

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 February 2008 (14.02.2008)

PCT

(10) International Publication Number
WO 2008/018758 A1

(51) International Patent Classification:
H04B 17/00 (2006.01)

(21) International Application Number:
PCT/KR2007/003823

(22) International Filing Date: 9 August 2007 (09.08.2007)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
10-2006-0076315 11 August 2006 (11.08.2006) KR

(71) Applicant (for all designated States except US): **SK TELECOM. CO., LTD.** [KR/KR]; 11 Euljiro 2-ga, Jung-gu, Seoul 100-999 (KR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **YIM, Cheolho** [KR/KR]; 3-5, Samcheong-dong, Jongro-gu, Seoul 110-230 (KR). **KANG, Sukyon** [KR/KR]; 307-307, Hansol Apt., Irwonbon-dong, 731, Gangnam-gu, Seoul

135-942 (KR). **PARK, Yeongho** [KR/KR]; 707-303, Tapmaeul Gyeongnam Apt., Yatap-dong, Bundang-gu, Seongnam-si, Gyeonggi-do 463-923 (KR). **PARK, Jooyul** [KR/KR]; 503-1702, Hyundai 5, Gwangjang-dong, Gwangjin-gu, Seoul 143-210 (KR). **KIM, Joungcheol** [KR/KR]; 1003-603, Byeolvit Maeul, Hwajeong 2-dong, Deokyang-gu, Goyang-si, Gyeonggi-do 412-272 (KR).

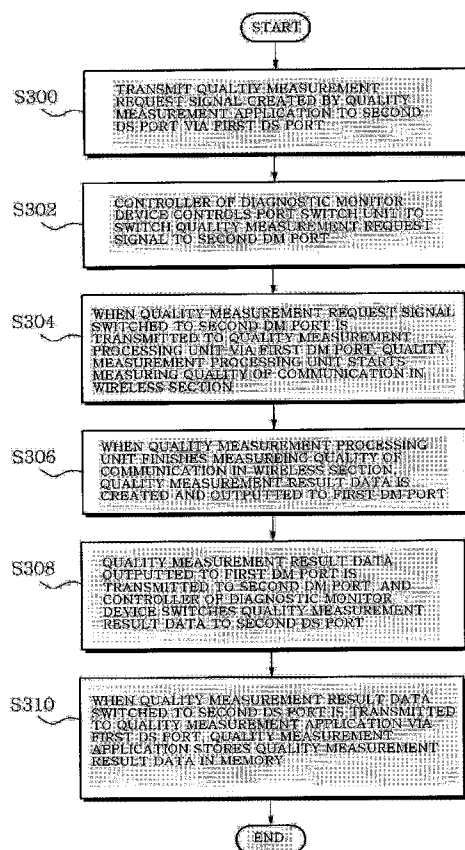
(74) Agents: **LEE, Chulhee** et al.; 5F, donggung Bldg., 647-13, Yeoksam-dong, Gangnam-gu, Seoul 135-911 (KR).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR PROVIDING AIR INTERFACE QUALITY OF SERVICE MEASUREMENT OF MOBILE COMMUNICATION NETWORK BY USING MOBILE COMMUNICATION TERMINAL



(57) Abstract: The present invention relates to a method and a system for measuring the quality of communication in a wireless section of a mobile communication network by using a mobile communication terminal. More particularly, the present invention relates to a method and a system for measuring and analyzing the quality of communication by using a mobile communication terminal, wherein a diagnostic monitor device is mounted on the mobile communication terminal, and an application for controlling the diagnostic monitor device to measure the quality and analyze the result of quality measurement is downloaded to the mobile communication terminal so that the terminal measures and analyzes the quality of communication.



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

**METHOD AND SYSTEM FOR PROVIDING AIR INTERFACE QUALITY OF
SERVICE MEASUREMENT OF MOBILE COMMUNICATION NETWORK BY USING
MOBILE COMMUNICATION TERMINAL**

5 **Technical Field**

 The present invention relates to a method and a system
for measuring the quality of communication in a wireless
section of a mobile communication network by using a mobile
communication terminal. More particularly, the present
10 invention relates to a method and a system for measuring and
analyzing the quality of communication by using a mobile
communication terminal, wherein a diagnostic monitor device
is mounted on the mobile communication terminal, and an
application for controlling the diagnostic monitor device to
15 measure the quality and analyze the result of quality
measurement is downloaded to the mobile communication
terminal so that the terminal measures and analyzes the
quality of communication.

20 **Background Art**

 As generally known in the art, mobile communication
systems have evolved from the 1st generation analog AMPS
(Advanced Mobile Phone System) type to the 2nd generation
cellular/PCS (Personal Communication Service) type. The

recent development of information communication has commercialized the 3rd generation mobile communication system, i.e. IMT-2000 (International Mobile Telecommunication 2000), based on standardization of ITU-R.

5 The IMT-2000 includes CDMA 2000 1X, 3X EV-DO, and WCDMA (Wide CDMA), and employs the IS-95C network, which has evolved from conventional IS-95A and IS-95B networks, so that it can provide wireless Internet at a maximum transmission rate of 144Kbps, which is much higher than the
10 data transmission rate supported by the IS-95A or IS-95B network (i.e. 14.4Kbps or 56Kbps). Particularly, the IMT-2000 service can not only improve the quality of conventional voice communication service and WBS (Wireless Broadcasting Service), but also can provide various
15 multimedia services (e.g. AOD, VOD) at a higher speed.

Recently, in an attempt to overcome the limit of wireless Internet services provided by the above-mentioned mobile communication systems, HPi (High Speed Portable Internet System) or Wibro (Wireless Broadband Internet
20 System) is being developed to provide subscribers on the move with ultra-high speed wireless Internet services at a lower fee. These portable Internet systems employ various types of portable terminals (e.g. laptop computers, PDAs, handheld PCs) to enable subscribers, who remain stationary

indoors or outdoors, as well as those who are moving at a low/medium speed (e.g. walking), to access Internet and use various types of information and contents. Particularly, these IP (Internet Protocol)-based wireless data systems enable subscribers moving at a speed of 60km/h to use wireless Internet, and provide a downlink transmission rate of 24Mbps or, if the MIMO (Multiple Input Multiple Output) system is applied, up to 50Mbps.

Mobile communication subscribers can not only conduct voice communication with their mobile communication terminals based on such mobile communication systems, but also wirelessly access Internet and receive texts, images, sounds, or multimedia services (e.g. moving images) via the mobile communication systems based on wireless Internet technology. As such, wireless Internet enables subscribers to access Internet via their mobile communication terminals with neither spatial nor temporal limitations, search for various types of information, and download them.

Recent development of Internet and multimedia data technologies have caused the appearance of CPs (Content Providers) who provide various types of contents, such as multimedia communication, network games, and moving image games. Consequently, an increasing number of subscribers use various services from the CPs.

The hardware of mobile communication terminals is also being developed to support various services available. Although initial models supported nothing but voice communication and short message services, mobile communication terminals now tend to be equipped with a camera so that pictures can be taken, as well as a module capable of playing sounds. Furthermore, mobile communication terminals equipped with a module for receiving satellite broadcasts have recently appeared.

Meanwhile, mobile communication providers are paying attention to provide the increasing number of mobile communication terminal users with stable mobile communication services. This requires that the quality of communication via the mobile communication terminals be measured.

In order to measure and analyze the quality of communication, mobile communication providers maintain hundreds of agents for repair and optimization. When the agents measure the quality of communication in a specific region or place, they use measuring vehicles and expensive measuring equipment. Furthermore, it takes six months to a full year to measure the quality of communication in the entire coverage area of a mobile communication provider. This means that, if the quality of communication in the

entire area has been measured, the initially measured data dates back one year, and cannot be regarded as reflecting the current quality of communication.

In addition, conventional measuring equipment causes
5 tens of thousands of dollars and is bulky and heavy so that it must be carried on a vehicle. Even small-sized measuring equipment for replacing such medium/large-sized equipment cannot be easily carried, and must interwork with a separate laptop computer for controlling the equipment and handling
10 the analysis result.

In order to solve the above-mentioned technological problems, PC-based programs for directly connecting mobile communication terminals and laptop computers via data cables and conducting measurements have been recently replacing
15 medium/large-sized measuring equipment. However, these programs have a problem in that, in order to measure the quality of communication in a specific region, laptop or desktop computers storing a measurement program must be carried together with data cables for data communication
20 with the computers.

Disclosure of the Invention

Therefore, the present invention has been made in view of the above-mentioned problems, and the present invention

provides a method and a system for measuring and analyzing the quality of communication by using a mobile communication terminal, wherein a diagnostic monitor device is mounted on the mobile communication terminal, and an application for
5 controlling the diagnostic monitor device to measure the quality and analyze the result of quality measurement is downloaded to the mobile communication terminal so that the terminal measures and analyzes the quality of communication.

According to an aspect of the present invention, there
10 is provided a method for measuring quality of communication in a wireless section by a mobile communication terminal, the method including the steps of (a) switching a quality measurement request signal created by a quality measurement application and transmitting the signal to a diagnostic
15 monitor port; (b) transmitting the quality measurement request signal, the quality measurement request signal having been transmitted to the diagnostic monitor port, to a quality measurement processing unit and measuring quality of communication in the wireless section; (c) creating quality
20 measurement result data and outputting the data to the diagnostic monitor port when the quality measurement processing unit finishes measuring quality of communication in the wireless section; (d) switching the quality measurement result data, the quality measurement result data

having been outputted to the diagnostic monitor port, and transmitting the data to the quality measurement application; and (e) receiving the quality measurement result data by the quality measurement application and
5 storing the data in a memory.

According to another aspect of the present invention, there is provided a method for measuring quality of communication in a wireless section by a mobile communication terminal using a diagnostic monitor device,
10 the method including the steps of (a) transmitting a quality measurement request signal created by a quality measurement application of the mobile communication terminal to a second data service port of the diagnostic monitor device via a first data service port of the mobile communication
15 terminal; (b) switching the quality measurement request signal, the quality measurement request signal having been transmitted to the second data service port, to a second diagnostic monitor port of the diagnostic monitor device by the diagnostic monitor device; (c) transmitting the quality
20 measurement request signal, the quality measurement request signal having been switched to the second diagnostic monitor port, to a quality measurement processing unit via a first diagnostic monitor port of the mobile communication terminal by the diagnostic monitor device; (d) creating quality

measurement result data by the quality measurement processing unit after finishing measuring quality of communication in the wireless section, outputting the data to the first diagnostic monitor port, and transmitting the data to the second diagnostic monitor port; (e) switching the quality measurement result data, the quality measurement result data having been transmitted to the second diagnostic monitor port, to the second data service port by the diagnostic monitor device; and (f) transmitting the quality measurement result data, the quality measurement result data having been switched to the second data service port, to the mobile communication terminal via the first data service port by the diagnostic monitor device.

According to another aspect of the present invention, there is provided a diagnostic monitor device mounted on a mobile communication terminal to transmit/receive a signal for measuring quality of communication in a wireless section by the mobile communication terminal, the diagnostic monitor device including a communication interface having a second data service port of the diagnostic monitor device and a second diagnostic monitor port of the diagnostic monitor device so that signals transmitted/received between the mobile communication terminal and the diagnostic monitor device are inputted/outputted, the second data service port

receiving a quality measurement request signal transmitted from a first data service port of the mobile communication terminal, the second diagnostic monitor port receiving quality measurement result data transmitted from a first
5 diagnostic monitor port of the mobile communication terminal; a port switch unit for providing a switch for switching a signal inputted to the second data service port to the second diagnostic monitor or switching a signal inputted to the second diagnostic monitor port to the second
10 data service port; and a controller for controlling the port switch unit to switch the quality measurement request signal, the quality measurement request signal having been inputted to the second data service port via the first data service port, to the second diagnostic monitor port, the controller
15 controlling the port switch unit to switch the quality measurement result data, the quality measurement result data having been inputted to the second diagnostic monitor port via the first diagnostic monitor port, to the second data service port.

20

Brief Description of the Drawings

The foregoing and other objects, features, and advantages of the present invention will become more apparent from the following detailed description when taken

in conjunction with the accompanying drawings in which:

FIG. 1 shows the brief internal structure of a mobile communication terminal adapted to measure the quality of communication in a wireless section of a mobile communication network according to a preferred embodiment of the present invention;

FIG. 2 shows the brief internal structure of a diagnostic monitor device mounted on a mobile communication terminal to measure the quality of communication in a wireless section of a mobile communication network according to a preferred embodiment of the present invention; and

FIG. 3 is a flowchart showing steps for measuring the quality of communication by using a diagnostic monitor device according to a preferred embodiment of the present invention.

Best Mode for Carrying Out the Invention

Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. It is to be noted that the same reference numerals are used to designate the same elements throughout the specification. In addition, detailed descriptions of known functions and configurations incorporated herein is omitted to avoid making the subject

matter of the present invention unclear.

It will be assumed in the following description that a CDMA (Code Division Multiple Access) 2000 system is used as the mobile communication system. However, this assumption is
5 just for the purpose of convenience of description, and does not limit the present invention in any manner.

FIG. 1 shows the brief internal structure of a mobile communication terminal adapted to measure the quality of communication in a wireless section of a mobile
10 communication network according to a preferred embodiment of the present invention.

The mobile communication terminal 100 adapted to measure the quality of communication in a wireless section of a mobile communication network according to a preferred
15 embodiment of the present invention includes a microprocessor 110; a memory 120; a program storage unit 130; a quality measurement processing unit 140; a diagnostic monitor device interworking unit 150; a user interface unit 160; a display unit 170; a first communication interface
20 180; a first DS (Data Service) port 182; and a first DM (Diagnostic Monitor) port 184. The mobile communication terminal 100 can access Internet via a mobile communication network by using an Internet access protocol or a wireless Internet access browser, such as WAP (Wireless Application

Protocol), MIE (Microsoft Internet Explorer) based on HTML using HTTP, HDPT (Handheld Device Transport Protocol), "i-Mode" of NTT DOCOMO Inc., or "NATE" of SK Telecom., Inc. Among the Internet access protocols used by the mobile communication terminal 100, the MIE uses m-HTML, which is obtained by slightly modifying and condensing the HTML, and the i-Mode uses c-HTML (compact HTML) which is a subset of the HTML.

The microprocessor 110 controls the overall operation of the mobile communication terminal 100 as it transmits/receives voice data and measure the quality of communication. Particularly, when the user drives a quality measurement application and makes an input for measuring the quality of communication via the user interface unit 160, the microprocessor 110 controls relevant components so that the quality measurement application creates a quality measurement request signal, which is transmitted to the diagnostic monitor device 200 via the first DS port 182, and that the quality measurement processing unit 140 creates quality measurement result data, which is transmitted to the diagnostic monitor device 200 via the first DM port 184.

The memory 120 includes an EEPROM (Electrically Erasable Programmable Read Only Memory), a flash memory, and a RAM in order to store basic programs necessary for driving

of the mobile communication terminal 100. The flash memory contains a program storage unit 130 for storing basic programs, including a real-time operating system, mobile communication terminal call processing software, multimedia coloring software, and a short message application for composing and checking short messages, as well as a quality measurement application for controlling the quality measurement processing unit 140 and the diagnostic monitor device interworking unit 150 to measure the quality of communication by the mobile communication terminal 100. The software of the program storage unit 130 is loaded onto the RAM and driven.

The quality measurement application according to the present invention refers to a program for measuring and analyzing the quality of communication by the mobile communication terminal 100. When the user executes the quality measurement application, the diagnostic monitor device interworking unit 150 is used to check if the diagnostic monitor device 200 is mounted on the mobile communication terminal 100. If not, a warning message is displayed to inform that the diagnostic monitor device 200 must be mounted. The quality measurement application receives an input of signals requesting measurement collection from the user of the mobile communication

terminal, creates a quality measurement request signal, analyzes quality measurement result data consisting of raw data, creates a graph together with a description of corresponding parameters, and displays it on the display
5 unit 170 of the mobile communication terminal 100.

The quality measurement processing unit 140 according to a preferred embodiment of the present invention receives a quality measurement request signal from the first DM port 184, measures the quality of communication in a wireless
10 section of the mobile communication network used by the mobile communication terminal 100, creates data regarding the quality measurement result after the measurement is over, and outputs the data to the first DM port 184.

The diagnostic monitor interworking unit 150 according to a preferred embodiment of the present invention checks if
15 the diagnostic monitor device 200 is connected to the mobile communication terminal 100 under the control of the microprocessor 110, causes the mobile communication terminal 100 and the diagnostic monitor device 200 to interwork with
20 each other based on an RS-232C protocol so that the quality measurement request signal, which has been inputted from the second DM port 214 via the first DM port 184, is transmitted to the quality measurement processing unit 140, and that the quality measurement result data outputted to the first DM

port 184 by the quality measurement processing unit 140 is transmitted to the diagnostic monitor device 200 via the second DM port 214.

5 The user interface unit 160 has numeric keys for inputting numbers (e.g. telephone numbers), character keys, and function keys for calling specific functions. The mobile communication terminal 100 relies on the user interface unit 160 to compose short messages.

10 The user interface unit 160 according to a preferred embodiment of the present invention assigns keys needed by the quality measurement application to measure the quality of communication in a wireless section.

For example, the numeric keys of the user interface unit 160 are used to input numbers before the quality measurement application is run. After the quality measurement application is driven and numeric key "1" is designated as a quality measurement start key, the quality measurement application creates a quality measurement request signal if the user presses "1".

20 The display unit 170 according to a preferred embodiment of the present invention displays the operating conditions of the mobile communication terminal 100, including power consumption, radio wave receiving intensity, date, and time. The display unit 170 provides a screen

showing menu items for running the application, as well as a screen for downloading various content applications by the mobile communication terminal 100 during a wireless data service. The display unit 170 displays the quality measurement application on the screen, as well as tabulated communication quality information created by the quality measurement application after analyzing the communication quality result data together with a description of corresponding parameters.

10 The first communication interface 180 according to a preferred embodiment of the present invention provides a path of signals transmitted/received by the mobile communication terminal 100 for communication with an external device. The communication interface of the mobile communication terminal 100 generally consists of a number of pins.

For example, the communication interface of the mobile communication terminal 100 is of a port type consisting of 24 pins, and is connected to an external device via serial cables.

20 The first communication interface 180 according to a preferred embodiment of the present invention includes a first DS port 182 and a first DM port 184 acting as communication interfaces, to which some of the pins of the

first communication interface 180 are assigned to be used.

The first DS port 182 acts as a communication interface for transmitting various types of signals created by the mobile communication terminal 100 to an external
5 device and receiving various types of signals inputted from the external device. According to the present invention, the first DS port 182 provides a path for transmitting a quality measurement request signal created by the quality measurement application to the diagnostic monitor device 200
10 and receiving quality measurement result data inputted from the diagnostic monitor device 200.

The first DM port 184 acts as a communication interface for receiving a signal instructing the mobile communication terminal 100 to measure quality of
15 communication in a wireless section and outputting the measurement result. According to the present invention, the first DM port 184 provides a path for receiving a quality measurement request signal inputted from the diagnostic monitor device 200 and transmitting the quality measurement
20 result data to the diagnostic monitor device 200.

Detailed descriptions of known configurations or functions shown in FIG. 1 is omitted to avoid making the subject matter of the present invention unclear.

FIG. 2 shows the brief internal structure of a

diagnostic monitor device mounted on a mobile communication terminal to measure the quality of communication in a wireless section of a mobile communication network according to a preferred embodiment of the present invention.

5 The diagnostic monitor device 200 according to a preferred embodiment of the present invention includes a second communication interface 210, a second DS port 212, a second DM port 214, a port switch unit 220, and a controller 230.

10 The second communication interface 210 according to a preferred embodiment of the present invention is connected to the first communication interface so that the diagnostic monitor device 200 is mounted on the mobile communication terminal 100, and includes a second DS port 212 and a second
15 DM port 214.

 As has been described with reference to the first DS port 182 and the first DM port 184 shown in FIG. 1, some of the pins of the second communication interface 210 are assigned to the second DS port 212 and the second DM port
20 214 to be used.

 According to the present invention, the first and second DS ports 182 and 212 correspond to each other, and so do the first and second DM ports 184 and 214. Therefore, the first and second communication interfaces 180 and 210

preferably have the same number of pins, which correspond to each other one by one. Alternatively, the second communication interface 210 has the same number of pins assigned to the first DS port 182 and the first DM port 184.

5 For example, assuming that the first communication interface 180 has a total of 24 pins and that the first DS port 182 and the first DM port 184 have 8 pins assigned thereto, respectively, the second communication interface 210 consists of a total of 16 pins that have been assigned
10 to the first DS port 182 and the first DM port 184. In this case, each pin is implemented at a location where the second DM port 212 and the second DM port 214 correspond to the first DS port 182 and the first DM port 184, respectively.

The port switch unit 220 according to a preferred
15 embodiment of the present invention has switches for switching signals inputted to the second DS port 212 to the second DM port 214 under the control of the controller 230, or switching data inputted to the second DM port 214 to the second DS port 212.

20 The controller 230 according to a preferred embodiment of the present invention controls every component of the diagnostic monitor device 200. Particularly, when a quality measurement request signal is inputted to the second DS port 212, the controller 230 controls the port switch unit 220 to

switch the quality measurement request signal to the second DM port 214. When quality measurement result data is inputted to the second DM port 214, the controller 230 controls the port switch unit 220 to switch the data to the second DS port 212.

Considering that the DM port 340 of the mobile communication terminal 100 is generally adapted to receive a command from an external terminal (e.g. laptop or desktop PC) to be driven, the diagnostic monitor device 200 enables the mobile communication terminal 100 to act as an external terminal.

FIG. 3 is a flowchart showing steps for measuring the quality of communication by using a diagnostic monitor device according to a preferred embodiment of the present invention.

In order to measure the quality of communication in a wireless section, the user of the mobile communication terminal mounts the diagnostic monitor device 200 on the mobile communication terminal 100 and runs the quality measurement application.

The quality measurement application may be downloaded from a specific server, which stores the application, after wirelessly accessing the server. Alternatively, the quality measurement application may be downloaded to the mobile

communication terminal 100 from an external device (e.g. laptop or desktop PC), which stores the application, via a serial cable.

The quality measurement application may also be
5 downloaded after the diagnostic monitor device 200 is mounted. If no diagnostic monitor device 200 has been mounted after the mobile communication terminal 100 runs the quality measurement application, the quality measurement application preferably display a warning message informing
10 that no diagnostic monitor device 200 has been mounted.

The quality measurement application creates a quality measurement request signal based on the input of the mobile communication terminal user, and transmits the signal to the second DS port 212 of the diagnostic monitor device 200 via
15 the first DS port 182 (S300).

After the quality measurement request signal is inputted to the second DS port 212, the controller 230 of the diagnostic monitor device 200 controls the port switch unit 220 to switch the quality measurement request signal to
20 the second DM port 214 (S302).

After the quality measurement request signal is switched to the second DM port 214 and transmitted to the quality measurement processing unit 140 via the first DM port 184, the quality measurement processing unit 140 begins

to measure the quality of communication in the wireless section (S304).

The diagnostic monitor device interworking unit 150 causes the first DM port 184 of the mobile communication terminal 100 and the second DM port 214 of the diagnostic monitor device 200 to interwork with each other based on the RS-232C protocol. As a result, the quality measurement request signal, which has been switched from the second DS port 212 to the second DM port 214, is transmitted to the quality measurement processing unit 140 via the first DM port 184.

In order to measure the quality of communication in the wireless section, the quality measurement processing unit 140 measures not only the signal, TA (Temporal Analyzer), and finger of the mobile communication terminal 100, but also the signaling message created by the mobile communication terminal 100. These parameters created by the mobile communication terminal 100 to measure the quality of communication in the wireless section are widely known in the art, and detailed description thereof will be omitted herein.

After the quality measurement processing unit 140 finishes measuring the quality of communication in the wireless section, data regarding the quality measurement

result is created and outputted to the first DM port 184 (S306).

After being outputted to the first DM port 184, the quality measurement result data is transmitted to the second
5 DM port 214, and the controller 230 of the diagnostic monitor device 200 controls the port switch unit 220 to switch the quality measurement result data to the second DS port 212 (S308).

After being switched to the second DS port 212, the
10 quality measurement result data is transmitted to the quality measurement application via the first DS port 182. Then, the quality measurement application stores the quality measurement result data in the memory 120 of the mobile communication terminal 100 (S310).

15 The quality measurement application loads and analyzes the quality measurement result data stored in the memory 120 when the user of the mobile communication terminal makes an input. Then, the application displays the result of analysis, particularly tabulated communication quality information, on
20 the screen of the display unit 170 together with a description of corresponding parameters.

Although the present invention has been described on an assumption that the diagnostic monitor device 200 is mounted on the mobile communication terminal 100 to measure

the quality of communication in a wireless section, the quality measurement request signal created by the quality measurement application of the mobile communication terminal 100 may be switched inside the mobile communication terminal
5 and transmitted to the DM port of the mobile communication terminal so that the quality measurement processing unit 140 measures the quality of communication in the wireless section.

In addition, the quality measurement result data
10 stored in the memory 120 of the mobile communication terminal 100 may be transmitted to a separate server for detailed analysis, in addition to the analysis by the quality measurement application.

For example, a server for storing and managing the
15 communication quality by the mobile communication terminal 100 (hereinafter, referred to as a communication quality management server) is installed on the mobile communication network, and one of the function keys provided by the quality measurement application contains the URL of the
20 communication quality management server so that, when the mobile communication terminal user selects the function key, the mobile communication terminal 100 accesses the communication quality management server via wireless Internet by using the mobile communication network and

uploads the quality measurement result data stored therein.

Industrial Applicability

As can be seen from the foregoing, according to the
5 present invention, the mobile communication terminal alone
is enough to measure and analyze the quality of
communication so that mobile communication providers can
easily measure, analyze, and maintain the quality of
communication.

10

While this invention has been described in connection
with what is presently considered to be the most practical
and exemplary embodiment, it is to be understood that the
invention is not limited to the disclosed embodiment and the
15 drawings, but, on the contrary, it is intended to cover
various modifications and variations within the spirit and
scope of the appended claims.

Claims

1. A method for measuring quality of communication in a wireless section by a mobile communication terminal, the method comprising the steps of:

5 (a) switching a quality measurement request signal created by a quality measurement application and transmitting the signal to a diagnostic monitor port;

 (b) transmitting the quality measurement request signal, the quality measurement request signal having been
10 transmitted to the diagnostic monitor port, to a quality measurement processing unit and measuring quality of communication in the wireless section;

 (c) creating quality measurement result data and outputting the data to the diagnostic monitor port when the
15 quality measurement processing unit finishes measuring quality of communication in the wireless section;

 (d) switching the quality measurement result data, the quality measurement result data having been outputted to the diagnostic monitor port, and transmitting the data to the
20 quality measurement application; and

 (e) receiving the quality measurement result data by the quality measurement application and storing the data in a memory.

2. The method as claimed in claim 1, further comprising a step of (f) analyzing the quality measurement result data by the quality measurement application, obtaining communication quality information as a result of analysis, and displaying the information on a screen of the mobile communication terminal after step (e).

3. A method for measuring quality of communication in a wireless section by a mobile communication terminal using a diagnostic monitor device, the method comprising the steps of:

(a) transmitting a quality measurement request signal created by a quality measurement application of the mobile communication terminal to a second data service port of the diagnostic monitor device via a first data service port of the mobile communication terminal;

(b) switching the quality measurement request signal, the quality measurement request signal having been transmitted to the second data service port, to a second diagnostic monitor port of the diagnostic monitor device by the diagnostic monitor device;

(c) transmitting the quality measurement request signal, the quality measurement request signal having been switched to the second diagnostic monitor port, to a quality

measurement processing unit via a first diagnostic monitor port of the mobile communication terminal by the diagnostic monitor device;

(d) creating quality measurement result data by the
5 quality measurement processing unit after finishing measuring quality of communication in the wireless section, outputting the data to the first diagnostic monitor port, and transmitting the data to the second diagnostic monitor port;

10 (e) switching the quality measurement result data, the quality measurement result data having been transmitted to the second diagnostic monitor port, to the second data service port by the diagnostic monitor device; and

(f) transmitting the quality measurement result data,
15 the quality measurement result data having been switched to the second data service port, to the mobile communication terminal via the first data service port by the diagnostic monitor device.

20 4. The method as claimed in claim 3, wherein the quality measurement application is adapted to check whether or not the diagnostic monitor device is mounted on the mobile communication terminal, display a warning message informing that the diagnostic monitor device must be mounted

when no diagnostic monitor device has been mounted, analyze the quality measurement result data, create a corresponding graph, and display the graph on a screen of the mobile communication terminal together with a description of
5 corresponding parameters.

5. The method as claimed in claim 3, wherein, in step (c), a diagnostic monitor device interworking unit of the mobile communication terminal causes the first diagnostic
10 monitor port and the second diagnostic monitor port to interwork with each other via an RS-232C protocol so that the quality measurement request signal transmitted to the second diagnostic monitor port is transmitted to the quality measurement processing unit via the first diagnostic monitor
15 port.

6. The method as claimed in claim 3, further comprising a step of (g) storing the quality measurement result data by the mobile communication terminal after
20 receiving the data, analyzing the quality measurement result data by the quality measurement application, and displaying communication quality information created as a result of analysis on a screen of the mobile communication terminal after step (f).

7. The method as claimed in claim 6, wherein the mobile communication terminal is adapted to transmit the quality measurement result data stored in the mobile communication terminal to a communication quality management server via a mobile communication network.

8. The method as claimed in claim 3, wherein the quality measurement processing unit is adapted to measure quality of communication in the wireless section when the quality measurement request signal created by the quality measurement application is received, and create quality measurement result data after the measurement of quality of communication in the wireless section is completed.

15

9. A diagnostic monitor device mounted on a mobile communication terminal to transmit/receive a signal for measuring quality of communication in a wireless section by the mobile communication terminal, the diagnostic monitor device comprising:

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a communication interface having a second data service port of the diagnostic monitor device and a second diagnostic monitor port of the diagnostic monitor device so that signals transmitted/received between the mobile

communication terminal and the diagnostic monitor device are inputted/outputted, the second data service port receiving a quality measurement request signal transmitted from a first data service port of the mobile communication terminal, the
5 second diagnostic monitor port receiving quality measurement result data transmitted from a first diagnostic monitor port of the mobile communication terminal;

a port switch unit for providing a switch for switching a signal inputted to the second data service port
10 to the second diagnostic monitor or switching a signal inputted to the second diagnostic monitor port to the second data service port; and

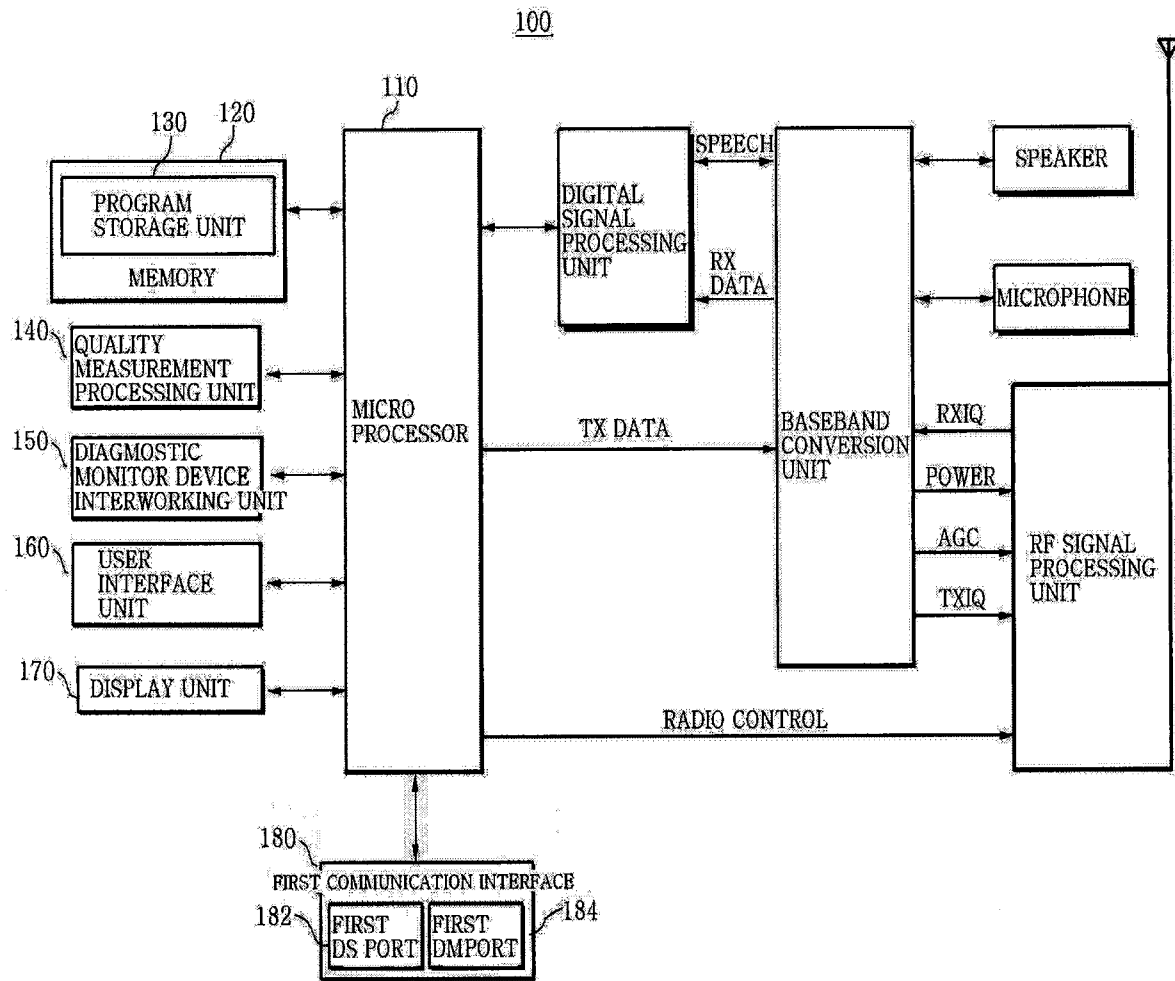
a controller for controlling the port switch unit to switch the quality measurement request signal, the quality
15 measurement request signal having been inputted to the second data service port via the first data service port, to the second diagnostic monitor port, the controller controlling the port switch unit to switch the quality measurement result data, the quality measurement result data
20 having been inputted to the second diagnostic monitor port via the first diagnostic monitor port, to the second data service port.

10. The diagnostic monitor device as claimed in claim

9, wherein the communication interface has pins corresponding to pins of a communication interface of the mobile communication terminal, and the first data service port and the first diagnostic monitor port correspond to the
5 second data service port and the second diagnostic monitor port one by one.

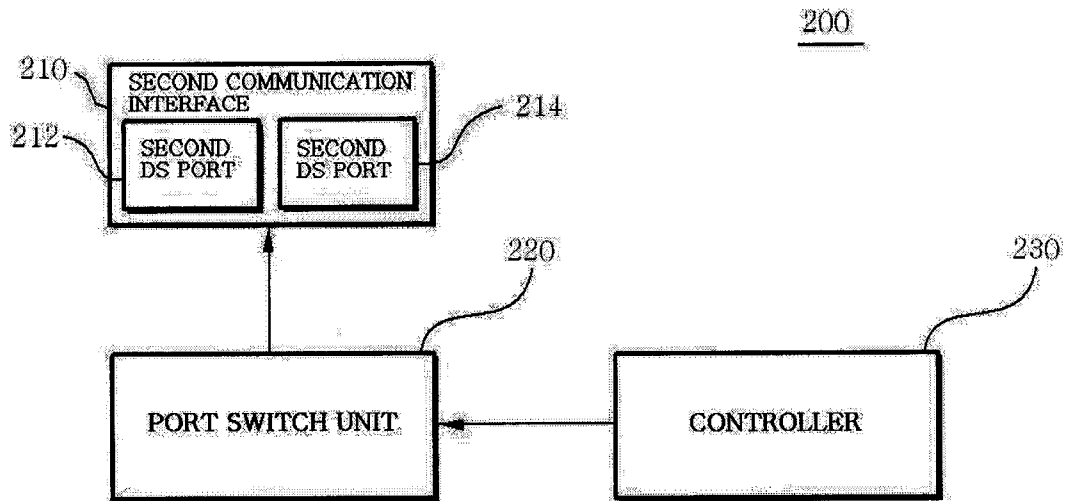
11. The diagnostic monitor device as claimed in claim 9, wherein the second diagnostic monitor port is adapted to
10 interwork with the first diagnostic monitor port via an RS-232C protocol by means of a diagnostic monitor device interworking unit of the mobile communication terminal.

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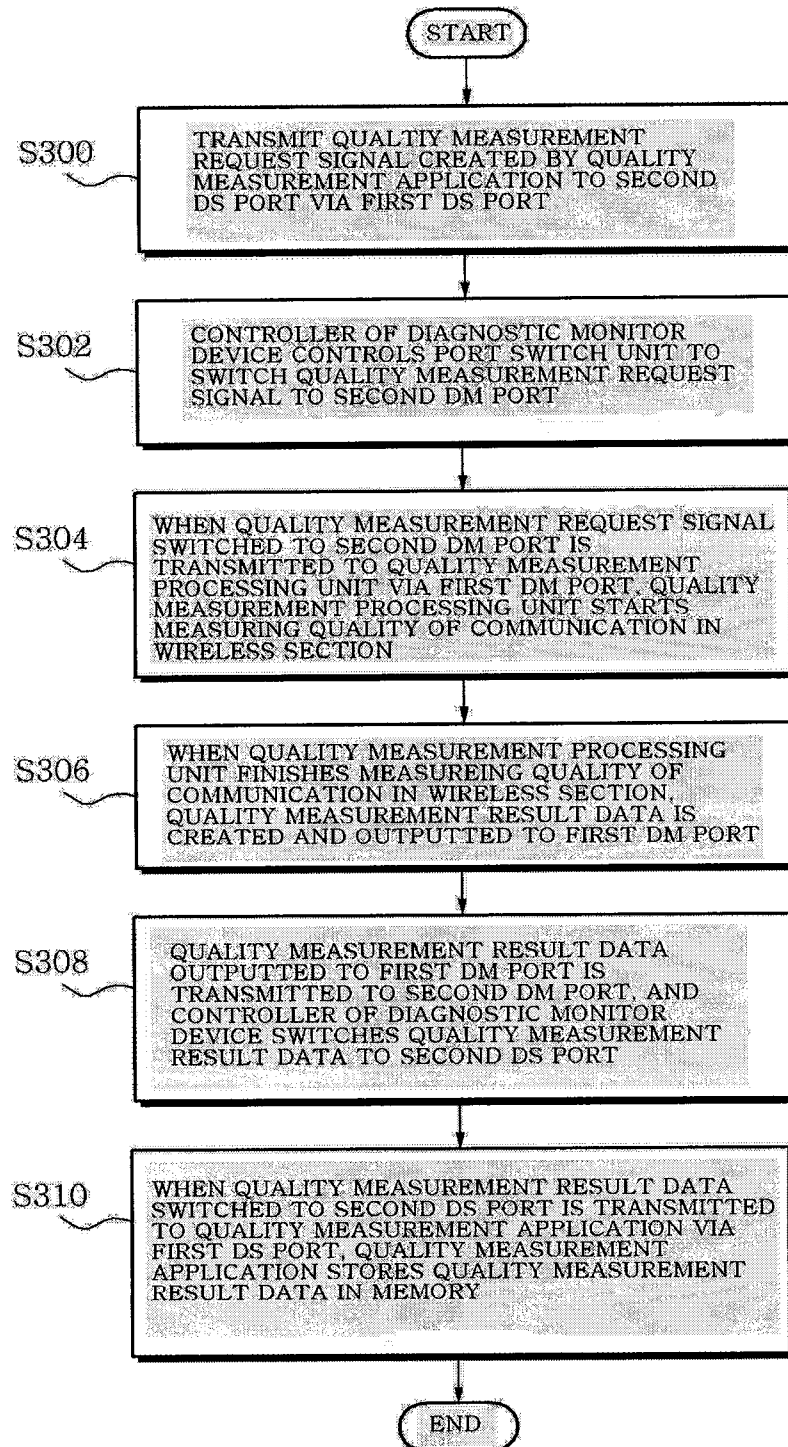
【FIG. 1】

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【FIG. 2】

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【FIG. 3】

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/003823**A. CLASSIFICATION OF SUBJECT MATTER****H04B 17/00(2006.01)i**

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 8 H04B

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal) : "mobile, cellular, wireless, quality, measurement, terminal"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2005-0086054 A (SK TELECOM CO., LTD.) 30 Aug. 2005 Abstract, Fig.1	1-11
A	KR 10-2006-0032740 A (KTFREETEL CO., LTD.) 18 Apr. 2006 Abstract, Fig. 1	1-11
A	JP 2001-320416 A (NEC CORP) 16 Nov. 2001 Abstract, Fig.1, 6	1-11
A	KR 10-2004-0003531 A (LG TELECOM, LTD.) 13 Jan. 2004 Abstract, Fig.3-5	1-11
A	KR 10-2004-0037607 A (LG TELECOM, LTD.) 07 May 2004 Abstract, Fig.1-4	1-11

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

14 NOVEMBER 2007 (14.11.2007)

Date of mailing of the international search report

14 NOVEMBER 2007 (14.11.2007)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

LEE, Jin Ick

Telephone No. 82-42-481-5770



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/003823

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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JP13320416 A	16.11.2001	JP2001320416A2	16.11.2001
KR2004003531A	13.01.2004	None	
KR2004037607A	07.05.2004	None	