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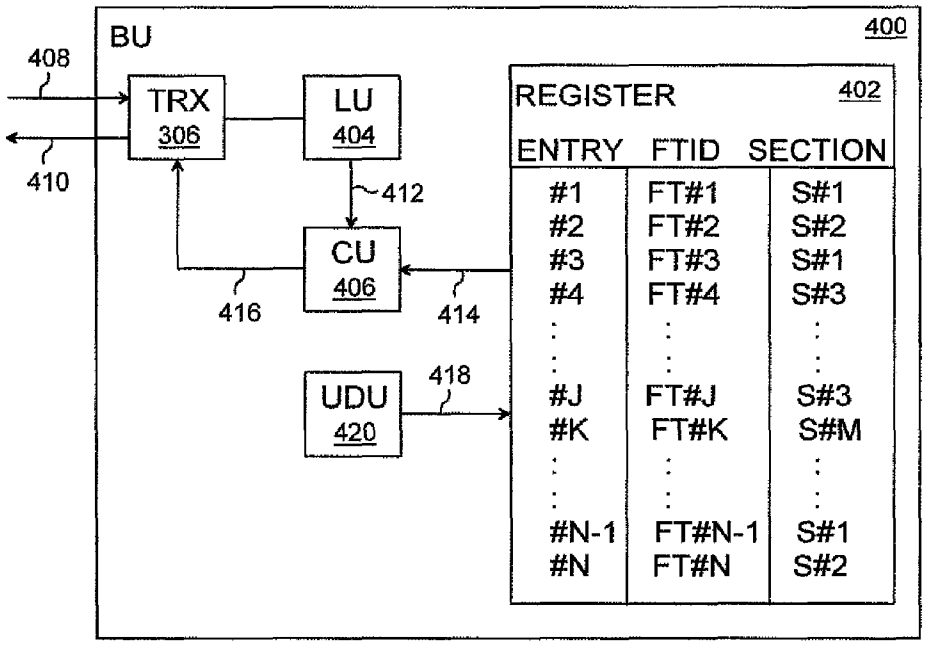
(54) **Title:** CONFIGURATION OF WIRELESS PERSONAL AREA NETWORK



(57) **Abstract:** Wireless personal area network (WPAN), a network element, a method of configuring a wireless personal area network, and a computer program are presented. The wireless personal area network comprises: a plurality of space-fixed wireless terminals (1 to 8); and a register (402) comprising entries of the space-fixed wireless terminals (1 to 5), wherein an entry indicates an association between a space-fixed wireless terminal (1 to 5) and a section in a physical structure on the basis of the spatial location of the space-fixed wireless terminal (1 to 8).

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Configuration of wireless personal area network

Field

The invention relates to a wireless personal area network, a network element of a wireless personal area network, a method for configuring a wireless personal area network, and a computer program implementing the method.

Background

Wireless personal area networks (WPAN) provide local network connectivity for wireless terminals, which may number thousands in a single WPAN. When a mobile wireless terminal enters a coverage area of the WPAN, a list of wireless terminals is provided for the mobile wireless terminal. A user of the mobile wireless terminal may use the entries on the list for connecting and controlling individual wireless terminals on the list.

In some applications, especially in indoor applications, the list may include a plenty of wireless terminals irrelevant to the user, and thus degrade the usability of the personal area network. Irrelevant wireless terminals may be outside the sight of the user or otherwise be of no importance due to the spatial distance or obstructions between the user and the wireless terminals. Therefore, it is useful to consider means for improving the usability of WPANs.

Brief description of the invention

An object of the invention is to provide an improved wireless personal area network, a network element of a wireless personal area network, a method for configuring a personal area network, and a computer program.

According to a first aspect of the invention, there is provided a wireless personal area network comprising: a plurality of space-fixed wireless terminals; and a register comprising entries of the space-fixed wireless terminals, wherein an entry indicates an association between a space-fixed wireless terminal and a section in a physical structure on the basis of the spatial location of the space-fixed wireless terminal.

According to a second aspect of the invention, there is provided a network element of a wireless personal area network comprising a plurality of space-fixed wireless terminals, the network element comprising a register comprising entries of the space-fixed wireless terminals, wherein an entry indicates an association between a space-fixed wireless terminal and a section in

a physical structure on the basis of the spatial location of the space-fixed wireless terminal.

According to a third aspect of the invention, there is provided a method of configuring a wireless personal area network comprising a plurality of space-fixed wireless terminals, the method comprising setting up a register comprising entries of the space-fixed wireless terminals, wherein an entry indicates an association between a space-fixed wireless terminal and a section in a physical structure on the basis of the spatial location of the space-fixed wireless terminal.

According to another aspect of the invention, there is provided a computer program encoding instructions for executing a computer process for configuring a wireless personal area network, wherein the wireless personal area network comprises a plurality of space-fixed wireless terminals and the computer process comprises setting up a register comprising entries of the space-fixed wireless terminals, wherein an entry indicates an association between a space-fixed wireless terminal and a section in a physical structure on the basis of the spatial location of the space-fixed wireless terminal.

The invention provides several advantages.

The invention is based on a register indicating an association between a section of a physical structure and space-fixed wireless terminals locating in the section. Entries in the register enable relevant information to be provided for a mobile wireless terminal entering the section, wherein the relevant information may relate to the space-fixed wireless terminals located in the section. Further, based on register entries, transmission of non-relevant information to the mobile terminal may be blocked, thus reducing the information flow to the mobile wireless terminal and improving the usability of the mobile terminal. A blocking of the transmission non-relevant information further results in increase of the bandwidth for payload.

List of drawings

In the following, the invention will be described in greater detail with reference to the embodiments and the accompanying drawings, in which

Figure 1A shows a first example of a wireless personal network area;

Figure 1B shows a second example of a wireless personal network area;

Figure 2 shows an example of a fixed terminal;

Figure 3 shows a first example of a base unit;

Figure 4 illustrates a second example of a base unit; and

Figure 5 illustrates a methodology according to embodiments of the invention.

Description of embodiments

With reference to Figures 1A and 1B, examine an example of a wireless personal area network (WPAN) 100 comprising network elements, such as a plurality of space-fixed wireless terminals 1 to 8 (FT#1, FT#2,.., FT#N), a wireless gateway (WGW) 9 and a base unit 10 (BU). The space-fixed wireless terminals 1 to 8 are herein referred to as fixed terminals 1 to 8.

The WPAN 100 is a digital network, which may possess self-organizing and ad-hoc aspects. In this example, a ZigBee network topology conforming an IEEE 802.15.4 specification is used for illustrating general aspects of WPAN 100.

Furthermore, Figures 1A and 1B show a physical structure 104, such as a building or a structure in a building, which confines the WPAN 100. The physical structure 104 may be divided into sections 106A to 106D by boundaries 102A to 102D. The boundary 102A to 102D may be a physical boundary, such as a wall or another structure reducing mobility of persons in the physical structure 104. In this case, the section 106A to 106D may be a room, for example. The boundary 102A to 102D may also be a non-physical boundary, such as an imaginary boundary in an open-plan office.

Figures 1A and 1B further show a mobile wireless terminal 11 (MT), herein also referred to as a mobile terminal 11. The mobile terminal 11 comprises communicating means, such as a radio transceiver and processor for executing communication protocol, for wirelessly communicating with fixed terminals 1 to 8 and possibly with the wireless gateway 9 and/or the base unit 10.

The mobile terminal 11 typically comprises a user interface, such as a display and keyboard/keypad. The mobile terminal 11 may further implement a communication protocol for communicating information with the fixed terminals 1 to 8 and/or the wireless gateway 9.

The communication protocol may further enable communication of access control information with the base unit 10, where the access control information includes a list of relevant fixed terminals. A relevant fixed terminal is located in section 106A, where the mobile terminal 11 is located.

The fixed terminals 1 to 8 are wirelessly coupled to the base unit 10 by the wireless gateway 9. A fixed terminal 1 to 8 may also be referred to as an end device in a ZigBee system.

The fixed terminal 1 to 8 is typically a battery powered sensor/controller module, which may sensor/control devices, such as home appliances, thermostats, humidistats, smoke detectors, lights and a heating system. The fixed terminals 1 to 8 are fixed in the sense that the section 106A to 106D in which the fixed terminal 1 to 8 is located remains unaltered.

In an embodiment of the invention, each fixed terminal 1 to 8 holds a terminal identity, which is specific to the fixed terminal 1 to 8. The terminal identity may be used for directing communication to the fixed terminal 1 to 8 and/or identifying an origin of communication from a fixed terminal 1 to 8. The terminal identity may be a number sequence. The terminal identity may further include information on the type of the fixed terminal 1 to 8.

The mobile terminal 11 may comprise an operating system for operating/monitoring at least some of the fixed terminals 1 to 8. The monitoring includes observing results generated by a sensor or a fixed terminal 1 to 8. The operating includes remotely using controlling capability, such as switching capability, of the fixed terminal 1 to 8. Communication associated with the remote operating/monitoring between a fixed terminal 1 to 8 and the mobile terminal 11 may be implemented with a direct wireless link between the mobile terminal 11 and the fixed terminal 1 to 8 or indirectly via the wireless gateway 9.

In an embodiment of the invention, the mobile terminal 11 is a mobile terminal of a wireless telecommunication system. In such a case, the mobile terminal is capable of operating both in the WPAN 100 and the wireless telecommunication system. The wireless telecommunication system may be a cellular telecommunication system based on, for example, GSM (Global System for Mobile Communications), GERAN (GSM/EDGE Radio access network), GPRS (General Packet Radio Service), E-GPRS (EDGE GPRS), UMTS (Universal Mobile Telecommunications System), CDMA2000 (CDMA, Code Division Multiple Access), US-TDMA (US Time Division Multiple Access), TDS-CDMA (Time Division Synchronization CDMA) or WiMax (Worldwide Interoperability for Microwave Access).

In an embodiment of the invention, the mobile terminal 11 is a remote control with user interface.

In an embodiment of the invention, the wireless telecommunication system is WLAN (Wireless Local Area Network).

The base unit 10 may also be referred to as Coordinator in a Zigbee system. The base unit 10 is typically the most capable device of the WPAN 100, having capability of forming the root of WPAN 100, providing with connectivity to other networks and storing information about the WPAN 100, including acting as the repository for security keys.

The wireless gateway 9, also referred to as Router in a ZigBee system, can act as an intermediate router, passing data between the base unit 10 and the fixed terminals 1 to 8, and between the fixed terminals 1 to 8.

The fixed terminals 1 to 8 may form spatial sub-networks 108A, 108B according to their location in the physical structure 104. In the given example, fixed terminals 1 to 3 form a spatial sub-network 108A, while fixed terminals 4 and 5 form a spatial sub-network 108B. Other fixed terminals 6 to 8 may or may not form spatial sub-networks.

In an embodiment of the invention, each spatial sub-network comprises a sub-network specific wireless gateway 9 as shown in Figure 1B.

A spatial sub-network 108A, 108B may be associated with a section 106A, 106B of the physical structure 104. The section 106A, 106B confines fixed terminals 1 to 8 belonging to the spatial sub-network 108A, 108B. In the examples of Figures 1A and 1B, spatial sub-network 108A is associated with section 106A, while spatial sub-network 108B is associated with section 106B.

In an embodiment of the invention, at least some of the fixed terminals 1 to 8 are capable of wirelessly communicating with the mobile terminal 11. The wireless communication includes transmitting and receiving radio signals between the fixed terminal 1 to 8 and the mobile terminal 11.

With reference to Figure 2, a fixed terminal (FT) 200 may comprise a processing unit (PU) 202, a memory unit (MEM) 204, a transceiver (TRX) 206 and a sensor/controller (S/C) 208.

The processing unit 202 executes computer processes encoded into a computer program. The computer program may be stored in the memory unit 204.

The transceiver 206 implements a wireless communication link between the fixed terminal 200 and the wireless gateway 9. The transceiver 206 may further implement a wireless communication link between the fixed terminal 200 and the mobile terminal 11.

In an embodiment of the invention, the transceiver 206 and the processing unit 202 are configured to estimate signal strength of a communication signal received from the mobile terminal 11. The signal strength may be presented with an RSSI value (Received Signal Strength Indicator), for example. The signal strength may be used for indicating the distance between the transceiver 206 and the mobile terminal 11. Information on the transmission power of the communication signal may also be used for a distance determination.

Information on the signal strength may be transmitted wirelessly to the base unit 10 directly or via the wireless gateway 9.

In an embodiment of the invention, the mobile terminal 11 measures signal strength of signals transmitted by the fixed terminals 1 to 8 and transmit information on the signal strength to the base unit 10.

The sensor/controller 208 may measure a physical quantity, such as an environment parameter or control operation of a system, such as a heating system and/or an electricity system.

With reference to Figure 3, the base unit (BU) 300 comprises a processing unit (PU) 302, a memory unit (MEM) 304 and a transceiver (TRX) 306.

The processing unit 302 executes computer processes encoded into a computer program. The computer program may be stored in the memory unit 304.

The transceiver 306 implements a wireless communication link between the base unit 300 and the wireless gateway 9. The transceiver 306 may further implement a wireless communication link between the fixed terminal 1 to 8 and the base unit 300.

With reference to an example of Figure 4, the base unit (BU) 400 comprises a register 402, a locating unit (LU) 404 and a command unit (CU) 406.

In an embodiment of the invention, the transceiver 306 receives signals 408 from the space-fixed wireless terminals 1 to 8 directly or via the wireless gateway 9. The signals 408 may carry signal strength information on the signal strength transmitted by the mobile terminal 11 and received by each fixed terminal 1 to 8.

The signal strength information is inputted into the locating unit 404.

The locating unit 404 indicates if the mobile terminal 11 enters a section 106A, 106B. In the examples of Figures 1A and 1B, the mobile terminal 11 enters section 106A.

In an embodiment of the invention, the locating unit 404 calculates a position vector of the mobile terminal 11 by using signal strength information. The signal strength information may be generated by fixed terminals 1 to 8 having signal strength measuring capability.

In an embodiment of the invention, the signal strength information is generated by the wireless gateway 9.

The locating unit 404 may compare the position vector with the topography of the physical structure 104 and determine the section 106A according to the comparison.

In an embodiment of the invention, the locating unit 404 includes information on the boundaries 102A to 102D of the sections 106A, 106B and compares the position vector with the boundaries 102A to 102D. A section 106A, 106B with boundaries 102A to 102D confining the position vector is considered to be a relevant section 106A.

The register 402 comprises N entries (#1, #2,.., #N) of fixed terminals 1 to 8.

In an embodiment of the invention, an entry (#1, #2,.., #N) comprises a terminal identity (FT#1, FT#2,..,FT#N) and section identity (S#1, S#1,..,S#M). The section identity is specific to a section 106A to106D.

In an embodiment of the invention, a terminal identity is associated with a section identity. A fixed terminal holding a terminal identity is located in the section holding the section identity. For example, in the register 402 of the current example, fixed terminal FT#1 is associated with section S#1, while fixed terminal FT#2 is associated with section S#2. In reverse, section S#1 is associated with fixed terminals FT#1, FT#3, FT#N-1, while section S#2 is associated with fixed terminals FT#2, FT#K, FT#N.

The association between the terminal identity and the section identity may be implemented with an associative data structure.

In an embodiment of the invention, the entries (#1, #2,.., #N) are entries of an access control list of a ZigBee system. The access control list is a table used by a device to determine which devices are authorized to perform a specific function. The access control list may further store security material, such as cryptographic keys, frame counts and security level information of

fixed devices 1 to 8. The access control list is typically a part of a PAN (Personal Area Network) information base.

After identifying a relevant section 106A, the locating unit 404 may communicate the section identity 412 to the command unit 406.

The command unit 406 may retrieve terminal identities 414 from the register 402, wherein the terminal identities 414 are associated with the relevant section 106A by using the section identity 412.

In an embodiment of the invention, the command unit 406 issues a command 416 to communicate terminal identities of fixed terminals 1 to 3 locating in the relevant section 106A. The terminal identities are communicated to the mobile terminal 11 which has entered the relevant section 106A.

The command 416 is transmitted in a command transmission 410 to the wireless gateway 9 and/or to the fixed terminals 1 to 3 in the section 106A.

The mobile terminal 11 may display the terminal identities to the user, for example in a list showed on the user interface. A list restricted to fixed terminals 1 to 3 locating in the relevant section 106A reduces showing irrelevant fixed terminals to the user. The irrelevant fixed terminals are outside the relevant section 106A.

In an embodiment of the invention, the command 416 includes an allowance message, which allows the fixed terminals 1 to 3 to identify themselves with the mobile terminal 11. In such case, the fixed terminals 1 to 3 may send a radio transmission to the mobile terminal 11, which radio transmission includes the terminal identity of each fixed terminal 1 to 3.

In an embodiment of the invention, the command 416 includes the terminal identities of the fixed terminals 1 to 3 locating in the relevant section 106A. The command may be transmitted to the mobile terminal 11 from the wireless gateway 9, fixed terminal 1 to 3 and/or from the base unit 10.

In an embodiment of the invention, the WPAN 100 further comprises coded instructions to block communication of terminal identities of fixed terminals 6 to 8 to the mobile terminal 11 entering the relevant section 106A, which fixed terminals 6 to 8 are outside the relevant section 106A. This embodiment may be relevant when the configuration of the WPAN 100 assumes that the terminal identities of the fixed terminals 1 to 8 be communicated to the mobile terminal 11 by default. Thus, terminal identities of fixed terminals 1 to 3 locating in the relevant section 106A are not blocked. The coded instructions may

be implemented with software, which is executed in the processor unit 302 of the base unit 300.

In an embodiment of the invention, the command 416 includes display instructions to show the terminal identities of the fixed terminals 1 to 3 locating in the relevant section 106A. Identities of fixed terminals 1 to 8 outside the relevant section 106A may be available to the mobile terminal 11, but the display instructions instruct the mobile terminal 11 to display only terminal identities of the fixed terminals 1 to 3 locating in the relevant section 106A.

In an embodiment of the invention, the WPAN 100 further includes an updating unit (UDU) 420 for updating the information in the register 402. The updating comprises setting up the register 402 by inputting an input 418 including terminal identities and section identities into the register 402. The updating unit 420 may be implemented with the user interface of the mobile terminal 11. In an embodiment of the invention, the updating unit 420 is connected to the transceiver 306, and the updating may be carried out remotely.

The locating unit 404 may be implemented with a computer program executable in a digital processor, such as processing unit 302 of the base unit 300, in the WPAN. The locating unit 404 may also be located in the wireless gateway 9 and/or in a fixed terminal 1 to 8.

The command unit 406 may be implemented with a computer program executable in a digital processor, such as processing unit 302 of the base unit 300, in the WPAN. The command unit 406 may also be located in the wireless gateway 9 and/or in a fixed terminal 1 to 8.

With reference to Figure 5, an example of a methodology according to embodiments of the invention are shown.

In 500, the method starts.

In 502, a register 402 comprising entries of the space-fixed wireless terminals is set up, wherein an entry indicates an association between a space-fixed wireless terminal 1 to 5 and a section 106A, 106B in a physical structure 104 on the basis of the spatial location of the space-fixed wireless terminal 1 to 5.

In 504, it is indicated if a mobile terminal 11 enters the section 106A.

In 506, a command 416 to communicate identities of space-fixed wireless terminals 1 to 3 locating in a relevant section 106A is issued to a mobile terminal 11 entering the relevant section 106A.

In 508, communication of identities of space-fixed wireless terminals 4 to 8 to a mobile terminal 11 entering the relevant section 106A is blocked, which space-fixed wireless terminals 4 to 8 are outside the relevant section 106A.

In 510, the method ends.

Embodiments of the method may be implemented as a computer program comprising instructions for executing a computer process in a digital processor, such as the processing unit 302 of the base unit 400. The computer program may be embodied in a computer program product.

The computer program may be stored on a computer program distribution medium readable by a computer or a processor. The computer program medium may be, for example but not limited to, an electric, magnetic, optical, infrared or semiconductor system, device or transmission medium. The computer program medium may include at least one of the following media: a computer readable medium, a program storage medium, a record medium, a computer readable memory, a random access memory, an erasable programmable read-only memory, a computer readable software distribution package, a computer readable signal, a computer readable telecommunications signal, computer readable printed matter, and a computer readable compressed software package.

Even though the invention has been described above with reference to an example according to the accompanying drawings, it is clear that the invention is not restricted thereto but it can be modified in several ways within the scope of the appended claims.

Claims

1. A wireless personal area network, characterized in that the wireless personal area network comprises:

a plurality of space-fixed wireless terminals (1 to 8); and

a register (402) comprising entries of the space-fixed wireless terminals (1 to 5), wherein an entry indicates an association between a space-fixed wireless terminal (1 to 5) and a section in a physical structure on the basis of the spatial location of the space-fixed wireless terminal (1 to 8).

2. The wireless personal area network of claim 1, further comprising a locating unit (404) operatively connectable to the space-fixed wireless terminals (1 to 8) and the register (402), the locating unit (404) being configured to indicate if a mobile wireless terminal (11) enters the section.

3. The wireless personal area network of claim 1, wherein at least some of the space-fixed wireless terminals (1 to 8) are capable of communicating wirelessly with a mobile wireless terminal (11).

4. The wireless personal area network of claim 1, further comprising a command unit (406) for issuing a command to communicate identities of space-fixed wireless terminals locating in the section to a mobile wireless terminal (11) entering the section.

5. The wireless personal area network of claim 1, further comprising coded instructions to block communication of identities of space-fixed wireless terminals (6 to 8) to a mobile wireless terminal (11) entering the section, which space-fixed wireless terminals (6 to 8) are outside the section.

6. A network element of a wireless personal area network, characterized in that the wireless personal area network comprises a plurality of space-fixed wireless terminals, the network element comprising a register (402) comprising entries of the space-fixed wireless terminals (1 to 5), wherein an entry indicates an association between a space-fixed wireless terminal (1 to 5) and a section in a physical structure on the basis of the spatial location of the space-fixed wireless terminal (1 to 8).

7. The network element of claim 6, further comprising a locating unit (404) operatively connectable to the space-fixed wireless terminals (1 to 8) and the register (402), the locating unit (404) being configured to indicate if a mobile wireless terminal (11) enters the section.

8. The network element of claim 6, wherein at least some of the space-fixed wireless terminals are capable of communicating wirelessly with a mobile wireless terminal.

9. The network element of claim 6, further comprising command unit (406) for issuing a command to communicate identities of space-fixed wireless terminals locating in the section to a mobile wireless terminal (11) entering the section.

10. The network element of claim 6, further including coded instructions to block communication of identities of space-fixed wireless terminals (6 to 8) to a mobile wireless terminal (11) entering the section, which space-fixed wireless terminals (6 to 8) are outside the section.

11. A method of configuring a wireless personal area network, characterized in that the wireless personal area network comprises a plurality of space-fixed wireless terminals, the method comprising setting up (502) a register comprising entries of the space-fixed wireless terminals, wherein an entry indicates an association between a space-fixed wireless terminal and a section in a physical structure on the basis of the spatial location of the space-fixed wireless terminal.

12. A method of claim 11, characterized by indicating (504) if a mobile wireless terminal enters the section.

13. A method of claim 11, characterized by issuing (506) a command to communicate identities of space-fixed wireless terminals locating in the section to a mobile wireless terminal entering the section.

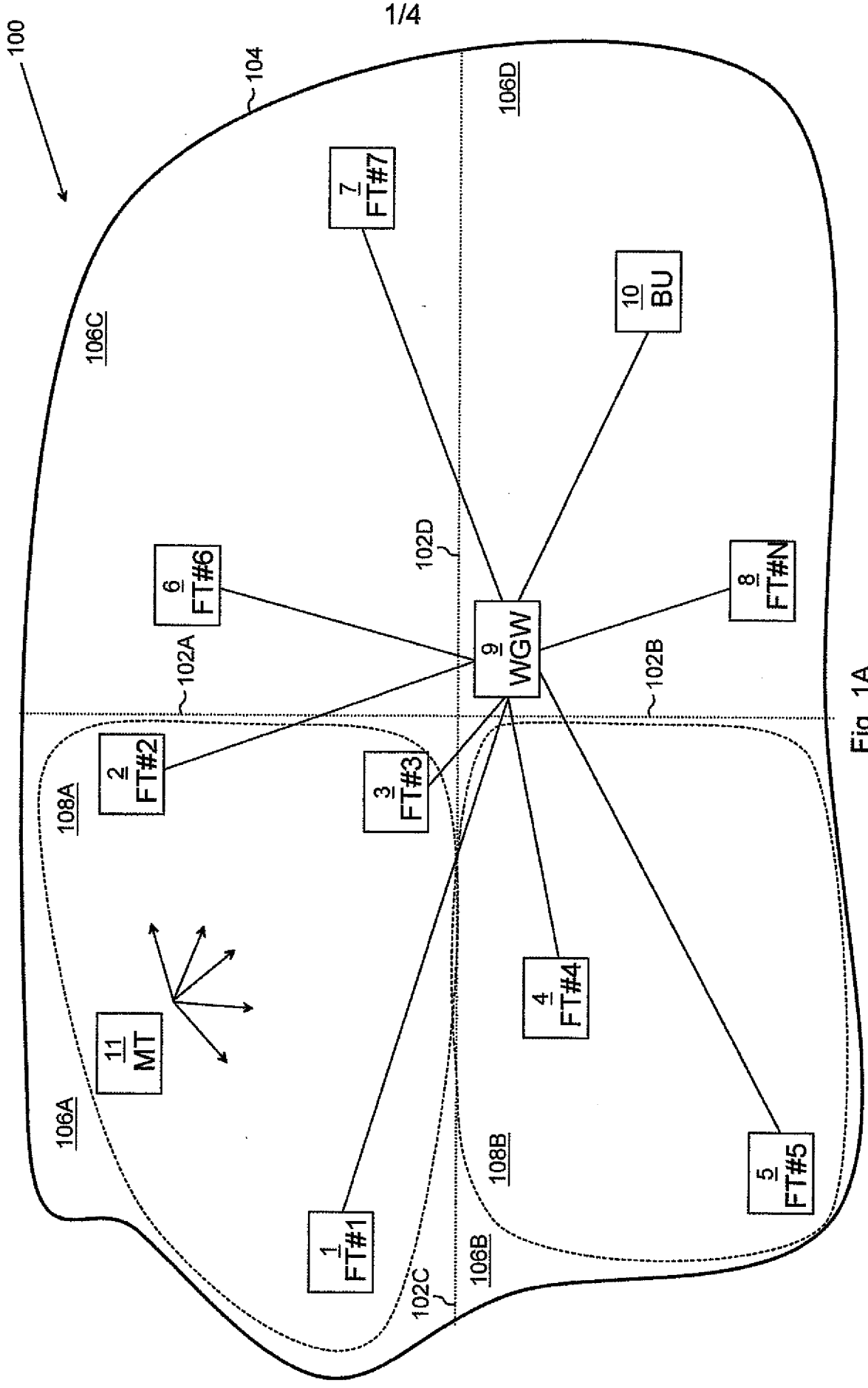
14. A method of claim 11, characterized by blocking (508) communication of identities of space-fixed wireless terminals to a mobile wireless terminal entering the section, which space-fixed wireless terminals are outside the section.

15. A computer program encoding instructions for executing a computer process for configuring a wireless personal area network, characterized in that the wireless personal area network comprises a plurality of space-fixed wireless terminals, the computer process comprising setting up (502) a register comprising entries of the space-fixed wireless terminals, wherein an entry indicates an association between a space-fixed wireless terminal and a section in a physical structure on the basis of the spatial location of the space-fixed wireless terminal.

16. A computer program product encoding a computer program of claim 15.

17. A computer program distribution medium readable by a computer and encoding a computer program of claim 15.

18. The computer program distribution medium of claim 17, the distribution medium including at least one of the following media: a computer readable medium, a program storage medium, a record medium, a computer readable memory, a computer readable software distribution package, a computer readable signal, a computer readable telecommunications signal, and a computer readable compressed software package.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104
106C
106D
7 FT#7
10 BU
6 FT#6
102D
8 FT#N
9 WGW
102A
102B
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108A
11 MT
4 FT#4
106A
108B
5 FT#5
1 FT#1
102C
106B

Fig. 1A

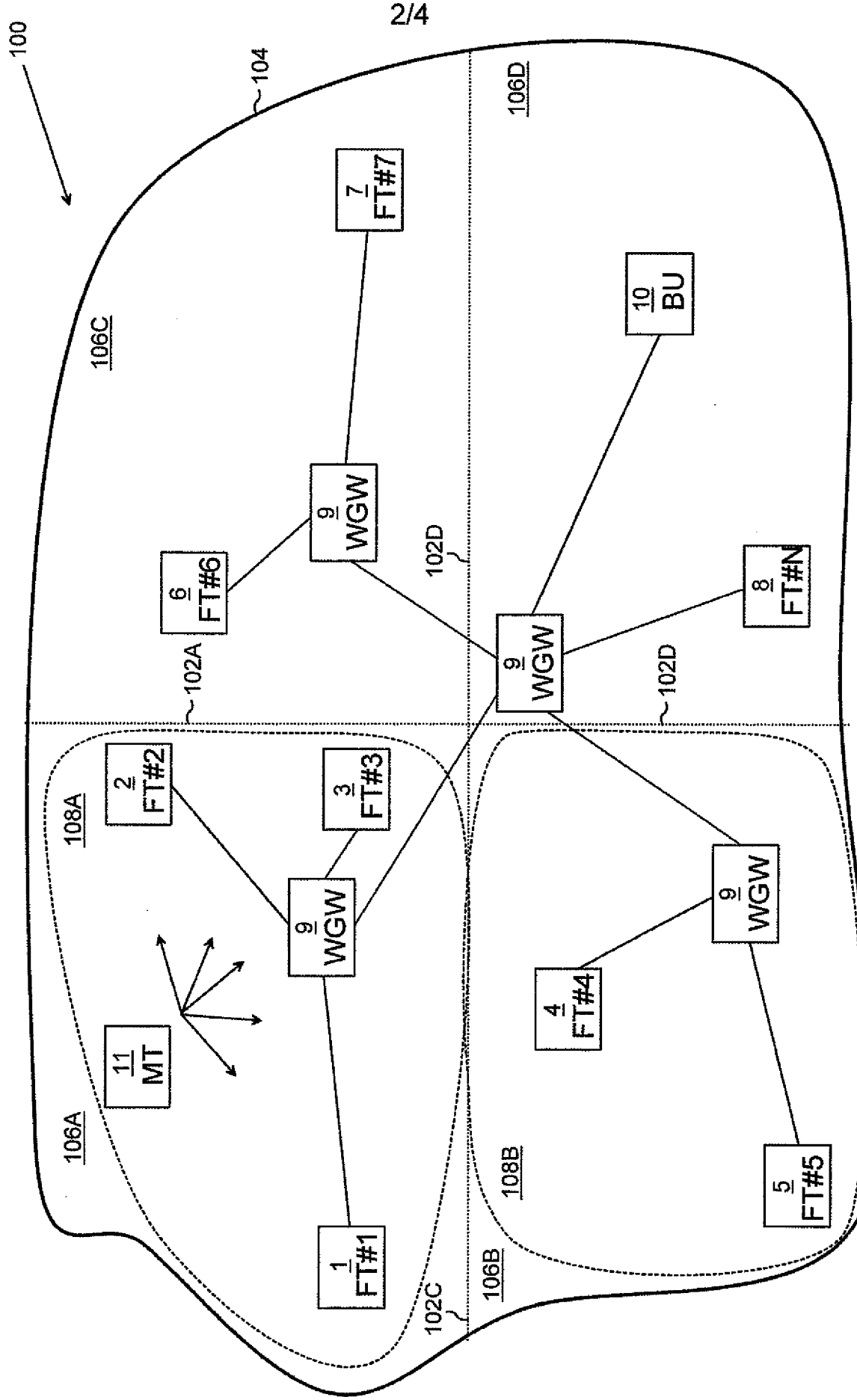
100
104
106C
106D
7 FT#7
10 BU
9 WGW
6 FT#6
102D
8 FT#N
102A
9 WGW
102D
108A
2 FT#2
3 FT#3
9 WGW
9 WGW
11 MT
4 FT#4
106A
108B
1 FT#1
5 FT#5
102C
106B

Fig. 1B

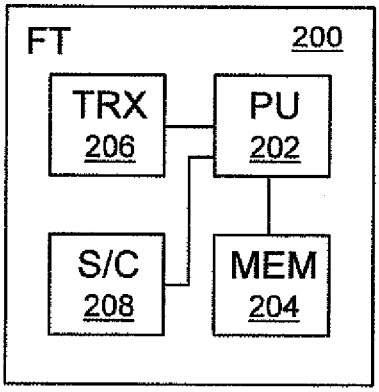

Fig. 2

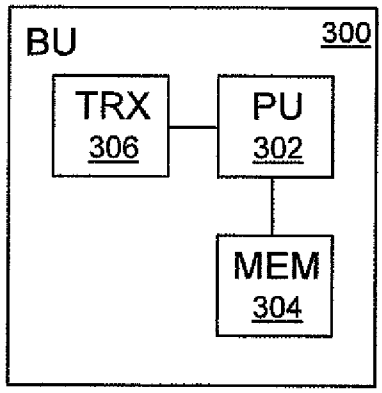

Fig. 3

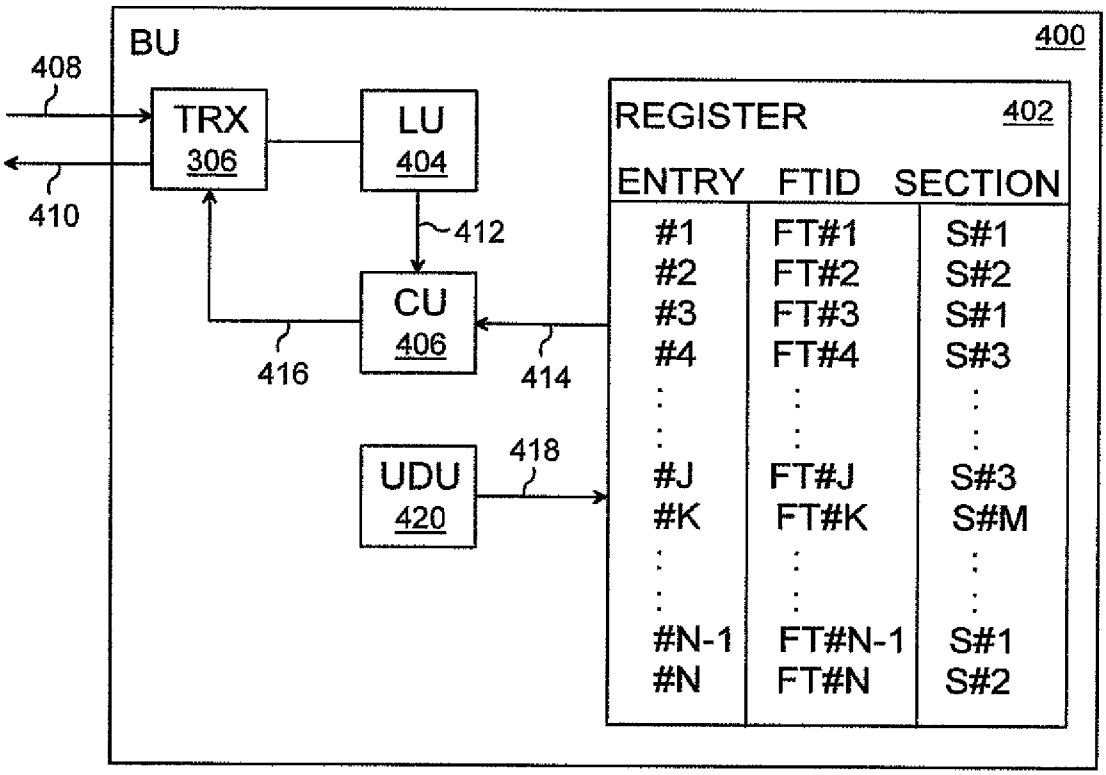

Fig. 4

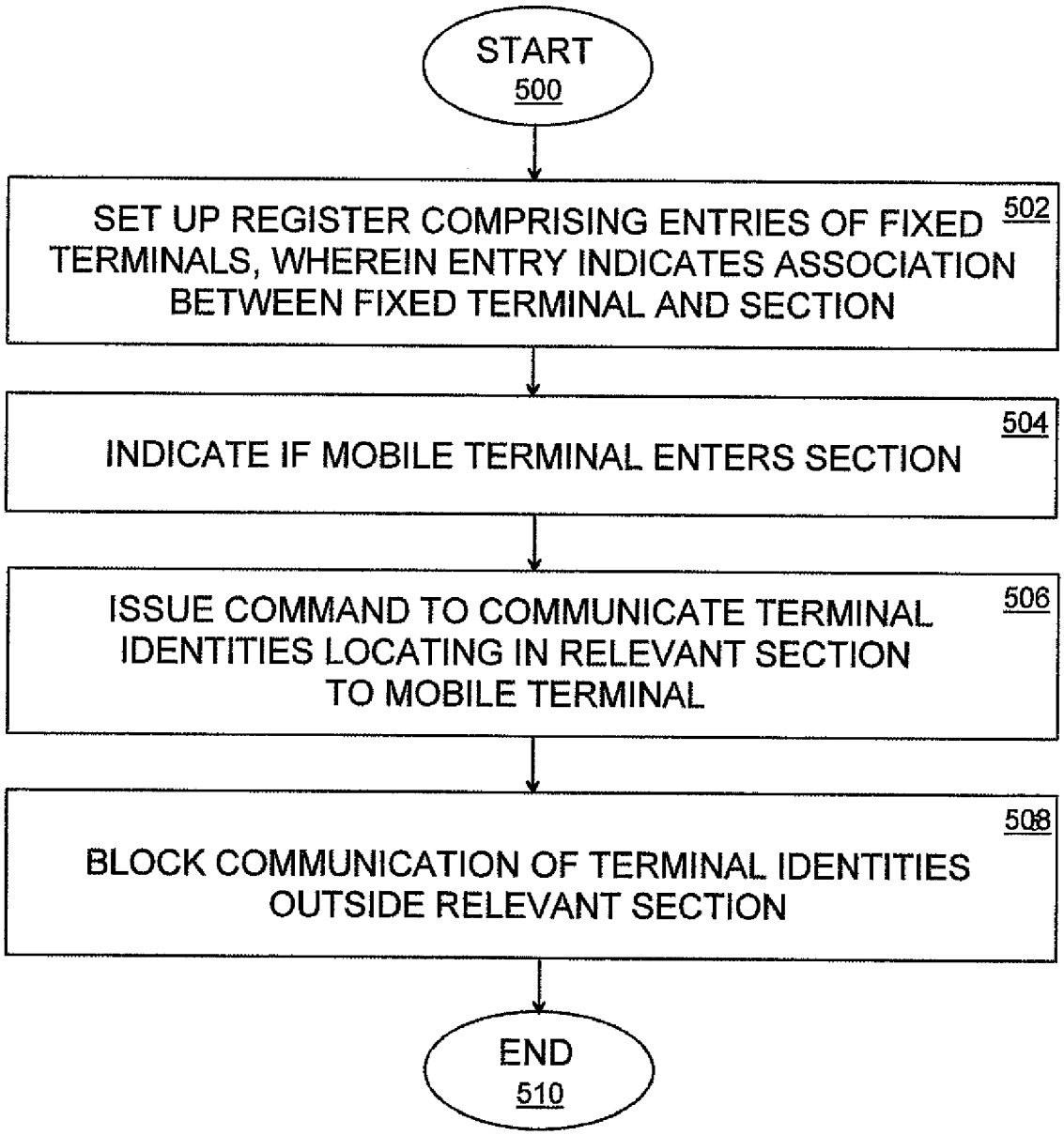
START
500
SET UP REGISTER COMPRISING ENTRIES OF FIXED TERMINALS, WHEREIN ENTRY INDICATES ASSOCIATION BETWEEN FIXED TERMINAL AND SECTION
502
INDICATE IF MOBILE TERMINAL ENTERS SECTION
504
ISSUE COMMAND TO COMMUNICATE TERMINAL IDENTITIES LOCATING IN RELEVANT SECTION TO MOBILE TERMINAL
506
BLOCK COMMUNICATION OF TERMINAL IDENTITIES OUTSIDE RELEVANT SECTION
508
END
510

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2006/050581

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC8: H04L

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

FI, SE, NO, DK

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

EPO-Internal, WPI, INSPEC, ETSI, IEEE, Compendex, IEE, IETF, IPCOM, Internet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5544321 A (THEIMER MARVIN M et al.) 06 August 1996 (06.08.1996), whole document	1-18
X	EP 1612999 A1 (MICROSOFT CORP) 04 January 2006 (04.01.2006), paragraphs [0013], [0031], [0046]-[0051],[0062]-[0064], [0073], Figs. 2,3,6,7,9	1-18
A	SCHULZRINNE et al., Ubiquitous Computing in Home Networks. IEEE Communications Magazine, November 2003, Vol.41, No.11, pages 128 - 135, ISSN 0163-6804. Retrieved from the Internet: URL:http://ieeexplore.ieee.org/iel5/35/27889/01244933.pdf?tp=&arnumber=1244933&isnumber=27889> [retrieved on 2007-07-11], whole document	1-18

☒ 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	Date of mailing of the international search report
08 August 2007 (08.08.2007)	24 September 2007 (24.09.2007)

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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CHAUDHRY et al. 'A proxy-enabled service discovery architecture to find proximity-based services in 6LoWPAN.' In: Embedded and Ubiquitous Computing. International Conference, EUC 2006, 1-4 Aug. 2006. Proceedings (Lecture Notes in Computer Science Vol. 4096), Berlin: Springer-Verlag, 2006, p. 956 - 965., abstract	1-18
A	US 2006/0240774 A1 (BLOM JAN et al.) 26 October 2006 (26.10.2006), abstract, paragraph [0040]	
A	US 2005/0147133 A1 (TANG HONG D et al.) 07 July 2005 (07.07.2005), abstract, Fig. 1	1-18
E,X	WO 2007/012998 A1 (KONINKL PHILIPS ELECTRONICS NV et al.) 01 February 2007 (01.02.2007), whole document	1-18

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WO 2007/012998 A1	01/02/2007	None	

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CLASSIFICATION OF SUBJECT MATTER

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H04L 29/08 (2006.01)
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H04L 12/28 (2006.01)
G06Q 10/00 (2006.01)