(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
2 September 2004 (02.09.2004)

PCT

(10) International Publication Number
WO 2004/075583 A1

(51) International Patent Classification[7]: H04Q 7/32, 7/30

(21) International Application Number:
PCT/CH2003/000138

(22) International Filing Date: 24 February 2003 (24.02.2003)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **SWISSCOM AG** [CH/CH]; Ostermundigenstrasse 93, CH-3000 Bern 29 (CH).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **MORENO BLANCA, Ferran** [ES/CH]; Ostermundigenstrasse 93, CH-3050 Bern (CH). **BISCHOFF, Jean-Claude** [CH/CH]; Le Grand Clos 14, CH-1774 Montagny-les-Monts (CH).

(74) Agent: **BOVARD LTD.**; Optingenstrasse 16, CH-3000 Berne 25 (CH).

(81) Designated States *(national)*: AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

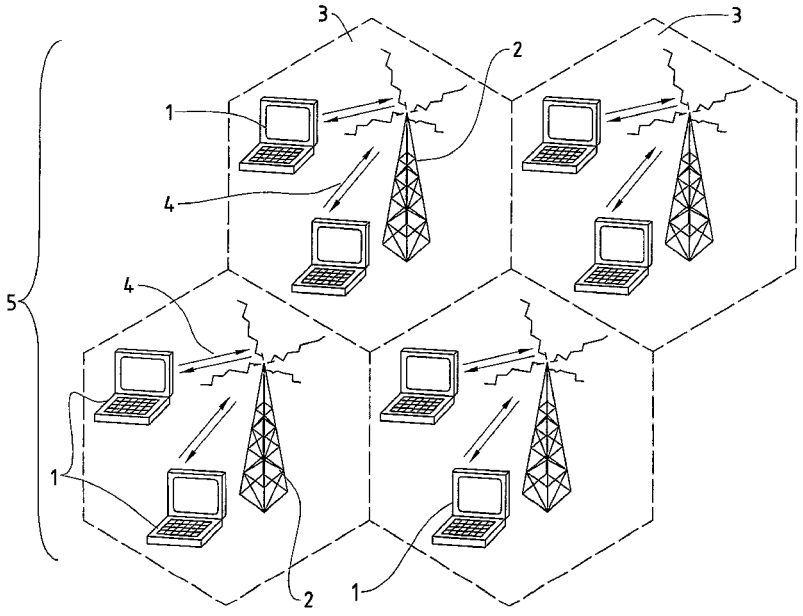
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF,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

**Declaration under Rule 4.17:**
— *of inventorship (Rule 4.17(iv)) for US only*

**Published:**
— *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: REDUCTION OF ELECTROSMOG IN WIRELESS LOCAL NETWORKS




(57) Abstract: A method and system for reduction of electrosmog in wireless local networks, one or more mobile network units (1) communicating with a base station (2) of a wireless local network (5). After a predefinable time interval without connecting signal, the base station (2) changes over from the normal transmitting-receiving mode into a sleep mode, in which sleep mode no beacon signals and/or other radio frequency signals are transmitted from the base station (2). If a mobile network unit (1) requires a network connection, it transmits an alert signal, and, upon receiving the alert signal of the mobile network unit (1), the base station transmits beacon signals to the mobile network unit (1) and changes over into the normal transmitting-receiving mode.

WO 2004/075583 A1

# Reduction of Electrosmog in Wireless Local Networks

This invention relates to a method and system for reduction of electrosmog in wireless local area networks (WLAN), one or more mobile network units communicating with a base station by means of radio frequency signals in a wireless local area network, which base station amplifies the radio frequency signals of the mobile network unit and/or connects the wireless local area network to a wired fixed network by means of bridge functions. In particular, the invention relates to a method and system in which a WLAN comprises a plurality of access points with differing transmission cells.

The influence of electrosmog on the human body is a known problem. The health risk from mobile radio transmitters, handys and DECT telephones has been an explosive subject among the general public at least since the enormous breakthrough in mobile radio technology in the 1990s. To meet the concerns of science from the legislative side, the permissible limit values have thus been lowered several times, and technology has been increasingly focused on this problem. The risk of damage to health through electrosmog has also become better understood as a result of more recent and improved studies. When, for example, human blood cells are irradiated with electromagnetic fields, clear damage to hereditary material has been demonstrated and there have been indications of an increased cancer risk (Mashevich M., Folkman D., Kesar A., Barbul A., Korenstein R., Jerby E., Avivi L., Department of Human Genetics and Molecular Medicine, Tel-Aviv University, Tel-Aviv, Israel, "Exposure of human peripheral blood lymphocytes to electromagnetic fields associated with cellular phones leads to chromosomal instability," *Bioelectromagnetics,* 2003 Feb., 24(2): 82-90). In this study, for example, human peripheral lymphocytes were exposed to continuous electromagnetic fields of 830 MHz in order to examine whether this leads to losses or gains in chromosomes (aneuploidy). Bigger changes lead to instability of the genome (= the totality of all genes of a germinal cell) and thereby to cancer. The human peripheral blood lymphocytes (PBL) were irradiated at different average specific absorption rates (SAR) of 1.6 to 8.8 W/kg over a time period of 72 hours in an exposure system based on a parallel plate resonator in a temperature range of 34.5 to 37.5 °C. The average absorption rate (SAR) and

its distribution in the exposed tissue culture flask were determined by combining the measurement results with a numerical analysis based on a finite element simulation code. A linear increase in the chromosome No. 17 -- an aneuploidy (=numerical chromosome aberration) -- was observed as a function of the SAR, demonstrating that this radiation has a genotoxic effect. The SAR-dependent aneuploidy was accompanied by an abnormal mode of replication of the chromosome 17 region engaged in segregation (repetitive DNA arrays associated with the centromere), suggesting that epigenetic alterations are involved in the SAR dependent genetic toxicity. Control experiments (i.e. without any radio frequency radiation) carried out in the temperature range of 34.5 to 38.5 °C showed that elevated temperature is not associated with either the genetic or epigenetic alterations observed following RF radiation, these alterations being the increased levels of aneuploidy and the modification in replication of the centromeric DNA arrays. These findings indicate that the genotoxic effect of electromagnetic radiation is elicited via a non-thermal pathway. Moreover aneuploidy is to be considered as a known phenomenon in the increase of cancer risk.

Thus it has been possible to show that mobile radio radiation can cause damage to genetic material, in particular in human white blood cells, whereby both the DNA itself is damaged and the number of chromosomes changed. This mutation can consequently lead to increased cancer risk. In particular, it could also be shown that this destruction is not dependent upon temperature increases, i.e. is non-thermal. Based on the scientific studies in the field, and owing to increasing pressure from the public, especially in the industrialized countries, epidemiological studies have been systematized by the World Health Organization (WHO) in the last few years, such as e.g. the currently running WHO Interphone Project, in order to be able to assess more precisely the health risks from electrosmog and work out corresponding guidelines.

Local networks (LAN: Local Area Network) usually consist of so-called nodes which are connected via physical media, such as e.g. coaxial cable, twisted pair or optical fiber cable. These LANs are also referred to as wired LANs (wired fixed networks). In the last few years wireless LANs have

also become more and more popular (e.g. through developments such as the AirPort System of Apple Computer, Inc.). Wireless LANs -- also referred to as WLANs -- are especially suitable for integrating mobile units (nodes), such as e.g. laptops, notebooks, PDAs (Personal Digital Assistants) or mobile radio devices, in particular mobile radio telephones, with a corresponding interface, into a local computer network. The mobile nodes have an adaptor comprising a transceiver as well as a control card (such as e.g. infrared (IR) adaptor or a low frequency radio wave adaptor). The advantage of such mobile nodes is that they can be moved freely within the range of the wireless LANs. The mobile nodes communicate either directly with one another (peer-to-peer wireless LAN) or send their signal to a base station which amplifies the signal and/or passes it on. The base stations can likewise comprise bridge functions. Via such base stations with bridge functions, so-called access points (AP), the mobile nodes can access the wireless LAN on a wired LAN. Typical network functions of an access point comprise the transmission of messages of one mobile node to another, the sending of messages from the wired LAN to a mobile node and the transmission of messages of a mobile node to the wired LAN.

There exist many different access methods for WLAN in the state of the art which make it possible for a user of a mobile network device to access a wireless local network. One of these access methods, such as e.g. Carrier Sense Multiple Access/Collision Detection (CSMA/CD) or token passing have proved to be highly successful in their industrial application. Today the use of local or wide area networks usually does not have any clearly defined, predetermined characteristics anymore. With the growth of heterogeneous multimedia data exchange (e.g. video data streams, etc.) via WLANs, the Quality of Service (QoS) parameter for a particular type of data exchange (or application) has become more and more important. Such parameters comprise, for example, the highest possible bandwidth, lowest possible delay, etc. For such accesses, new access methods in the asynchronous or synchronous networks have been developed and can be found in the state of the art.

Together with the growth of the WLAN and the standardization of the access methods and the physical layer specifications for WLANS, such as e.g.

the 802.X physical layer protocols and non- 802.X protocols (e.g. ATM: Asynchronous Transfer Mode Protocol), the security needs of users and service providers of such networks have also become greater and greater. Unambiguous network recognition as well as user identification and/or authentication thereby complement one another. Within a WLAN, an AP transmits so-called Service Set IDentifier (SSID) when a mobile network unit tries to integrate itself in the wireless network. An SSID is an unambiguous identification, 32 characters long, which is assigned to the header of data messages sent over the network, and serves as a password for the mobile network units. The SSID differs from one WLAN to another. That means that all APs and mobile network units of a particular WLAN must use the same SSID. A network unit which cannot support the unambiguous SSID will not be granted any network access via a base station or respectively an AP. As mentioned, in the 802.X network technology, such as e.g. the 802.11 network technology, the network units normally communicate via an access point (AP). In the infrastructure mode, mobile network units can either communicate with one another or with network components of a wired network. An AP with bridge functions, which is connected to a wired network and one or more other access points, is referred to as the Basic Service Set (BSS). Designated as the Extended Service Set (ESS) are a plurality of BSS, which form in each case a sub-network. WLANs are usually operated in the infrastructure mode in order to provide access to other services, such as e.g. file server, printer services and/or the worldwide backbone network (Internet). In the 802.X technology, an SSID concerns in each case a Basic Service Set. Thus a mobile unit can only have network access to a BSS if it supports the corresponding SSID. SSIDs are sometimes referred to as network names since the SSIDs unambiguously designate or identify a network.

The physical range of an AP is called the Basic Service Area (BSA). If a mobile node is located within the BSA of an AP, it can communicate with this AP if the AP is likewise within the signal range (Dynamic Service Area (DSA)) of the mobile node. Mobile nodes typically have a signal strength of 100 mwatt to one watt. To connect the wireless LAN to the wired LAN, it is important for the AP to determine whether a particular message (information frame) on the network is intended for a node which lies within the wired LAN or within the

wireless LAN, and to pass on this information, if necessary, to the corresponding node. For this purpose APs have so-called bridge functions, e.g. corresponding to the standard IEEE Std 802.1D-1990 "Media Access Control Bridge" (31-74 ff). With such bridge functions, a new mobile node is registered in the wireless LAN, typically in a FDB (Filtering Database) of the AP in whose range the node is located. With each information frame on the LAN, the AP compares the destination address with the addresses (MAC addresses (Media Access Control Addresses)) which it has stored in the FDB, and sends, rejects or passes on the frame to the wired LAN or to the wireless LAN. The range of a wireless LAN is limited by factors such as e.g. wavelength of the signal, signal strength, impediments, etc. The radio frequency parameters cannot be selected freely, however. In most countries there are regulations, more or less strict, as mentioned further above, as concerns the low frequency transmission for wireless LANs (e.g. USA (FCC), Switzerland (BAKOM), etc.). This applies in particular to the USA, for example. In the USA the regulations are issued by the United States Federal Communications Commission (FCC) (D 15, Title 47, Code of Federal Regulations 1985). Three bandwidths are permitted: 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz. Many applications today use the 900 MHz band. The quantity of data which can be transmitted over the 900 MHz band is limited, however, by the narrow frequency bandwidth in this band. Therefore more and more applications are using the frequency band around 2400 MHz. Future applications will presumably also use the band around 5800 MHz in order to meet the growing demand for high data throughput.

Despite increasingly strict national guidelines with respect to legally specified limits, the impact of electrosmog in WLANs on the human body can be considerable. Moreover it is to be expected that this impact will continue to increase in the future for many people. Two factors in particular are playing a role in this: First, more and more applications require additional, usually higher-energy frequency bands in order to be able to meet the growing need with respect to transmission rate. Second, the need for WLAN expansion in the private sphere as well as in the public sphere, e.g. in airports, railway stations, trains, restaurants, exhibition halls, etc., has by far not yet reached its peak. With the state of the art as a basis, there has been a lot of effort put into providing evidence for the detrimental effects of electrosmog and setting

corresponding limits. Limits and guidelines alone will not suffice, however, to further contain the electrosmog in WLANs since the development in WLANs runs in exactly the opposite direction, as mentioned above. WLANs even represent zones in which people usually spend longer periods of time (place of work, Internet, network games, etc.) and are therefore to be considered as particularly problematic with respect to radiation impact. WLANs in the state of the art moreover send base stations, such as access points, so-called beacon signals periodically so that mobile units can recognize the network and authenticate themselves with an access point. These beacon signals comprise recognition signals, such as e.g. SSIDs and/or other radio frequency signals with control parameters. Even if no mobile units are located in the WLAN, the beacon signals continue to be transmitted periodically to the APs. This means that even when the WLAN is not being used at all, an underlying stress from electromagnetic radiation remains for persons in the Basic Service Area of an access point of the WLAN. For example, in the case of WLANs at places of employment, such as offices, etc., there exists therefore permanent stress from electrosmog from the WLAN on the employees of the company or organization. In the state of the art there exists only the possibility of further reducing the limits for electromagnetic radiation.

It is an object of this invention to propose a new method and system for reducing electrosmog in wireless local networks which do not have the drawbacks described above. In particular a solution should be proposed which can be managed without any disruptive software and/or hardware adaptations and is thus easily achievable for existing WLAN technologies.

These objects are achieved, according to the present invention, in particular through the elements of the independent claims. Further preferred embodiments follow moreover from the dependent claims and from the description.

In particular, these objects are achieved through the invention in that, for reducing electrosmog in wireless local area networks (WLANs), one or more mobile network units communicate with a base station in a wireless local network by means of radio frequency signals, which base station amplifies the

radio frequency signals of the mobile network unit and/or connects the wireless local area network to a wired fixed network by means of bridge functions, the base station changes over from the normal transmitting-receiving mode into a sleep mode after a predefinable time interval without connecting signal to a mobile network unit, in the sleep mode no recognition signals and/or other radio frequency signals being transmitted from the base station, the base station being ready to receive radio frequency signals, however, when needing a network connection, a mobile network unit transmits an alert signal to the base station, and upon receiving the alert signal of the mobile network unit, the base station transmits to the mobile network unit the recognition signals necessary for the connection and changes over into the normal transmitting and receiving mode. The invention as described above has the advantage that electrosmog in WLANs can be greatly reduced during times when there is no network activity. At the same time energy consumption is also reduced since in sleep mode no beacon signals or other radio frequency signals are transmitted from the base stations. The whole method and system is achievable in particular without any hardware changes of any kind in the mobile network unit being necessary on the user side, nor on the side of the base stations, and it is therefore simpler and less expensive to achieve compared with other solutions. This means that not only are the costs for new hardware saved, but also the costs for installing it. It must also be pointed out that in mobile network units weight and space considerations often play a role too. The present invention requires neither additional hardware space, nor does it result in increased weight of the mobile terminal (network unit). For company-internal WLANs, for example, it also further increases security, making it more difficult for the WLAN to be used by unauthorized persons e.g. outside of business hours since no periodic beacon signal is sent anymore by the base station or base stations if they are in sleep mode.

In an embodiment variant, when in need of a network connection, the mobile network unit transmits an alert signal only if it does not receive any recognition signal from a base station. This embodiment variant has the advantage, among other things, that no unnecessary alert signal has to be transmitted if the base station is already in normal transmitting-receiving mode.

This likewise results in a further reduction of electrosmog and at the same time energy saving in the mobile network units.

In another embodiment variant, only the base station in whose basic service area (BSA) the mobile network unit is located changes over into the normal transmitting and receiving mode, the other base stations of the wireless local network remaining in their previous operating mode. This embodiment variant has the advantage, among other things, that the electrosmog can be further reduced since for mobile units which are at times stationary, such as e.g. when working with a laptop at one's place of employment, only the needed base station goes back into the normal transmitting-receiving mode.

In still another embodiment variant, the base stations of the basic service areas (BSAs) bordering on the basic service area (BSA) of the base station in whose BSA the mobile network unit is located likewise change over automatically into the normal transmitting-receiving mode if they were previously in the sleep mode. This embodiment has, among other things, the same advantages as the preceding one, but during a shift of the mobile network unit from one BSA to the next, the base station of the bordering BSA is already in the normal transmitting and receiving mode.

In an embodiment variant, the base station of the wireless local network changes over from sleep mode into the normal transmitting-receiving mode only if a network-specific recognition signal of the alert signal corresponds to a stored recognition signal of the wireless local network. This embodiment has the advantage, among other things, that the user as well as the service provider of the WLAN is given additional security. Through the additional authentication by means of a network-specific recognition signal, an unauthorized person, such as someone outside the company in the case of company WLANs, cannot even activate the normal transmitting and receiving mode of the WLAN or respectively of the base station.

In an embodiment variant, at least parts of the network-specific recognition signal, such as e.g. supplementary information data, are definable for the wireless local network by a user of the mobile unit and/or by an operator.

This embodiment variant has, among other things, the same advantages as the preceding embodiment variant. The security can be further increased however through the addition of supplementary information data determinable by the user or operator. In an embodiment variant, these data can even be supplementary information data freely chosen by the user, whereby, as a borderline case, the supplementary information data could even be empty. As further embodiment variants, an unambiguous identification code of the user can be used as the supplementary information data. For example, this can be an IMSI (International Mobile Subscriber Identification) and/or a MSISDN (Mobile Subscriber ISDN) which is stored on a SIM (Subscriber Identification Module) card of the mobile network unit. This has the advantage, among other things, that a particular user can be identified by means of the MSISDN, and, if required, can be correspondingly authenticated, e.g. with a log-in password, etc., without the user having to be registered beforehand in the system, e.g. in a database. As an additional embodiment, it is even conceivable for the MSISDN of a mobile radio device of the user to be used as the MSISDN, for example, the mobile radio device being one from which an access request was previously sent to a central unit.

In a further embodiment variant, the alert signal is transmitted from the mobile unit in a network-independent way for each wireless local network. This embodiment variant has the advantage, among other things, that any mobile network unit can activate possibly available WLANs in a standard way, independently of a specific recognition signal, or at least can receive a beacon signal or similar signal of the network.

In another embodiment variant, the wireless local network is set up based on the 802.X network technology, the recognition signals containing the corresponding Service Set Identifiers (SSID). This embodiment variant has the advantage, among other things, that a standardized access method and standardized physical layer specifications with the 802.X layer protocols can be used for the WLANs. This allows a cost-effective implementation without it being necessary to depart from the standard methods. At the present time the standards of the Institute of Electrical and Electronics Engineers (IEEE) have taken hold worldwide in the WLAN area. Among the IEEE standards which

have gained acceptance are in particular the IEEE 802 standards for LAN (Local Area Network) technologies.

In another embodiment variant, the wireless local network is set up based on Bluetooth technology. Among other things, this embodiment variant has the same advantages as the preceding one. In particular, Bluetooth is supported by a wide range of well-known hardware and software producers, such as e.g. Ericsson, IBM, Intel, Nokia, Toshiba, etc., which are themselves members of the Bluetooth Special Interest Group, which defines the Bluetooth standard.

Embodiment variants of the present invention will be described in the following with reference to examples. The examples of the embodiments are illustrated by the following attached figures:

Figure 1 shows a block diagram illustrating schematically the architecture of an embodiment variant of a method and/or system according to the invention for reducing electrosmog in wireless local networks 5, one or more mobile network units 1 communicating by means of radio frequency signals 4 with a base station 2 of a wireless local network 5, which base station 2 amplifies the radio frequency signals 4 of the mobile network unit 1 and/or connects the wireless local network 5 to a wired fixed network by means of bridge functions.

Figure 2 shows a flow chart presenting schematically the architecture of a method and/or system in a wireless local network 5, whereby a beacon signal is constantly being transmitted from the base stations 2 in order to make a potential user aware of the availability of a WLAN 5.

Figure 3 shows a flow chart presenting schematically the architecture of a method and/or system according to the invention in a wireless local network 5, the WLAN 5 having two different operating modes, such as a normal transmitting - receiving mode and a sleep mode. The figure shows in particular the course of switchover from the sleep mode into the normal transmitting -

receiving mode when a mobile network unit 1 would like to use the wireless local network 5.

Figure 1 illustrates an architecture which can be used to achieve the invention. In this embodiment example, one or more mobile network units 1 communicate by means of radio frequency signals 4 with a base station 2, or respectively an access point, of a wireless local network 5. Wireless local networks 5 are also referred to as WLANs (Wireless Local Area Networks). A WLAN can be composed of one or more such base stations or respectively access points. The base station 2 amplifies the radio frequency signals 4 of the mobile network unit 1 and/or connects the wireless local network 5 by means of bridge functions to a wired fixed network. Base stations 5, or respectively access points, of a WLAN 5 can be connected e.g. via physical media such as, for instance, coaxial cable, twisted pair or fiber optic cable to assigned radius servers. The connection can comprise communication networks, such as, for example, mobile radio networks, such as a terrestrial mobile radio network, e.g. a GSM or UMTS network, or a satellite-based mobile radio network and/or one or more fixed networks, for instance the public switched telephone network (PSTN) and/or ISDN (Integrated Services Digital Network) or a suitable LAN (Local Area Network) or WAN (Wide Area Network). During log on of a mobile network unit 1 of a user in a WLAN 5, an identification code of the user is transmitted for authentication of the user together with supplementary information data, which can be determined by the user, via one of the APs 2 of the WLAN 5 to a central unit and/or radius server. The communication between the central unit and the access points 2 can take place e.g. via a TCP/IP interface and/or CORBA interface, an ATM module, a SMS and/or USSD gateway by means of special short messages, for example SMS (Short Message Services), USSD (Unstructured Supplementary Services Data) messages, or other techniques such as MExE (Mobile Execution Environment), via protocols such as GPRS (Generalized Packet Radio Service), WAP (Wireless Application Protocol) or another user information channel. The data transfer between the central unit and the access points 2 is initiated and carried out e.g. via transfer modules, implemented through software or hardware, of the central unit as well as of the access points. The mobile network units 1 or so-called mobile nodes can be e.g. laptops, notebooks, PDAs (Personal Digital

Assistants) or mobile radio devices, in particular mobile radio telephones. The mobile nodes are equipped through hardware and software with a corresponding interface in order to integrate them in a local wireless computer network (WLAN). They communicate by means of radio frequency signals with the access points 2 of the WLAN 5. The mobile nodes 1 can comprise e.g. an adaptor, which includes a transceiver as well as a control card (such as e.g. an infrared (IR) adaptor or a low frequency radio wave adaptor). The mobile nodes 1 are thereby able to move freely within the range of the wireless LAN 5. The access points 2 of the WLAN 5 can e.g. amplify the radio frequency signals of the mobile node 1 as well as comprise bridge functions which make it possible to access nodes 1 of a wired LAN from the wireless local network 5 and vice-versa. For transmission of the radio frequency signals, the access points 2 comprise at least one antenna. The antenna can be e.g. a dipole antenna, a loop radiator such as a folded dipole, a Marconi aerial or a ground plane antenna, a directional antenna such as e.g. a yagi aerial, a turnstile antenna or a parabolic aerial, an omnidirectional antenna or a fractal antenna system. The radio frequency signals lie typically in the frequency bands reserved for wireless LAN between 800 MHz and 6000 MHz, such as e.g. three frequency bands set by the United States Federal Communication Commission (FCC) in the USA: 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz (D 15 of Title 47, Code of Federal Regulations). They can also be in the range of 400 MHz, for example, as is common e.g. with electronic, wireless garage openers, or at the WLL (Wireless Local Loop) frequencies auctioned a year ago in Germany and Switzerland, e.g. 26 GHz for wireless local loop methods. It is to be pointed out, however, that other frequencies are also possible, without affecting the scope of the invention. Thus, in principle, infrared signals can also be used for the invention such as e.g. IrDA, IR-LAN, etc. The bridge functions of the base station 2 can be achieved e.g. according to IEEE standard 802.1D-1990 "Media Access Control Bridges" pp. 31-47. In the WLAN network recognition and user identification and/or authentication complement one another. For network recognition, an AP periodically transmits so-called beacon signals within a WLAN, which signals comprise e.g. Service Set IDentifiers (SSID) and/or other control parameters for integrating a mobile network unit 1 into a wireless network. This applies in particular to the 802.X, such as e.g. the 802.11 network technologies, but also to Bluetooth and other network technologies. Beacon

signals are thus transmitted all the time to make potential users or respectively their mobile network units 1 aware of available WLANs 5. In the present invention, however, after a predefined time interval without a connection signal to a mobile network unit 1, the base station 2 switches over from normal transmitting and receiving mode to sleep mode. Understood by "normal transmitting and receiving mode" is the normal operating mode of the AP during which mobile network units 1 can access the APs or not.

In a flow chart, Figure 2 illustrates how a mobile network unit 1 recognizes the WLAN and connects thereto before the user can authenticate himself e.g. with the central unit and/or radius server. As mentioned, the base station in normal transmitting and receiving mode transmits beacon signals periodically 11. Even when no mobile network units are located in the WLAN, the beacon signals continue to be periodically transmitted from the APs. The SSID can be an unambiguous identification symbol, 32 characters long, which is assigned to the header of data messages sent over the network and which serves as a password for the mobile network units. The SSID differs from one WLAN to another. That means that all APs and mobile network units of a particular WLAN must use the same SSID. A network unit which cannot support an unambiguous SSID will normally not be granted any network access via a base station or respectively an AP. In the secure access mode (802.X) of the APs, the SSID from base station 2 and mobile network unit 1 must agree. In the non-secure access mode, a mobile network unit 1 can log on with the configured SSID, a blank SSID, or with the SSID set on "any." The beacon signals can be transmitted encrypted or unencrypted. The 802.11 network standard uses for encryption purposes WEP (Wired Equivalent Privacy), for example. WEP operates in three modes: no encryption, 40-bit encryption and 128-bit encryption. The 802.11 standard encrypts only the data packets, however, and not the management packets. The SSID is part of the beacon and probe management signal and is not encrypted when WEP is activated. A mobile network unit 1 receives the beacon signal 13, and recognizes the WLAN 5 from the beacon. Default SSIDs of WLANs are e.g. “tsunami” - Cisco, “101” – 3Com, “RoamAbout Default Network Name” - Lucent/Cabletron, “Default SSID", “Compaq” - Compaq, “WLAN” – Addtron (a popular AP), “intel” - Intel, “linksys” – Linksys, “Wireless”. Thus if a mobile network unit 1 receives a

beacon signal 13, it logs on with the corresponding AP, and carries out the authentication 14 of the user, if necessary, e.g. with the central unit, before it has access to the WLAN 5. If the mobile node 1 does not receive any beacon signal, but nevertheless needs a WLAN connection, it continues to scan for beacon signals 15 until it has found an available WLAN. This applies to the normal transmitting and receiving mode. In the normal transmitting and receiving mode the AP automatically transmits a further beacon signal after a predefined time interval 12. In the case that a base station 2 switches over into sleep mode, no recognition signals and/or other radio frequency signals are transmitted anymore from the base station 2, i.e. also no beacon signals, but the base station 2 nevertheless remains ready to receive radio frequency signals 4 also in sleep mode.

Figure 3 illustrates the method according to the invention on the side of the AP 2 when the base station 2 is in sleep mode. If a mobile network unit 1 needs a network connection, it transmits an alert signal which is received by the base station 2. If, in the normal transmitting and receiving mode, the base station does not receive any connection signal from a mobile network unit 1, the AP 2 waits for a predefinable period of time 24, if thereafter it still does not receive any connection signal 25, the base station 2 switches over into sleep mode 26, and waits 27 for a connection signal from a mobile node 1. Upon receiving an alert signal from a mobile network unit 1, the base station 2 transmits 22 the recognition signals necessary for the connection and/or beacon signals to the mobile network unit 1 (e.g. beacon signal), and, as described under Figure 2, carries out the authentication of the user of the mobile network unit 1. All base stations 2 of a WLAN 5 can always switch together from sleep mode into the normal transmitting and receiving mode, or only those base stations 2 in whose basic service areas 3 the mobile network unit 1 is located, the other base stations 2 of the wireless local network 5 remaining in their previous operating mode. It can make sense in addition for the base stations 2 of basic service areas 3 bordering on the basic service areas 3 of the base station 2 in whose BSA the mobile node 1 is located to automatically switch over into the normal transmitting and receiving mode if they were previously in sleep mode. In an embodiment variant, the mobile network unit 1, when needing a network connection, can transmit an alert signal

only when no recognition signal is received from a base station 2, or automatically every time it needs a WLAN, for example. It is furthermore possible for the base station 2 of the wireless local network 5 to switch over from sleep mode into the normal transmitting-receiving mode only when a network-specific recognition of the alert signal corresponds with a stored recognition signal of the wireless local network 5. This results in additional protection against unauthorized use of the WLAN. The security of the WLAN 5 can be further increased in that at least parts of the network-specific recognition signal are definable for the wireless local network 5 by the user of the mobile unit 1 and/or by an operator. As a special embodiment variant, the MSISDN and/or IMSI of a mobile radio device of the user of the mobile network unit 1 can be used as the supplementary information data. Moreover this can be stored on a SIM (Subscriber Identification Module) card of the mobile network unit. For other embodiments it can be important, however, that the alert signal is transmitted from the mobile network unit 1 in a network-independent way. This could be advantageous in particular for WLANs in public buildings, airports, etc. It is important to point out that the method or respectively system according to the invention can be achieved without modification of existing hardware on the side of the base stations 1 and on the side of the mobile network units 1, requiring only modification of the corresponding software components. Of course it is also possible to achieve the method and system according to the invention through addition of corresponding hardware modules.

## Claims

1. A method for reducing electrosmog in wireless local networks, one or more mobile network units (1) communicating with a base station (2) of a wireless local network (5) by means of radio frequency signals (4), which base station (2) amplifies the radio frequency signals (4) of the mobile network unit (1) and/or connects the wireless local network (5) to a wired fixed network by means of bridge functions, wherein

the base station (2) changes over from the normal transmitting-receiving mode into a sleep mode after a predefinable time interval without connecting signal to a mobile network unit (1), in the sleep mode no recognition signals and/or other radio frequency signals being transmitted from the base station (2), the base station being ready to receive radio frequency signals (4), however,

when needing a network connection, a mobile network unit (1) transmits an alert signal to the base station,

upon receiving the alert signal of the mobile network unit (1), the base station (2) transmits to the mobile network unit (1) the recognition signals necessary for the connection and changes over into transmitting and receiving mode.

2. The method according to claim 1, wherein, when in need of a network connection, the mobile network unit (1) transmits an alert signal only if it does not receive any recognition signal from a base station (2).

3. The method according to one of the claims 1 or 2, wherein only the base station in whose basic service area the mobile network unit (1) is located changes over into the normal transmitting and receiving mode, the other base stations (2) of the wireless local network (5) remaining in their previous operating mode.

4. The method according to claim 3, wherein the base stations (2) of the basic service areas (3) bordering on the basic service area (3) of the base station (2) in whose basic service area the mobile network unit (1) is located likewise change over automatically into the normal transmitting-receiving mode if they were previously in the sleep mode.

5. The method according to one of the claims 1 to 4, wherein the base station (2) of the wireless local network (5) changes over from sleep mode into the normal transmitting-receiving mode only if a network-specific recognition signal of the alert signal corresponds to a stored recognition signal of the wireless local network (5).

6. The method according to claim 5, wherein at least parts of the network-specific recognition signal are definable for the wireless local network (5) by a user of the mobile unit (1) and/or by an operator.

7. The method according to one of the claims 1 to 6, wherein the alert signal from the mobile network unit (1) is transmitted in a network independent way for every wireless local network (5).

8. The method according to one of the claims 1 to 7, wherein the wireless local network (5) is set up based on the 802.X network technology, the recognition signals containing the respective Service Set Identifier (SSID).

9. The method according to one of the claims 1 to 7, wherein the wireless local network (5) is set up based on Bluetooth technology.

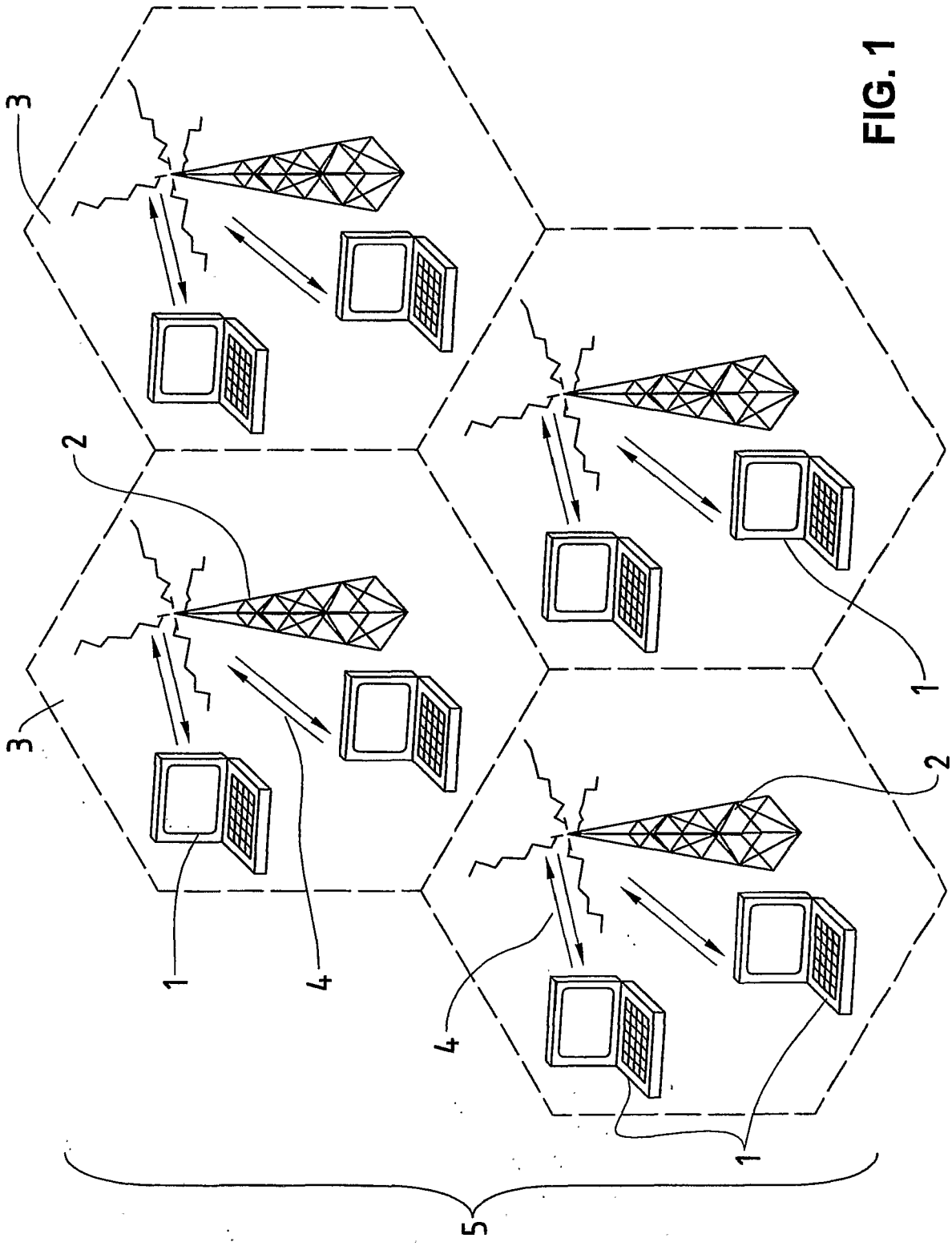



FIG. 1

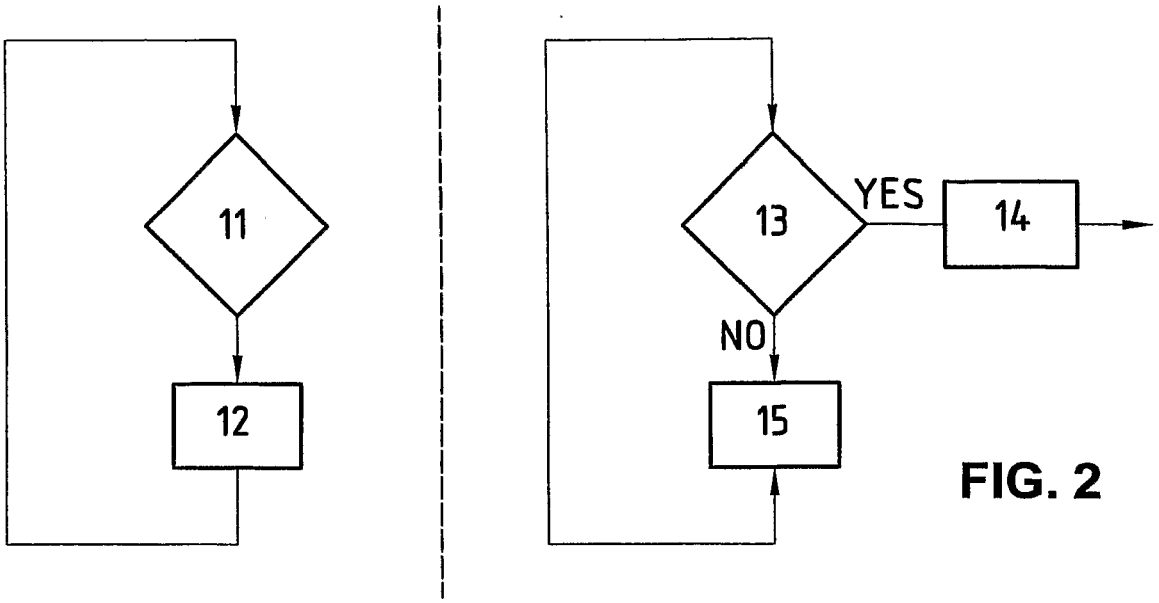



FIG. 2

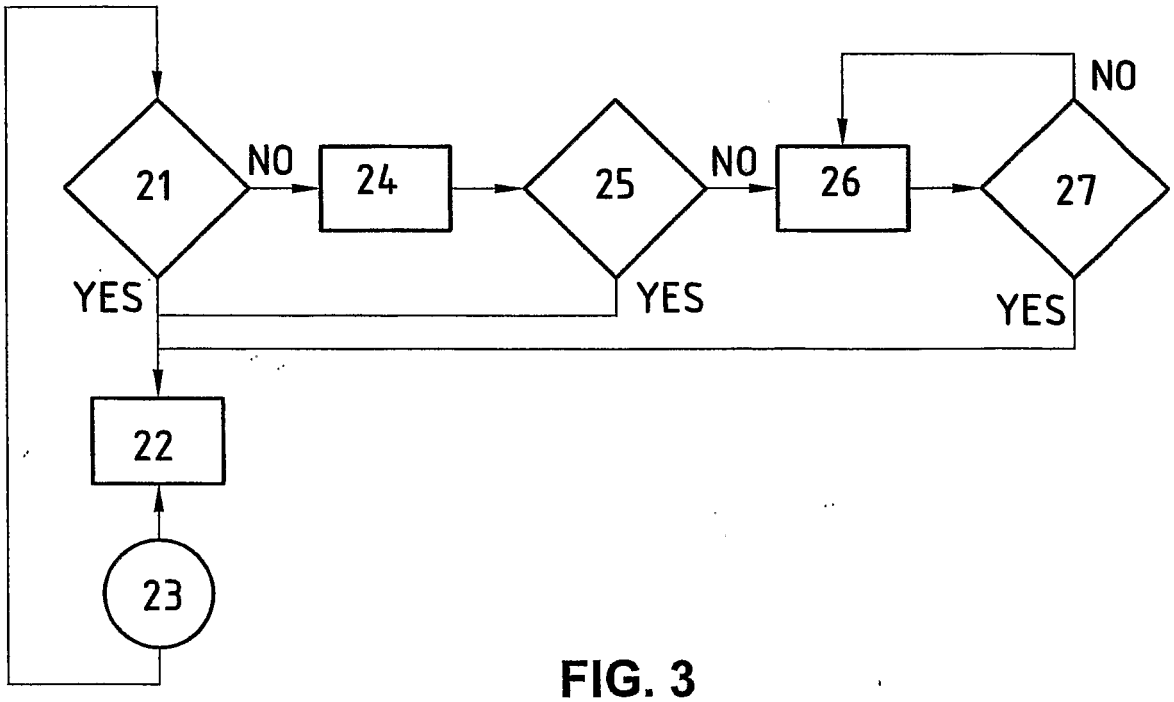



FIG. 3

# INTERNATIONAL SEARCH REPORT

International Application No
PCT/CH 03/00138

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/32 H04Q7/30

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q H04B

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | US 5 884 196 A (LEKVEN ERIC J ET AL)<br>16 March 1999 (1999-03-16)<br>abstract<br>figure 2<br>column 6, line 11 - line 31 | 1-9 |
| A | WO 02 093778 A (QUALCOMM INC)<br>21 November 2002 (2002-11-21)<br>abstract<br>paragraph '0009! - paragraph '0010!<br>claim 1 | 1-9 |
| A | US 6 339 694 B1 (NUCKOLS JEFFREY R ET AL)<br>15 January 2002 (2002-01-15)<br>column 3, line 43 - line 60<br>abstract | 1-9 |

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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

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

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

"O" document referring to an oral disclosure, use, exhibition or other means

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

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

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

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

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 14 October 2003 | 22/10/2003 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL – 2280 HV Rijswijk<br>Tel. (+31–70) 340–2040, Tx. 31 651 epo nl,<br>Fax: (+31–70) 340–3016 | Dionisi, M |

Form PCT/ISA/210 (second sheet) (July 1992)

# INTERNATIONAL SEARCH REPORT

International Application No
PCT/CH 03/00138

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication,where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | WO 02 07464 A (ERICSSON TELEFON AB L M)<br>24 January 2002 (2002-01-24)<br>page 2, line 5 - line 23<br>page 15, line 11 - line 15 | 1-9 |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CH 03/00138

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 5884196 A | 16-03-1999 | AU 717244 B2 | 23-03-2000 |
| | | AU 3569397 A | 05-01-1998 |
| | | BR 9709555 A | 11-01-2000 |
| | | CN 1228230 A | 08-09-1999 |
| | | EP 0903047 A2 | 24-03-1999 |
| | | JP 2000515334 T | 14-11-2000 |
| | | KR 2000016550 A | 25-03-2000 |
| | | WO 9747149 A2 | 11-12-1997 |
| WO 02093778 A | 21-11-2002 | US 2002177461 A1 | 28-11-2002 |
| | | US 2002173325 A1 | 21-11-2002 |
| | | US 2002173326 A1 | 21-11-2002 |
| | | US 2002172165 A1 | 21-11-2002 |
| | | WO 02093788 A1 | 21-11-2002 |
| | | WO 02098015 A1 | 05-12-2002 |
| | | WO 02093953 A1 | 21-11-2002 |
| | | WO 02093954 A1 | 21-11-2002 |
| | | WO 02093948 A1 | 21-11-2002 |
| | | WO 02093812 A2 | 21-11-2002 |
| | | WO 02093778 A1 | 21-11-2002 |
| | | US 2003008657 A1 | 09-01-2003 |
| | | US 2002173327 A1 | 21-11-2002 |
| | | US 2002172169 A1 | 21-11-2002 |
| US 6339694 B1 | 15-01-2002 | NONE | |
| WO 0207464 A | 24-01-2002 | US 6584330 B1 | 24-06-2003 |
| | | AU 7121601 A | 30-01-2002 |
| | | WO 0207464 A1 | 24-01-2002 |

**Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)**

*The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.*

**Declaration of inventorship (Rules 4.17(iv) and 51*bis*.1(a)(iv)) for the purposes of the designation of the United States of America:**

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/..... (if furnishing declaration pursuant to Rule 26*ter*).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications: .....

.....

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare 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 issued thereon.

**Name:** FERRAN MORENO BLANCA

Residence: BERN , SWITZERLAND 3050 Berne
(city and either US state, if applicable, or country)

Mailing Address: OSTERMUNDIGENSTRASSE 93 , 3050 BERNE (Switzerland)

.....

Citizenship: SPANISH

Inventor's Signature: MBB
(if not contained in the request, or if declaration is corrected or added under Rule 26*ter* after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date: 25.02.2003
(of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26*ter* after the filing of the international application)

**Name:** Jean-Claude Bischoff

Residence: Montagny-les-Monts, Switzerland 1774
(city and either US state, if applicable, or country)

Mailing Address: ~~Swisscom Ltd, Innovations, Broadband Networks~~
~~Ostermundigenstrasse 93, 3050 Bern, Switzerland~~
Le Grand Clos 14, 1774 Montagny-les-Monts (Switzerland)

Citizenship: Swiss

Inventor's Signature: MBischoff
(if not contained in the request, or if declaration is corrected or added under Rule 26*ter* after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date: 25.02.2003
(of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26*ter* after the filing of the international application)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 10 MAY 2005
WIPO PCT

| Applicant's or agent's file reference<br>154274.1/LE/mb | **FOR FURTHER ACTION** | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
|---|---|---|
| International application No.<br>PCT/CH 03/00138 | International filing date *(day/month/year)*<br>24.02.2003 | Priority date *(day/month/year)*<br>24.02.2003 |
| International Patent Classification (IPC) or both national classification and IPC<br>H04Q7/32 | | |
| Applicant<br>SWISSCOM AG et al | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 07.09.2004 | 09.05.2005 |
| Name and mailing address of the international preliminary examining authority:<br>European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465 | Authorized Officer<br>Schweitzer, J-C<br>Telephone No. +49 89 2399-8963 |

## I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

**Description, Pages**

1-15 as originally filed

**Claims, Numbers**

1-9 as originally filed

**Drawings, Sheets**

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   *(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 1-9 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | 1-9 |
| | No: | Claims | |
| Industrial applicability (IA) | Yes: | Claims | 1-9 |
| | No: | Claims | |

2. Citations and explanations

   **see separate sheet**

## Concerning section V.2 (reasoned statement under Article 35(2) PCT)

**Claim 1** relates to a method for reducing electrosmog in a wireless local network by putting a base station into sleep under certain conditions.

The nearest prior is given by the cited document **WO-A-02/07464 (Ericsson),** hereinafter referred to as document **D1**, which discloses a method for reducing energy consumption (and, thus, implicitly electrosmog) in a base station (node) of a wireless local network, by turning off or putting into sleep some of the node's equipments or traffic carriers during periods of low traffic.

In accordance with the invention, by contrast, when the base station has not received any connection signal from a mobile unit for a predetermined time period, it switches into a sleep mode wherein no recognition (beacon) signal is transmitted. Thus, instead of periodically sending such recognition signals, which are normally required by the mobile units to "recognize" the wireless network and authenticate themselves with the base station, the invention proposes to stop, during the sleep mode, the transmission of such recognition signals, while still allowing the reception of radio signals. A mobile unit needing a connection transmits an alert signal to the base station, which then changes over to the normal transmitting/receiving mode.

This claimed concept of underlying the invention permitting to reduce electrosmog in the vicinity of base stations is neither taught, nor rendered obvious, alone or in combination, by the prior art documents cited in the International Search Report.

The above-cited **D1** merely suggests the idea of turning off traffic carriers or specific circuits in the base station, but does not mention stopping the sending of beacons signals. The remaining cited documents concern remote units (mobile stations) having a sleep/dormant mode, rather than base stations or access points, and thus provide no incentive for the skilled person to arrive at the present invention.

Claim 1 is therefore novel and considered to involve the required inventive step, Articles 33(2) and (3) PCT. The subject-matter of claim 1 is also industrially applicable.

Dependent **claims 2 to 9** relate to further implementing details of the method defined by claim 1 to which they refer and are thus equally novel, inventive and industrially applicable.

Additional remarks concerning the clarity of the claims.

**Claim 1** states, at lines 4 to 6, that the *"base station amplifies the radio frequency signals to the mobile network unit and/or connects the wireless local network to wired fixed network..."*. The term "and/or" is however misleading, as it is actually clear that the base station -inter alia- has to perform both tasks/functions, that is amplifying radio signals to the mobile units (stations) and connecting the wireless and the fixed networks. The expression "and/or" should thus correctly read "and".

Moreover, in claim 1, it should be made clear that the expression "without connecting signals" actually means "without receiving any connection signal", as it is clear from the description, see e.g. at page 14, line 17.

Remarks concerning the form and contents of the application:

The independent claim is not drafted in the proper two-part "characterised" form recommended by Rule 6.3.(b),(I),(ii) PCT, having a preamble that correctly reflects the nearest prior art represented by the above noted **D1**.

In order to meet the requirements of Rule 5.1.(a),(ii) PCT, the prior art document **D1** noted above should be acknowledged by reference and briefly discussed in the introductory part of the description.

## REDUCTION OF ELECTROSMOG IN WIRELESS LOCAL NETWORKS

The EPO does not accept any responsibility for the accuracy of data and information originating from other authorities than the EPO; in particular, the EPO does not guarantee that they are complete, up-to-date or fit for specific purposes.

Legal status of WO2004075583 (A1) 2004-09-02:

| | |
|---|---|
| **WO F** | **0300138 W** (Patent of invention) |
| **PRS Date :** | 2004/09/02 |
| **PRS Code :** | AK |
| **Code Expl.:** | + DESIGNATED STATES |
| **KD OF CORRESP. PAT. :** | A1 |
| **DESIGNATED COUNTR. :** | AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW |
| **PRS Date :** | 2004/09/02 |
| **PRS Code :** | AL |
| **Code Expl.:** | + DESIGNATED COUNTRIES FOR REGIONAL PATENTS |
| **KD OF CORRESP. PAT. :** | A1 |
| **DESIGNATED COUNTR. :** | GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW AM AZ BY KG KZ MD RU TJ TM AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT SE SI SK TR BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG |
| **PRS Date :** | 2004/10/27 |
| **PRS Code :** | 121 |
| **Code Expl.:** | EP: THE EPO HAS BEEN INFORMED BY WIPO THAT EP WAS DESIGNATED IN THIS APPLICATION |
| **PRS Date :** | 2004/11/11 |
| **PRS Code :** | DFPE |
| **Code Expl.:** | REQUEST FOR PRELIMINARY EXAMINATION FILED PRIOR TO EXPIRATION OF 19TH MONTH FROM PRIORITY DATE (PCT APPLICATION FILED BEFORE 20040101) |
| **PRS Date :** | 2005/08/24 |
| **PRS Code :** | WWE |
| **Code Expl.:** | + WIPO INFORMATION: ENTRY INTO NATIONAL PHASE |
| **CC OF CORRESP. PAT. :** | EP |
| **CORRESP. PATENT D. :** | 2003815938 |
| **PRS Date :** | 2005/11/23 |
| **PRS Code :** | WWP |
| **Code Expl.:** | + WIPO INFORMATION: PUBLISHED IN NATIONAL OFFICE |
| **CC OF CORRESP. PAT. :** | EP |
| **CORRESP. PATENT D. :** | 2003815938 |
| **PRS Date :** | 2007/01/26 |
| **PRS Code :** | WWW |
| **Code Expl.:** | - WIPO INFORMATION: WITHDRAWN IN NATIONAL OFFICE |
| **CC OF CORRESP. PAT. :** | JP |
| **PRS Date :** | 2007/01/26 |
| **PRS Code :** | NENP JP |
| **Code Expl.:** | NON-ENTRY INTO THE NATIONAL PHASE IN: |

Data supplied from the ***espacenet*** database — Worldwide