3 is adapted to terminate connection to the cellular network and to switch off connection to audio/video amplifier 5 after receiving the tear-down signal. Wi-Fi module 4 is adapted to activate connection to VoIP network and to switch on connection to audio/video amplifier 5--for passing voice signal to audio amplifier 5 and video signal to display monitor 22-- after receiving a Wi-Fi link-up signal. The previously established communication link is thus continued uninterrupted via the VoIP network and through loudspeaker 21, microphone 20 and display monitor 23.

[0027] Assume that mobile communication device 100 is in communications with a VoIP network and may be leaving the coverage area of the Wi-Fi access point. Wi-Fi antenna 2 together with Wi-Fi module 4 and Wi-Fi signal monitor 8 continuously monitor for to detect Wi-Fi signals. If the detected Wi-Fi signal level falls below a second predefined threshold value V_{th2} , Wi-Fi signal level monitor 8 activates timer 7 and sends a wake-up signal to network switch unit 6 to change the state of network switch unit 6 from the sleep mode to stand-by mode. Network switch unit 6, in turn, supplies wake-up switching signals to cellular module 3 and to Wi-Fi module 4 to enable these modules to activate their respective switching procedures.

[0028] Once activated, timer unit 7 establishes a second time window of a second predefined size T_2 , as shown in Figure 3. During time window T_2 , Wi-Fi antenna 2 together

with Wi-Fi module 4 and Wi-Fi signal monitor 8 continue to monitor and detect the level of received Wi-Fi signal. If the Wi-Fi signal level detected during time window T_2 is equal to or greater than a third predefined threshold value V_{th3} , where V_{th3} is smaller than V_{th2} , the previously established VoIP communication continues without switching.

5 **[0029]** If the Wi-Fi signal level detected during time window T_2 is smaller than V_{th3} , at the expiration of time window T_2 , timer unit 7 is reset and activated to establishes a third time window of a third predefined size T_3 , where T_3 is smaller than T_2 . If the Wi-Fi signal level detected during time window T_3 is equal to or greater than V_{th3} , the previously established VoIP communication continues without switching.

10 **[0030]** If the Wi-Fi signal level detected during time window T_3 is less than V_{th3} , at the expiration of time window T_3 , timer unit 7 sends a Wi-Fi tear-down signal and a cellular link-up signal to network switch unit 6. In response, network switch unit 6 sends the tear-down signal to Wi-Fi module 3, and sends the link-up signal to cellular module 4. Network switch unit 6 also instructs audio/video amplifier 5 to generate an audio/video alert signals. The
15 generated audio alter signals is subsequently reproduced by speaker 21, and the generated video alert signal is subsequently reproduced by display monitor 22. The audio/video alert tones are adapted to notify the mobile communication device user of a network switch from Wi-Fi to cellular

20 **[0031]** Wi-Fi module 4 is adapted to terminate connection to the VoIP network and to switch off connection to audio/video amplifier 5 after receiving the tear-down signal. Cellular module 4 is adapted to activate connection to the cellular network and to switch on connection to audio/video amplifier 5 after receiving a Wi-Fi link-up signal. The previously established communication link is thus continued uninterrupted and through loudspeaker 21, microphone 20 and display monitor 23.

25 **[0032]** In accordance with some embodiments, if the mobile communication device detects both an Wi-Fi signal from an access point and a cellular signal from a mobile cellular base station before establishing a communication link, the mobile communication device first attempts to establish communication with the Wi-Fi access point using Wi-Fi module 4.

30 **[0033]** The above embodiments of the present invention are illustrative and not limiting. Various alternatives and equivalents are possible. It is understood that the functionality associated with any blocks described above may be centralized or distributed, whether locally or remotely. It is also understood that one or more blocks of each mobile communication

device may be performed by hardware, firmware or software, or some combinations thereof. The invention is not limited by the type of cellular network, e.g., CDMA, GSM, otherwise used to carry communication. Nor is the invention limited by the VoIP network. The invention is not limited by the Wi-Fi signals, such as those defined by IEEE 802.11x, where x
5 may be a, b, g, or WiMAX used to carry VoIP communication. The invention is not limited by the type of integrated circuit(s) in which the present invention may be disposed. Nor is the invention limited to any specific type of process technology, e.g., CMOS, Bipolar, or BICMOS that may be used to manufacture the present invention. Other additions, subtractions or modifications are obvious in view of the present invention and are intended to
10 fall within the scope of the appended claims.

WHAT IS CLAIMED IS:

1 1. A mobile communication device comprising:
2 a cellular communication module adapted to communicate with a wireless
3 cellular network;
4 a Wi-Fi communication module adapted to communicate with an access point
5 associated with a Wi-Fi network using a VoIP protocol; and
6 a switching circuit adapted to automatically switch operation between the
7 cellular communication module and the Wi-Fi communication module.

1 2. The mobile communication device of claim 1 wherein said wireless
2 cellular network is selected from a group consisting of GSM, CDMA, and CDMA2000
3 wireless cellular networks.

1 3. The mobile communication device of claim 2 wherein said Wi-Fi
2 network is selected from a group consisting of an IEEE 802.11x, Wi-Fi, and WiMAX
3 networks.

1 4. The mobile communication device of claim 3 further comprising:
2 a timer; and
3 a Wi-Fi signal monitor; wherein if the Wi-Fi signal monitor detects that a first
4 Wi-Fi signal level is greater than a first predefined threshold value V_{th1} , the timer is activated
5 to establish a first time window of a first predefined size T_1 , wherein if during T_1 the Wi-Fi
6 signal monitor detects that a second Wi-Fi signal level is equal to or greater than V_{th1} , at the
7 expiration of the first time window, the switching circuit sends a tear-down signal to the
8 cellular communication module and a link-up signal to the Wi-Fi communication module,
9 wherein said tear-down signal causes the cellular communication module to discontinue
10 handling a previously established cellular communication and wherein said link-up signal
11 causes the Wi-Fi communication module to handle the previously established cellular
12 communication via a VoIP network.

1 5. The mobile communication device of claim 4 wherein said tear-down
2 signal causes the cellular communication module to go into a sleep mode.

1 6. The mobile communication device of claim 4 wherein upon activation
2 of the timer, the network switching circuit causes the Wi-Fi communication module to
3 change state from a sleep mode to an active mode.

1 7. The mobile communication device of claim 4 wherein each of said
2 first and second Wi-Fi signal levels is defined by a respective plurality of samples of received
3 Wi-Fi signal.

1 8. The mobile communication device of claim 4 wherein if the Wi-Fi
2 signal monitor detects that the Wi-Fi signal level is below a second predefined threshold
3 value V_{th2} , the timer is activated to establish a second time window of a second predefined
4 size T_2 , wherein if during time window T_2 , the Wi-Fi signal monitor detects that the Wi-Fi
5 signal level is equal to or greater than a third predefined threshold value V_{th3} , a previously
6 established VoIP communication continues without switching, wherein V_{th3} is smaller than
7 V_{th2} .

1 9. The mobile communication device of claim 8 wherein if during time
2 window T_2 , the Wi-Fi signal monitor detects that the Wi-Fi signal level is smaller than V_{th3} ,
3 upon expiration of time window T_2 , the timer unit is activated to establish a third time
4 window of a third predefined size T_3 , where T_3 is smaller than T_2 , wherein if during time
5 window T_3 the Wi-Fi signal monitor detects that the Wi-Fi signal level is smaller than V_{th3} ,
6 the switching circuit sends a tear-down signal to the Wi-Fi communication module and a
7 link-up signal to the cellular communication module, wherein said tear-down signal causes
8 the Wi-Fi communication module to discontinue handling a previously established VoIP
9 communication and wherein said link-up signal causes the cellular communication module to
10 handle the previously established VoIP communication via a cellular network.

1 10. The mobile communication device of claim 9 wherein at the expiration
2 of the predefined time period T_2 , the network switching circuit causes the cellular
3 communication module to change state from a sleep mode to an active mode.

1 11. A method comprising:
2 detecting a first Wi-Fi signal level;
3 establish a first time window of a first predefined size T_1 if the detected first
4 Wi-Fi signal level is greater than a first predefined threshold value V_{th1} ;

5 detecting a second Wi-Fi signal level during the first time window;
6 automatically switching a communication in progress via a cellular wireless
7 network to a communication via a VoIP network if the second detected Wi-Fi signal level is
8 greater than V_{th1} .

1 12. The method of claim 11 wherein said wireless cellular network is
2 selected from a group consisting of GSM, CDMA, and CDMA2000 wireless cellular
3 networks.

1 13. The method of claim 11 wherein said VoIP network is in
2 communication with a network selected from a group consisting of an IEEE 802.11x, Wi-Fi
3 and WiMAX networks.

1 14. The method of claim 11 wherein each of said first and second Wi-Fi
2 signal levels is defined by a respective plurality of samples of received Wi-Fi signal.

1 15. The method of claim 11 further comprising:
2 detecting a third Wi-Fi signal level;
3 establishing a second time window of a second predefined size T_2 if the third
4 detected Wi-Fi signal level falls below a second predefined threshold value V_{th2} ;
5 detecting a fourth Wi-Fi signal level during the second time window; and
6 continuing a VoIP communication without change if the fourth detected Wi-Fi
7 signal level is equal to or greater than a third predefined threshold value V_{th3} , wherein V_{th3} is
8 smaller than V_{th2} .

1 16. The method of claim 15 further comprising:
2 establishing a third time window of a third predefined size T_3 if the fourth
3 detected Wi-Fi signal level is less than V_{th3} ;
4 detecting a fifth Wi-Fi signal level during the third time window;
5 automatically switching a communication in progress via a VoIP wireless
6 network to a communication via a cellular network if the fifth detected Wi-Fi signal level is
7 less than V_{th3} .

TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS

ABSTRACT OF THE DISCLOSURE

[0034] A mobile communication device includes, in part, a cellular communication module, a first antenna adapted to receive and transmit data between the mobile communication module and a cellular network, a Wireless Fidelity (Wi-Fi) communication module, a second antenna adapted to receive and transmit data between the Wi-Fi communication module and a VoIP network, a signal monitoring circuit, and a switching circuit adapted to switch an existing communication from the cellular communication module to the Wi-Fi communication module or vice versa.

60388221 v1/Fig. 1/AT

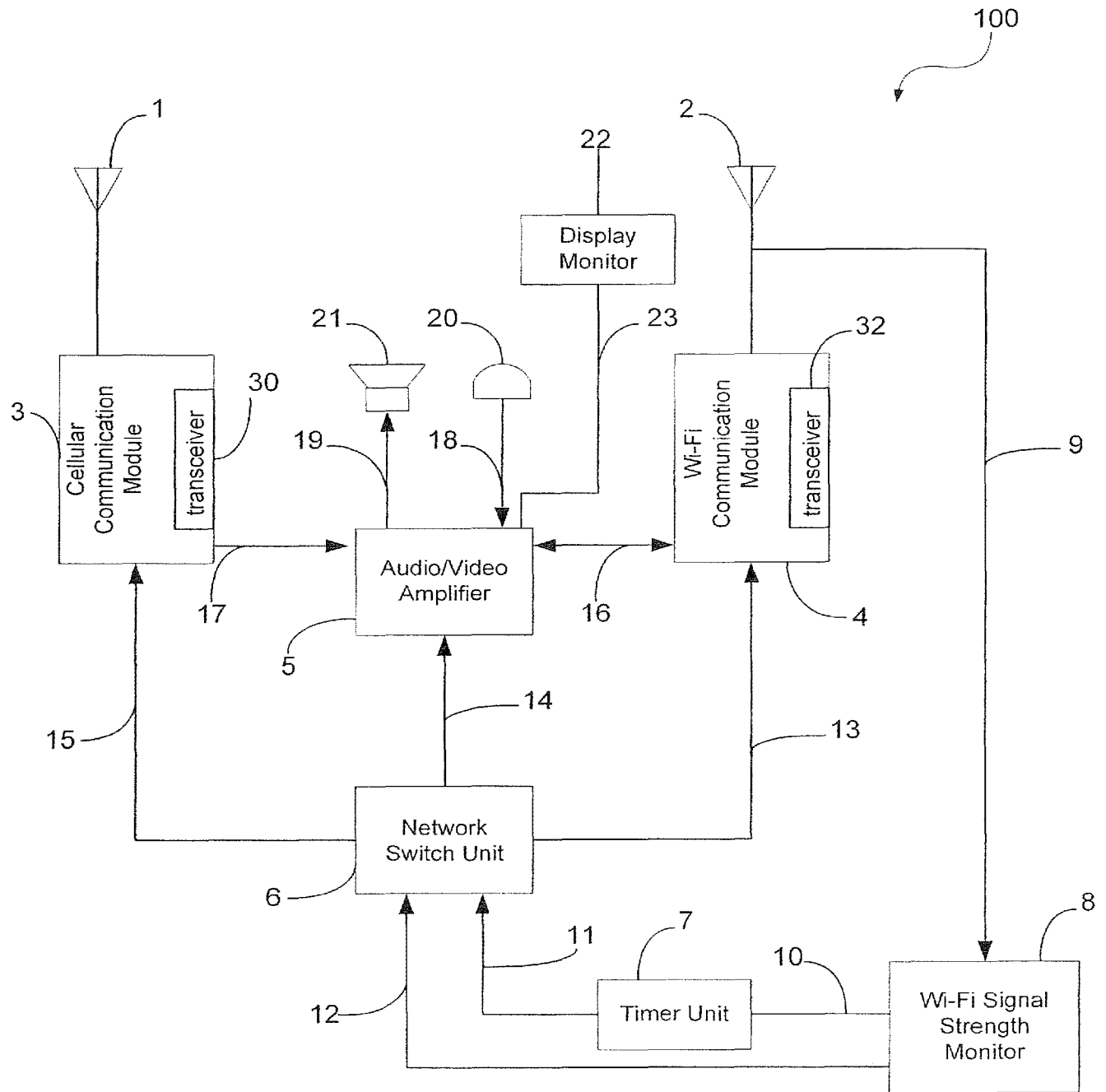


FIG. 1

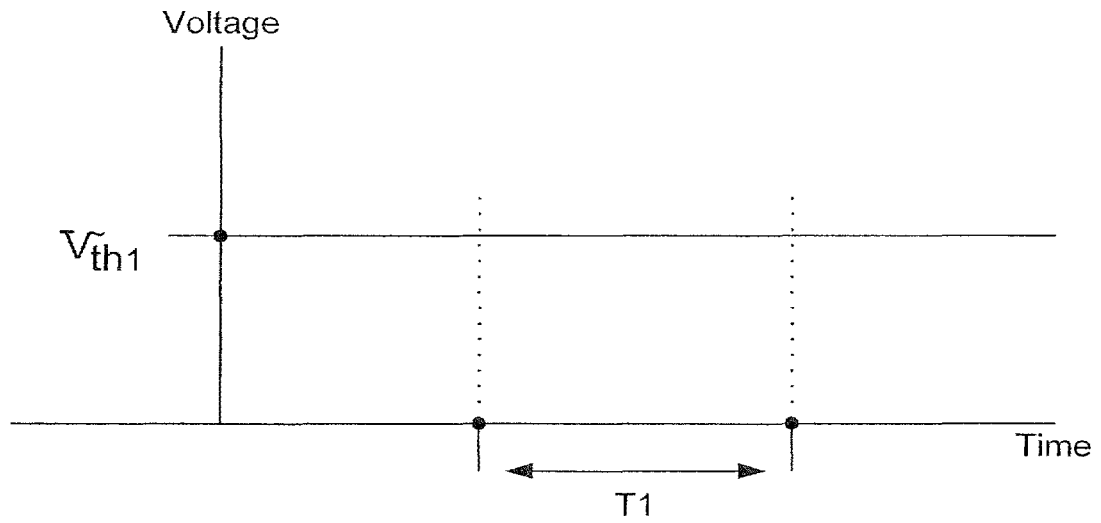


FIG. 2

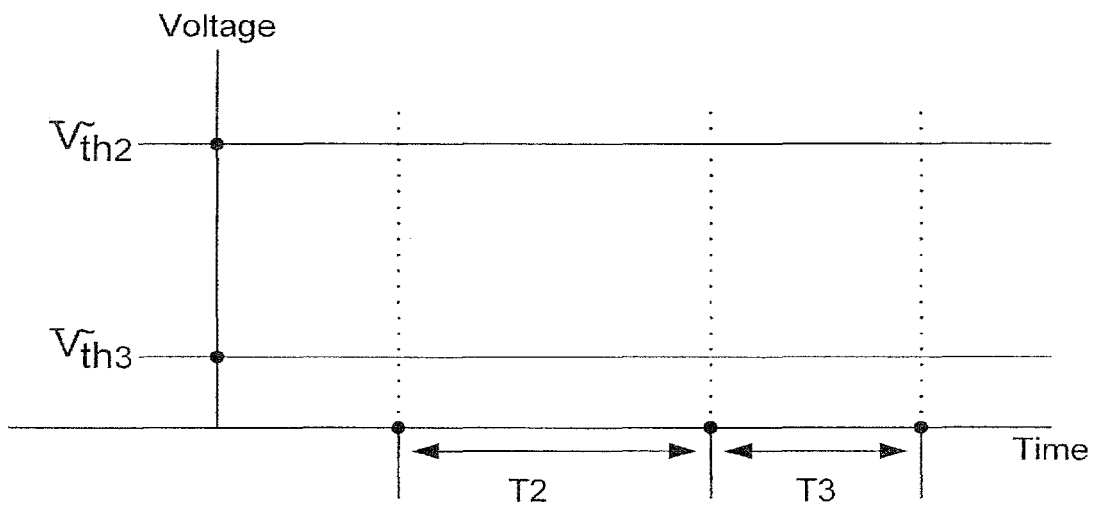


FIG. 3