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Közvetlen módú kommunikáció jogszerű ellenőrzése egy vezeték nélküli távközlési hálózatban

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(54) **DIRECT MODE LAWFUL INTERCEPTION IN A WIRELESS TELECOMMUNICATIONS NETWORK**

RECHTMÄSSIGE ÜBERWACHUNG FÜR DIREKTMODUS-KOMMUNIKATION IN EINEM
DRAHTLOSEN TELEKOMMUNIKATIONSNETZ

INTERCEPTION LÉGALE DES COMMUNICATIONS EN MODE DIRECT DANS UN RÉSEAU DE
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Description

BACKGROUND

[0001] The present invention relates a method for enabling lawful interception in a telecommunications network, especially a public land mobile network.

[0002] The present invention further relates to a user equipment for enabling lawful interception in a telecommunications network, and to a base transceiver station for enabling lawful interception in a telecommunications network.

[0003] For any communication via public land mobile networks, operators have the legal obligation to provide means for lawful interception towards the national authorities. Normally, the network provides a special lawful interception interface which allows breaking out traffic towards and from terminal devices which are subject to lawful interception. The details of the lawful interception requirements, lawful interception architecture and lawful interception interfaces are defined by 3GPP in TS 33.106, TS 33.107 & TS 33.108. In 3GPP the interface is called "Handover interface for lawful interception". Depending on the service domain (Circuit Switched vs. packet switched), the interfaces providing for traffic being forwarded to the lawful interception interface originate in the MSC (Mobile Switching Center), e.g. for CS voice traffic, or in the GGSN (GPRS (Global Packet Radio System) Gateway Support Node), e.g. for packet data services.

[0004] As device to device communications define new communication services directly between user equipments (or terminal devices) in the cellular network, new authentication and administration procedures are required. Besides an authentication towards the network, control means have to be provided which grant a particular user equipment (or terminal) to transmit in a broadcast like way allowing reception by a multitude of terminal devices in proximity range.

[0005] In contrast to conventional communication in a cellular network, the realization of device to device communication means that situations can occur where neither the radio access network, nor the core network are part of the device to device user data communication path.

[0006] This is a challenge for fulfilling the requirements for lawful interception, as current methods require the telecommunications network, especially the access network of the telecommunications network, to be at least principally able to access the user data communication path in order to be able to duplicate the traffic towards the lawful interception entity. In the framework of device to device communication, such an access of the user data communication path is not provided for in case that a device to device communication link is established, especially a direct mode device to device communication.

[0007] Document US-A-2004/203582 discloses communication interception in an ad-hoc wireless network

without requiring direct interception by a law enforcement agency and without requiring real-time involvement of the network infrastructure. The terminals capture call information about calls and store it inside the terminal so that it can be gathered later by the network provider when an MS contacts a base station again. The network provider will then forward the gathered information to the lawful intercept entity.

10 SUMMARY

[0008] The invention is defined by independent claims 1, 5, 8, 11 and 12. Specific embodiments are set out in the dependent claims.

15 **[0009]** An object of the present invention is to provide a technically simple, effective and especially cost effective solution for enabling lawful interception in a telecommunications network, especially a public land mobile network, where the telecommunications network provides (or provides at least partly, e.g. within a part of the access network of the telecommunications network) device to device communication services and wherein user equipments that are camping on the telecommunications network and that are requesting and using such device to device communications services are behaving such that
20 lawful interception can be realized as commonly known with cellular radio communication networks such as public land mobile networks.

25 **[0010]** The object of the present invention is achieved by a method for enabling lawful interception in a telecommunications network, the telecommunications network comprising a core network and an access network, wherein a user equipment, camping on the telecommunications network, is enabled for device to device communication, wherein the access network of the telecommunications network comprises a base transceiver station, wherein the user equipment is connected to the base transceiver station and the base transceiver station is enabled for allowing the user equipment to conduct device to device communication, wherein a minimum transmission power level corresponds to the smallest transmission power the user equipment uses when transmitting a radio signal, wherein in case that
30

45 -- the user equipment is subjected to a lawful interception observation, and
-- the user equipment is sending a request, to the base transceiver station, to conduct a device to device communication,

50 a first message is sent from the base transceiver station to the user equipment, wherein the first message comprises the indication of a permission to conduct a device to device communication by the user equipment, wherein

55 -- either the first message or
-- a second message sent from the base transceiver station to the user equipment furthermore comprises a transmission power information, wherein the trans-

mission power information indicates the value of the minimum transmission power of the user equipment when conducting device to device communication.

[0011] Alternatively, the object of the present invention is achieved by a method for enabling lawful interception in a telecommunications network, the telecommunications network comprising a core network and an access network, wherein a user equipment, camping on the telecommunications network, is enabled for device to device communication, wherein the access network of the telecommunications network comprises a base transceiver station, wherein the user equipment is connected to the base transceiver station and the base transceiver station is enabled for allowing the user equipment to conduct device to device communication, wherein a minimum transmission power level corresponds to the smallest transmission power the user equipment uses when transmitting a radio signal, wherein in case that

- the user equipment is subjected to a lawful interception observation, and
 - the user equipment is sending a request, to the base transceiver station, to conduct a device to device communication,
- a first message is sent from the base transceiver station to the user equipment, wherein the first message comprises the indication of a permission to conduct a device to device communication by the user equipment, wherein
- either the first message or
 - a second message sent from the base transceiver station to the user equipment furthermore comprises a transmission power information, wherein the transmission power information indicates the value of the minimum transmission power of the user equipment, when conducting device to device communication, such that the transmission power of the user equipment is set high enough by the user equipment to allow reception of the device to device communication at the base transceiver station.

[0012] It is thereby advantageously possible according to the present invention that data traffic - which is exchanged between user equipments that are enabled for device to device communication - is captured for lawful interception purposes, especially such data traffic that is transmitted directly between two user equipments (or terminals) that are enabled for device to device communication (or directly between more than two, e.g. three, four or even more user equipments (or terminals) that are enabled for device to device communication purposes), such data traffic being transmitted on the direct path (between the user equipments) either in a broadcast like way, or in a dedicated communication (direct mode) between the two device to device enabled user equipments (or the multitude of device to device enabled user equipments/terminal devices).

[0013] According to the present invention, it is advantageously possible that lawful interception is possible even for situations that two or more user equipments communicate directly with each other according to device to device communication procedures. It has to be assured that the user traffic data transmitted to or from a user equipment that has to be monitored according to a lawful interception observation is accessible to the access network of the telecommunications network, i.e. at least a base transceiver station. According to the present invention, it is proposed to impose an increased transmission power level to such a user equipment subjected to a lawful interception monitoring as well as to such user equipments that are communicating with the user equipment to be monitored, especially in a direct mode device to device communication situation.

[0014] The increased transmission power level to be used by the user equipment subjected to a lawful interception observation is defined by setting a minimum transmission power level corresponding to the smallest transmission power that the user equipment uses when transmitting radio signals.

[0015] Typically, device to device communication cannot be initiated by a user equipment camping on a telecommunications network, especially a cellular public land mobile network, without the user equipment receiving a message comprising the consent of a component of the telecommunications network, especially a component of the access network, typically a base transceiver station, that the device to device communication is granted for that specific user equipment. This means that prior to initiating the device to device communication, the user equipment receives a message (hereinafter also called "first message") having at least the content (perhaps inter alia) to grant the possibility to conduct a device to device communication.

[0016] Either in this first message received from the base transceiver station or in another message (hereinafter also called "second message") received from the base transceiver station, the minimum transmission power level is communicated to the user equipment. This is done by means of the transmission of transmission power information, wherein the transmission power information indicates the value of the minimum transmission power of the user equipment when conducting device to device communication.

[0017] According to the present invention, the minimum transmission power level should be chosen such that a reliable reception, by the respective base transceiver station, of the radio signals transmitted by the user equipment subjected to a lawful interception observation is possible when conducting a device to device communication. The minimum transmission power level can, e.g., be indicated by means of the transmission power information in the form of a coded information, e.g. a binary value using three bits for 8 different minimum transmission power levels, or using four bits for 16 different minimum transmission power levels or the like.

[0018] According to a preferred embodiment of the present invention, the request to conduct a device to device communication is a request to send a proximity transmission or a request to establish a direct mode transmission.

[0019] Thereby, it is advantageously possible to use the minimum transmission power level in different device to device communication situations.

[0020] According to a further preferred embodiment of the present invention, a further user equipment is camping on the telecommunications network, the further user equipment being enabled for device to device communication, wherein the further user equipment is connected to the base transceiver station and the base transceiver station is enabled for allowing the further user equipment to conduct device to device communication, wherein in case that the further user equipment is sending a further request, to the base transceiver station, to conduct a direct mode device to device communication with the user equipment while the user equipment being subjected to a lawful interception observation,

a further first message is sent from the base transceiver station to the further user equipment, wherein the further first message comprises the indication of a permission to conduct a device to device communication, by the further user equipment, with the user equipment, wherein

- either the further first message or
- a further second message sent from the base transceiver station to the further user equipment comprises a further transmission power information, wherein the further transmission power information indicates of the minimum transmission power of the further user equipment when the conducting the direct mode device to device communication with the user equipment.

[0021] Thereby, it is advantageously possible to intercept the entire device to device communication of a user equipment that is subjected to a lawful interception observation, also such parts of the device to device communication that the user equipment has with another user equipment that is not subjected to a lawful interception observation.

[0022] Furthermore, the present invention relates to a user equipment for enabling lawful interception in a telecommunications network, the telecommunications network comprising a core network and an access network, wherein the user equipment, camping on the telecommunications network, is enabled for device to device communication, wherein the user equipment is connected to a base transceiver station of the access network of the telecommunications network, wherein the base transceiver station is enabled for allowing the user equipment to conduct device to device communication, wherein the user equipment is configured such that

- in case that the user equipment is subjected to a

lawful interception observation, and the user equipment is sending a request, to the base transceiver station, to conduct a device to device communication,

a first message is received by the user equipment from the base transceiver station, wherein the first message comprises the indication of a permission to conduct a device to device communication by the user equipment, wherein the user equipment is configured such that a minimum transmission power level corresponds to the smallest transmission power the user equipment uses when transmitting a radio signal, and the minimum transmission power is used by the user equipment when conducting device to device communication, wherein the minimum transmission power is indicated by a transmission power information received by the user equipment

- either by the first message
- or by a second message sent from the base transceiver station to the user equipment.

[0023] Alternatively, the present invention relates furthermore also to a user equipment for enabling lawful interception in a telecommunications network, the telecommunications network comprising a core network and an access network, wherein the user equipment, camping on the telecommunications network, is enabled for device to device communication, wherein the user equipment is connected to a base transceiver station of the access network of the telecommunications network, wherein the base transceiver station is enabled for allowing the user equipment to conduct device to device communication, wherein the user equipment is configured such that -- in case that the user equipment is subjected to a lawful interception observation, and the user equipment is sending a request, to the base transceiver station, to conduct a device to device communication, a first message is received by the user equipment from the base transceiver station, wherein the first message comprises the indication of a permission to conduct a device to device communication by the user equipment, wherein the user equipment is configured such that a minimum transmission power level corresponds to the smallest transmission power the user equipment uses when transmitting a radio signal, and the minimum transmission power is used by the user equipment when conducting device to device communication, wherein the minimum transmission power is

- indicated by a transmission power information received by the user equipment

- either by the first message
- or by a second message sent from the base transceiver station to the user equipment, and

-- such that the transmission power of the user equipment is set high enough by the user equipment to

allow reception of the device to device communication at the base transceiver station.

[0024] Thereby, it is advantageously possible that the user equipment, being subjected to a lawful interception observation, is able to conduct device to device communication and the data traffic can nevertheless be intercepted.

[0025] It is furthermore preferred according to the present invention - also with respect to the user equipment - that the request to conduct a device to device communication is a request to send a proximity transmission or a request to establish a direct mode transmission.

[0026] Additionally, the present invention relates to a base transceiver station for enabling lawful interception in a telecommunications network, the telecommunications network comprising a core network and an access network, wherein a user equipment, camping on the telecommunications network, is enabled for device to device communication, wherein the user equipment is connected to the base transceiver station of the access network of the telecommunications network, wherein the base transceiver station is enabled for allowing the user equipment to conduct device to device communication, wherein a minimum transmission power level corresponds to the smallest transmission power the user equipment uses when transmitting a radio signal, wherein the base transceiver station is configured such that

-- in case that the user equipment is subjected to a lawful interception observation, and the base transceiver station is receiving a request, by the user equipment, to conduct a device to device communication, a first message is sent by the base transceiver station to the user equipment, wherein the first message comprises the indication of a permission to conduct a device to device communication by the user equipment, wherein the base transceiver station is configured such that

-- either the first message or

-- a second message sent from the base transceiver station to the user equipment furthermore comprises a transmission power information, wherein the transmission power information indicates the minimum transmission power of the user equipment when conducting device to device communication.

[0027] Alternatively, the present invention relates additionally also to a base transceiver station for enabling lawful interception in a telecommunications network, the telecommunications network comprising a core network and an access network, wherein a user equipment, camping on the telecommunications network, is enabled for device to device communication, wherein the user equipment is connected to the base transceiver station of the access network of the telecommunications net-

work, wherein the base transceiver station is enabled for allowing the user equipment to conduct device to device communication, wherein a minimum transmission power level corresponds to the smallest transmission power the user equipment uses when transmitting a radio signal, wherein the base transceiver station is configured such that

-- in case that the user equipment is subjected to a lawful interception observation, and the base transceiver station is receiving a request, by the user equipment, to conduct a device to device communication,

a first message is sent by the base transceiver station to the user equipment, wherein the first message comprises the indication of a permission to conduct a device to device communication by the user equipment, wherein the base transceiver station is configured such that

-- either the first message or

-- a second message sent from the base transceiver station to the user equipment furthermore comprises a transmission power information, wherein the transmission power information indicates the minimum transmission power of the user equipment when conducting device to device communication such that the transmission power of the user equipment (20) is set high enough by the user equipment to allow reception of the device to device communication at the base transceiver station.

[0028] The base transceiver station advantageously provides the possibility that a user equipment, being subjected to a lawful interception observation, can use device to device communication services and communication traffic can nevertheless be intercepted.

[0029] Additionally, the present invention relates to a program comprising a computer readable program code which, when executed on a computer or on a user equipment or on a base transceiver station, causes the computer or the user equipment or the base transceiver station to perform the inventive method.

[0030] Still additionally, the present invention relates to computer program product for using a user equipment with a base transceiver station, the computer program product comprising a computer program stored on a storage medium, the computer program comprising program code which, when executed on a computer or on the user equipment or on the base transceiver station, causes the computer or the user equipment or the base transceiver station to perform the inventive method.

[0031] These and other characteristics, features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention. The description is given for the sake of example only, without limiting the scope of the invention. The reference

figures quoted below refer to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032]

Figure 1 schematically illustrates a telecommunications network that is enabled for allowing user equipments, camping on the telecommunications network, especially a public land mobile network, the possibility to conduct device to device communication.

Figures 2 to 5 schematically illustrate communication diagrams between a base transceiver station and user equipments according to the present invention.

DETAILED DESCRIPTION

[0033] The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are nonlimiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes.

[0034] Where an indefinite or definite article is used when referring to a singular noun, e.g. "a", "an", "the", this includes a plural of that noun unless something else is specifically stated.

[0035] Furthermore, the terms first, second, third and the like in the description and in the claims are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other sequences than described or illustrated herein.

[0036] In Figure 1, a telecommunications network 100, especially a public land mobile network 100, is schematically shown, the telecommunications network 100 comprising an access network 110 and a core network 120. The telecommunications network 100 is preferably a cellular telecommunications network comprising typically a plurality of network cells, one of which is represented in Figure 1 by means of a drawnthrough line and reference sign 10. In the telecommunications network 100, typically a plurality of user equipments 20, 21, 22 are camping on the telecommunications network 100 within the network cell 10, i.e. the user equipments 20, 21, 22 are connected or are camping on a base transceiver station 111 serving the cell 10. The base transceiver station 111 is typically a base station, e.g. a NodeB or an eNodeB base transceiver station.

[0037] The telecommunications network 100 allows at least in parts of the telecommunications network 100 that

user equipments 20, 21, 22 use device to device communication services. Especially, the base transceiver station 111 is enabled for allowing the user equipments 20, 21, 22 to conduct device to device communication services. The user equipments 20, 21, 22 are also enabled for device to device communication.

[0038] The core network 120 is only schematically shown by means of a cloud representation. The public land mobile network 100 (especially the core network 120) comprises typically various network elements such as an MSC (Mobile Switching Center), a SGSN (Serving GPRS Support Node), a MME (Mobility Management Entity), preferably a plurality of network element thereof. These network elements are hierarchically higher network elements than the base transceiver station 111.

[0039] In Figures 2 to 5, communication diagrams between the base transceiver station 111 and user equipments 20 and 21 according to the present invention are schematically shown. According to the present invention, the user equipment designated by reference sign 20 is a user equipment that is subjected to a lawful interception observation and is also called a first user equipment 20. Furthermore according to the present invention, the user equipment designated by reference sign 21 is a so-called further user equipment (also called second user equipment 21) that is not subjected to a lawful interception observation but is communicating with the user equipment 20 (or first user equipment 20).

[0040] The premise is that the user equipment 20 and the further user equipment 21 are camping on the radio cell 10 served by the base transceiver station 111. The base transceiver station 111 is a controlling base station of any cellular radio technology. The purpose of the base transceiver station 111 (or base station) (and optionally the connected network elements of the core network 120) is to authenticate the user equipments 20, 21, 22 (or the corresponding subscriber) of the service or services using device to device communication and grant a data transmission for this device or these devices (i.e. user equipment or user equipments). The base transceiver station 111 furthermore controls the channel allocation (i.e. which radio resources shall be used by the user equipment or user equipments 20, 21, 22 for the device to device communication, especially for the related user data transmission; in this respect, the radio technology, frequency, time slot, transmission code, etc. are defined and allocated by the base transceiver station 111). Furthermore, the base transceiver station 111 informs the user equipment 20 or the plurality of user equipments 20, 21, 22 about transmission parameters to be used, such as, e.g., scrambling codes, modulation and coding schemes, possibly a radio identifier and transmission parameters like data rate, maximum allowed transmission power, etc. During the normal operation of the device to device communication, the controlling base transceiver station 111 might grant an access authentication attempt of a device to device user equipment 20, 21, 22 and in turn assigns parameters required to define the transmis-

sion resource. These parameters may be (partly) predefined, or valid for multiple transmissions.

[0041] Typically, device to device communication can occur in different communication contexts or according to different communication situations, which need to be distinguished for the grant of a device to device communication transmission:

-- The first is referred here as "device to device proximity transmission", i.e. a transmission, by the user (first) equipment 20, of data in a proximity range (around the (first) user equipment 20) that allows reception of such data by a single or a multitude of device to device enabled user equipments 21, 22 in the vicinity of the transmitting device to device enabled device (i.e. in the vicinity of the (first) user equipment 20).

-- Furthermore, a direct user data transmission - also called device to device direct mode transmission - between device to device enabled terminals (or user equipments) might be granted by the base transceiver station 111 (i.e. the controlling telecommunications network) where user data exchange is conducted directly between the user equipments 20, 21, 22 concerned, e.g. between the (first) user equipment 20 and the (second) further user equipment 21, i.e. not involving the base transceiver station 111 (except for the exchange of control or signalization information needed to be exchanged with the base transceiver station 111).

Additionally, the classical transmission between two mobile terminals (or user equipments) via the base transceiver station 111 and optionally also via the core network 120 might occur, which is referred to by the expression of "device to device default data path transmission" in the context of the present invention. This "default data path transmission" can be optimised to exclude the core network 120 in the data path and is thus called "locally routed data path".

[0042] The present invention is, however, focused on the handling - especially with respect to lawful interception purposes - of the two other device to device communication modes, i.e. device to device proximity transmission and device to device direct mode transmission.

[0043] In Figures 2 and 3, device to device communication occurs between the user equipment 20 and the further user equipment 21 (or between the first user equipment 20 and the second user equipment 21) using the device to device proximity transmission. In the situation illustrated in Figure 2, a device to device proximity transmission 301 is initiated by the user equipment 20 (or first user equipment 20). This device to device proximity transmission 301 of the user equipment 20 is answered by the further user equipment 21 (or second user equipment 21) by means of a proximity transmission answer 302 to the proximity transmission 301. In the situation illustrated in Figure 3, a further device to device

proximity transmission 303 is initiated by the further user equipment 21 (or second user equipment 21). This further device to device proximity transmission 303 of the further user equipment 21 is answered by the user equipment 20 (or first user equipment 20) by means of a further proximity transmission answer 304 to the further proximity transmission 303.

[0044] In both cases illustrated in Figures 2 and 3, in a preliminary step - i.e. prior to the transmission of the device to device proximity transmissions 301, 303 and the respective proximity transmission answers 302, 304 - of the communication of the (first) user equipment 20 and the further (or second) user equipment 21 with the base transceiver station 111, the user equipment 20 sends a request 201 to the base transceiver station 111 requesting to be allowed to use device to device services, and the base transceiver station 111 sends a first message 202 granting access to device to device communication services to the (first) user equipment 20. Either in the first message 202 or in an additional second message 203, the base transceiver station 111 furthermore indicates a minimum transmission power to be used for the device to device communication services, i.e. for the device to device proximity transmission 301 (in the communication situation of Figure 2) and for the device to device proximity transmission answer 304 (in the communication situation of Figure 3).

[0045] In Figures 4 and 5, device to device communication occurs between the user equipment 20 and the further user equipment 21 (or between the first user equipment 20 and the second user equipment 21) using the device to device direct mode transmission. In the situation illustrated in Figure 4, a device to device direct mode transmission 305 towards the further (or second) user equipment 21 is initiated by the user equipment 20 (or first user equipment 20). This request by the user equipment 20 is answered by the further user equipment 21 (or second user equipment 21) and a device to device direct mode transmission 306 initiated. In the situation illustrated in Figure 5, a device to device direct mode transmission 307 towards the (first) user equipment 20 is initiated by the further user equipment 21 (or second user equipment 21). This request by the further user equipment 21 (or second user equipment 21) is answered by the user equipment 20 (or first user equipment 20) and a device to device direct mode transmission 308 initiated.

[0046] In both cases illustrated in Figures 4 and 5, in a preliminary step - i.e. prior to the transmission of the requests to establish a device to device direct mode transmissions to the respective other user equipment - of the communication of the (first) user equipment 20 and the further (or second) user equipment 21 with the base transceiver station 111, the user equipment initiating the device to device direct mode transmission (i.e. the first user equipment 20 for the case illustrated in Figure 4, and the second user equipment 21 for the case illustrated in Figure 5) sends a request to the base transceiver sta-

tion 111 requesting to be allowed to use device to device services, and to set up a direct mode transmission to the other user equipment. This request corresponds, for the case illustrated in Figure 4, to the request 201 of the (first) user equipment 20 towards the base transceiver station 111 indicating that a direct mode device to device transmission towards the further (or second) user equipment 21 is requested; for the case illustrated in Figure 5, this request corresponds, to a request 211 of the further (or second) user equipment 21 towards the base transceiver station 111 indicating that a direct mode device to device transmission towards the (first) user equipment 20 is requested. In the situation of Figure 4, the base transceiver station 111 sends the first message 202 granting access to device to device communication services to the (first) user equipment 20. Either in the first message 202 or in the additional second message 203, the base transceiver station 111 furthermore indicates a minimum transmission power to be used for the device to device communication services, i.e. for the device to device direct mode transmission 305. In the situation of Figure 5, the base transceiver station 111 sends a further first message 212 granting access to device to device communication services to the further (or second) user equipment 21. Either in the further first message 212 or in an additional second message 213, the base transceiver station 111 furthermore indicates a minimum transmission power to be used for the device to device communication services, i.e. for the device to device direct mode transmission 307.

[0047] In a typical device to device communication situation, i.e. without lawful interception observation, the controlling basestation would control the transmission power of the respective user equipments within the radio cell or in proximity of each other in a way that a number of device to device communication enabled devices in the proximity range of the transmitting device to device enabled user equipment are able to receive the broadcast transmission of that user equipment. This is mainly in order to ensure that a transmission can be received within a defined range of the transmitting device to device user equipment, and limit interference problems with respect to other transmissions that could occur in case that the transmission power used by the device to device enabled user equipment is exceedingly high. Such a control of the transmission power of the respective user equipments within the radio cell or in proximity of each other can, e.g.,

- either be performed by means of setting, imposed by the base transceiver station, one defined transmission power level or value (for all such device to device communication enabled devices) or a plurality of defined transmission power levels or values, each for one of the respective device to device communication enabled user equipments,
- or be performed such that one defined transmission power range (i.e. between a lower transmission power level and a higher transmission power level)

is set (e. g. for all such device to device communication enabled devices) or a plurality of defined transmission power ranges, each for one of the respective device to device communication enabled user equipments are set by the base transceiver station and the actual transmission power level to be used is defined by the respective user equipment or user equipments,

such that device to device communication enabled devices in the proximity range of the transmitting device to device enabled user equipment are able to receive the broadcast transmission of that user equipment.

However, in case that a device to device data transmission (either the device to device proximity transmission (or proximity message) or the device to device direct mode transmission) are to be initiated by a user equipment subject to lawful interception requirements, it needs to be ensured that the content of the transmitted data can be received somewhere in the radio access network 110 of the telecommunications network 100 for further routing to the lawful interception interface of the telecommunications network 100. This can be assured, e.g., by imposing the minimum transmission power directly by the base transceiver station or by setting (or imposing), by the base transceiver station, the above mentioned defined transmission power range or the plurality of defined transmission power ranges such that the lower transmission power level corresponds to the minimum transmission power.

[0048] In case that a user equipment under lawful interception observation requests authentication for a device to device proximity transmission (i.e. in the situation illustrated in Figure 2), the controlling network (i.e. the base transceiver station) configures the grant for the requested device to device proximity transmission in such a way that it is ensured that the base transceiver station 111 can also receive the proximity transmission 301. According to the present invention, this is done by setting the transmission power of the user equipment 20 to be used to a value high enough so that the base transceiver station 111 can also receive this proximity transmission. As the controlling base transceiver station 111 is in charge of controlling all the radio resource utilisation under its coverage area (e.g. the radio cell), it can also allocate dedicated transmission resources for the actual device to device direct mode (or direct path) transmission for the user equipment 20 under observation, thereby minimising interference problems.

[0049] In a further exemplary situation (illustrated in Figure 3), the user equipment 20 being subject for lawful interception observation is not the user equipment 21 originating the device to device proximity transmission 303. The user equipment 20 subjected to lawful interception observation is just receiving the device to device proximity transmission 303 (from the further user equip-

ment 21, i.e. the originator) and is joining the originator (further user equipment 21), e.g. for further device to device direct communication. In this case, the receiver of the device to device proximity transmission 303 (i.e. the first user equipment 20) sends a "joining request" message to the controlling base transceiver station 111 which in turn links this user to the originator (i.e. the second user equipment 21) of the device to device proximity transmission 303.

[0050] According to another situation illustrated in Figures 4 and 5, a device to device enabled user equipment requires the setup of a device to device direct mode transmission (or direct mode path) to another device to device enabled user equipment, the controlling base transceiver station 111 can either set the configuration of the transmission for both terminals in a way that the base transceiver station 111 can receive the transmissions of both of the terminals (e.g. by setting the transmission power of both user equipments 20, 21 to higher values as normally required for the direct data transmission between the user equipments 20, 21) or to set up the "default data path transmission" or the "locally routed data path" in order to ensure that the data traffic is exchanged via the base transceiver station 111 or even the core network 120 and classic lawful interception can be used.

[0051] The present invention also refers to the situation where a lawful interception of all terminals (or user equipments) in a given area (e.g. a radio cell 10 of the telecommunications network 100) is required, especially by intercepting device to device proximity transmissions and/or device to device direct mode transmissions. In this case the device to device proximity transmission of any terminal in the respective area (so without a selection of individual subscribers, based on, e.g., the IMSI (International Mobile Subscriber Identity)) is set to a transmission power which is high enough to allow reception of the device to device messages at the controlling base transceiver station. This can be useful for authorities in case of group gatherings of persons under special legal observation or an area requiring specific observation of device to device communication (e.g. prisons).

[0052] According to another preferred embodiment of the present invention, user equipments can be used for relaying purposes of data path data transmitted between device to device enabled user equipments using device to device communication. This means that in a situation such that

- a device to device proximity transmission or direct mode transmission of a user equipment subjected to lawful interception cannot be received at the base transceiver station 111 (even though the user equipment already applies its maximum transmission power which is possible)
- but can be received at a third user equipment 22 and
- a radio transmission between the third user equipment 22 and the base transceiver station 111 is possible,

then the the third user equipment 22 can be used as a relay of this device to device transmission towards the base transceiver station 111.

Claims

1. Method for enabling lawful interception in a telecommunications network (100), the telecommunications network (100) comprising a core network (120) and an access network (110), wherein a user equipment (20), camping on the telecommunications network (100), is enabled for device to device communication, wherein the access network (110) of the telecommunications network (100) comprises a base transceiver station (111), wherein the user equipment (20) is connected to the base transceiver station (111) and the base transceiver station (111) is enabled for allowing the user equipment (20) to conduct device to device communication, wherein a minimum transmission power level corresponds to the smallest transmission power the user equipment (20) uses when transmitting a radio signal, wherein in case that

-- the user equipment (20) is subjected to a lawful interception observation, and

-- the user equipment (20) is sending a request (201), to the base transceiver station (111), to conduct a device to device communication, a first message (202) is sent from the base transceiver station (111) to the user equipment (20), wherein the first message (202) comprises the indication of a permission to conduct a device to device communication by the user equipment (20), wherein

-- either the first message (202) or

-- a second message (203) sent from the base transceiver station (111) to the user equipment (20)

furthermore comprises a transmission power information, wherein the transmission power information indicates the value of the minimum transmission power of the user equipment (20), when conducting device to device communication, such that the transmission power of the user equipment (20) is set high enough by the user equipment (20) to allow reception of the device to device communication at the base transceiver station (111).

2. Method according to claim 1, wherein the request (201) to conduct a device to device communication is a request to send a proximity transmission (301).
3. Method according to one of the preceding claims, wherein the request (201) to conduct a device to de-

vice communication is a request to establish a direct mode transmission (305).

4. Method according to one of the preceding claims, wherein a further user equipment (21) is camping on the telecommunications network (100), the further user equipment (21) being enabled for device to device communication, wherein the further user equipment (21) is connected to the base transceiver station (111) and the base transceiver station (111) is enabled for allowing the further user equipment (21) to conduct device to device communication, wherein in case that the further user equipment (21) is sending a further request (211), to the base transceiver station (111), to conduct a direct mode device to device communication with the user equipment (20) while the user equipment (20) being subjected to a lawful interception observation, a further first message (212) is sent from the base transceiver station (111) to the further user equipment (21), wherein the further first message (212) comprises the indication of a permission to conduct a device to device communication, by the further user equipment (21), with the user equipment (20), wherein
 - either the further first message (212) or
 - a further second message (213) sent from the base transceiver station (111) to the further user equipment (21)
 comprises a further transmission power information, wherein the further transmission power information indicates of the minimum transmission power of the further user equipment (21) when the conducting the direct mode device to device communication with the user equipment (20).
5. User equipment (20) for enabling lawful interception in a telecommunications network (100), the telecommunications network (100) comprising a core network (120) and an access network (110), wherein the user equipment (20), camping on the telecommunications network (100), is enabled for device to device communication, wherein the user equipment (20) is connected to a base transceiver station (111) of the access network (110) of the telecommunications network (100), wherein the base transceiver station (111) is enabled for allowing the user equipment (20) to conduct device to device communication, wherein the user equipment (20) is configured such that
 - in case that the user equipment (20) is subjected to a lawful interception observation, and the user equipment (20) is sending a request (201), to the base transceiver station (111), to conduct a device to device communication,

a first message (202) is received by the user equipment (20) from the base transceiver station (111), wherein the first message (202) comprises the indication of a permission to conduct a device to device communication by the user equipment (20), wherein the user equipment (20) is configured such that a minimum transmission power level corresponds to the smallest transmission power the user equipment (20) uses when transmitting a radio signal, and the minimum transmission power is used by the user equipment (20) when conducting device to device communication, wherein the minimum transmission power is -- indicated by a transmission power information received by the user equipment (20)

- either by the first message (202)
- or by a second message (203) sent from the base transceiver station (111) to the user equipment (20), and

-- such that the transmission power of the user equipment (20) is set high enough by the user equipment (20) to allow reception of the device to device communication at the base transceiver station (111).

6. User equipment (20) according to claim 5, wherein the request (201) to conduct a device to device communication is a request to send a proximity transmission (301).
7. User equipment (20) according to claim 5 or 6, wherein the request (201) to conduct a device to device communication is a request to establish a direct mode transmission (305).
8. Base transceiver station (111) for enabling lawful interception in a telecommunications network (100), the telecommunications network (100) comprising a core network (120) and an access network (110), wherein a user equipment (20), camping on the telecommunications network (100), is enabled for device to device communication, wherein the user equipment (20) is connected to the base transceiver station (111) of the access network (110) of the telecommunications network (100), wherein the base transceiver station (111) is enabled for allowing the user equipment (20) to conduct device to device communication, wherein a minimum transmission power level corresponds to the smallest transmission power the user equipment (20) uses when transmitting a radio signal, wherein the base transceiver station (111) is configured such that
 - in case that the user equipment (20) is subjected to a lawful interception observation, and

the base transceiver station (111) is receiving a request (201), by the user equipment (20), to conduct a device to device communication, a first message (202) is sent by the base transceiver station (111) to the user equipment (20), wherein the first message (202) comprises the indication of a permission to conduct a device to device communication by the user equipment (20), wherein the base transceiver station (111) is configured such that

-- either the first message (202) or

-- a second message (203) sent from the base transceiver station (111) to the user equipment (20)

furthermore comprises a transmission power information, wherein the transmission power information indicates the minimum transmission power of the user equipment (20) when conducting device to device communication such that the transmission power of the user equipment (20) is set high enough by the user equipment (20) to allow reception of the device to device communication at the base transceiver station (111).

9. Base transceiver station (111) according to claim 8, wherein the request (201) to conduct a device to device communication is a request to send a proximity transmission (301).

10. Base transceiver station (111) according to claim 8 or 9, wherein the request (201) to conduct a device to device communication is a request to establish a direct mode transmission (305).

Patentansprüche

1. Verfahren zum Ermöglichen eines rechtmäßigen Abfangens in einem Telekommunikationsnetz (100), wobei das Telekommunikationsnetz (100) ein Kernnetz (120) und ein Zugangsnetz (110) umfasst, wobei eine Nutzereinrichtung (20), die in dem Telekommunikationsnetz (100) kampiert, zu einer Gerät-zu-Gerät-Kommunikation befähigt ist, wobei das Zugangsnetz (110) des Telekommunikationsnetzes (100) eine Basistransceiverstation (111) umfasst, wobei die Nutzereinrichtung (20) mit der Basistransceiverstation (111) verbunden ist und die Basistransceiverstation (111) befähigt ist, es der Nutzereinrichtung (20) zu erlauben, eine Gerät-zu-Gerät-Kommunikation auszuführen, wobei ein Mindestsendeleistungspegel der kleinsten Sendeleistung entspricht, welche die Nutzereinrichtung (20) verwendet, wenn sie ein Funksignal sendet, wobei für den Fall, dass

- die Nutzereinrichtung (20) einer rechtmäßigen

Abfangüberwachung unterzogen wird, und

- die Nutzereinrichtung (20) eine Anforderung (201) an die Basistransceiverstation (111) sendet, eine Gerät-zu-Gerät-Kommunikation auszuführen,

eine erste Nachricht (202) von der Basistransceiverstation (111) an die Nutzereinrichtung (20) gesendet wird, wobei die erste Nachricht (202) den Hinweis auf eine Erlaubnis zum Ausführen einer Gerät-zu-Gerät-Kommunikation durch die Nutzereinrichtung (20) umfasst, wobei

- entweder die erste Nachricht (202) oder

- eine zweite Nachricht (203), die von der Basistransceiverstation (111) zu der Nutzereinrichtung (20) gesendet wird,

des Weiteren eine Sendeleistungsinformation umfasst, wobei die Sendeleistungsinformation den Wert der Mindestsendeleistung der Nutzereinrichtung (20) angibt, wenn eine Gerät-zu-Gerät-Kommunikation ausgeführt wird, so dass die Sendeleistung der Nutzereinrichtung (20) durch die Nutzereinrichtung (20) hoch genug eingestellt wird, um den Empfang der Gerät-zu-Gerät-Kommunikation in der Basistransceiverstation (111) zu erlauben.

2. Verfahren nach Anspruch 1, wobei die Anforderung (201), eine Gerät-zu-Gerät-Kommunikation auszuführen, eine Anforderung zum Senden einer Proximitätsübertragung (301) ist.

3. Verfahren nach einem der vorangehenden Ansprüche, wobei die Anforderung (201), eine Gerät-zu-Gerät-Kommunikation auszuführen, eine Anforderung zum Aufbau einer Direktmodusübertragung (305) ist.

4. Verfahren nach einem der vorangehenden Ansprüche, wobei eine weitere Nutzereinrichtung (21) in dem Telekommunikationsnetz (100) kampiert, wobei die weitere Nutzereinrichtung (21) für eine Gerät-zu-Gerät-Kommunikation befähigt wird, wobei die weitere Nutzereinrichtung (21) mit der Basistransceiverstation (111) verbunden ist und die Basistransceiverstation (111) befähigt ist, es der weiteren Nutzereinrichtung (21) zu erlauben, eine Gerät-zu-Gerät-Kommunikation auszuführen, wobei, falls die weitere Nutzereinrichtung (21) eine weitere Anforderung (211) an die Basistransceiverstation (111) sendet, eine Direktmodus-Gerät-zu-Gerät-Kommunikation mit der Nutzereinrichtung (20) auszuführen, während die Nutzereinrichtung (20) einer rechtmäßigen Abfangüberwachung unterzogen wird, eine weitere erste Nachricht (212) von der Basistransceiverstation (111) an die weitere Nutzereinrichtung (21) gesendet wird, wobei die weitere erste

Nachricht (212) den Hinweis auf eine Erlaubnis zum Ausführen einer Gerät-zu-Gerät-Kommunikation, durch die weitere Nutzereinrichtung (21), mit der Nutzereinrichtung (20) umfasst, wobei

- entweder die weitere erste Nachricht (212) oder
- eine weitere zweite Nachricht (213), die von der Basistransceiverstation (111) an die weitere Nutzereinrichtung (21) gesendet wird,

eine weitere Sendeleistungsinformation umfasst, wobei die weitere Sendeleistungsinformation die Mindestsendeleistung der weiteren Nutzereinrichtung (21) angibt, wenn die Direktmodus-Gerät-zu-Gerät-Kommunikation mit der Nutzereinrichtung (20) ausgeführt wird.

5. Nutzereinrichtung (20) zum Ermöglichen eines rechtmäßigen Abfanges in einem Telekommunikationsnetz (100), wobei das Telekommunikationsnetz (100) ein Kernnetz (120) und ein Zugangsnetz (110) umfasst, wobei die Nutzereinrichtung (20), die in dem Telekommunikationsnetz (100) kampiert, zu einer Gerät-zu-Gerät-Kommunikation befähigt ist, wobei die Nutzereinrichtung (20) mit einer Basistransceiverstation (111) des Zugangsnetzes (110) des Telekommunikationsnetzes (100) verbunden ist, wobei die Basistransceiverstation (111) befähigt ist, es der Nutzereinrichtung (20) zu erlauben, eine Gerät-zu-Gerät-Kommunikation auszuführen, wobei die Nutzereinrichtung (20) so eingerichtet ist, dass

- in dem Fall, dass die Nutzereinrichtung (20) einer rechtmäßigen Abfangüberwachung unterzogen wird und die Nutzereinrichtung (20) eine Anforderung (201) an die Basistransceiverstation (111) sendet, eine Gerät-zu-Gerät-Kommunikation auszuführen, eine erste Nachricht (202) durch die Nutzereinrichtung (20) von der Basistransceiverstation (111) empfangen wird, wobei die erste Nachricht (202) den Hinweis auf eine Erlaubnis zum Ausführen einer Gerät-zu-Gerät-Kommunikation durch die Nutzereinrichtung (20) umfasst, wobei die Nutzereinrichtung (20) so eingerichtet ist, dass ein Mindestsendeleistungspegel der kleinsten Sendeleistung entspricht, welche die Nutzereinrichtung (20) verwendet, wenn sie ein Funksignal sendet, und die Mindestsendeleistung durch die Nutzereinrichtung (20) verwendet wird, wenn eine Gerät-zu-Gerät-Kommunikation ausgeführt wird,

wobei die Mindestsendeleistung

- durch eine Sendeleistungsinformation angegeben wird, die durch die Nutzereinrichtung (20) empfangen wird

- entweder durch die erste Nachricht (202)
- oder durch eine zweite Nachricht (203), die von der Basistransceiverstation (111) zu der Nutzereinrichtung (20) gesendet wird, und
- so, dass die Sendeleistung der Nutzereinrichtung (20) durch die Nutzereinrichtung (20) hoch genug eingestellt wird, um den Empfang der Gerät-zu-Gerät-Kommunikation in der Basistransceiverstation (111) zu erlauben.

6. Nutzereinrichtung (20) nach Anspruch 5, wobei die Anforderung (201), eine Gerät-zu-Gerät-Kommunikation auszuführen, eine Anforderung zum Senden einer Proximitätsübertragung (301) ist.

7. Nutzereinrichtung (20) nach Anspruch 5 oder 6, wobei die Anforderung (201), eine Gerät-zu-Gerät-Kommunikation auszuführen, eine Anforderung zum Aufbau einer Direktmodusübertragung (305) ist.

8. Basistransceiverstation (111) zum Ermöglichen eines rechtmäßigen Abfanges in einem Telekommunikationsnetz (100), wobei das Telekommunikationsnetz (100) ein Kernnetz (120) und ein Zugangsnetz (110) umfasst, wobei eine Nutzereinrichtung (20), die in dem Telekommunikationsnetz (100) kampiert, zu einer Gerät-zu-Gerät-Kommunikation befähigt ist, wobei die Nutzereinrichtung (20) mit der Basistransceiverstation (111) des Zugangsnetzes (110) des Telekommunikationsnetzes (100) verbunden ist, wobei die Basistransceiverstation (111) befähigt ist, es der Nutzereinrichtung (20) zu erlauben, eine Gerät-zu-Gerät-Kommunikation auszuführen, wobei ein Mindestsendeleistungspegel der kleinsten Sendeleistung entspricht, welche die Nutzereinrichtung (20) verwendet, wenn sie ein Funksignal sendet, wobei die Basistransceiverstation (111) so eingerichtet ist, dass

- für den Fall, dass die Nutzereinrichtung (20) einer rechtmäßigen Abfangüberwachung unterzogen wird und die Basistransceiverstation (111) eine Anforderung (201) durch die Nutzereinrichtung (20) empfängt, eine Gerät-zu-Gerät-Kommunikation auszuführen, eine erste Nachricht (202) durch die Basistransceiverstation (111) an die Nutzereinrichtung (20) gesendet wird, wobei die erste Nachricht (202) den Hinweis auf eine Erlaubnis zum Ausführen einer Gerät-zu-Gerät-Kommunikation durch die Nutzereinrichtung (20) umfasst, wobei die Basistransceiverstation (111) so eingerichtet ist, dass
- entweder die erste Nachricht (202) oder
- eine zweite Nachricht (203), die von der Basistransceiverstation (111) zu der Nutzereinrichtung (20) gesendet wird,

des Weiteren eine Sendeleistungsinformation um-

fasst, wobei die Sendeleistungsinformation die Mindestsendeleistung der Nutzereinrichtung (20) angibt, wenn eine Gerät-zu-Gerät-Kommunikation ausgeführt wird, so dass die Sendeleistung der Nutzereinrichtung (20) durch die Nutzereinrichtung (20) hoch genug eingestellt wird, um den Empfang der Gerät-zu-Gerät-Kommunikation in der Basistransceiverstation (111) zu erlauben.

9. Basistransceiverstation (111) nach Anspruch 8, wobei die Anforderung (201), eine Gerät-zu-Gerät-Kommunikation auszuführen, eine Anforderung zum Senden einer Proximitätsübertragung (301) ist.

10. Basistransceiverstation (111) nach Anspruch 8 oder 9, wobei die Anforderung (201), eine Gerät-zu-Gerät-Kommunikation auszuführen, eine Anforderung zum Aufbau einer Direktmodusübertragung (305) ist.

Revendications

1. Procédé pour permettre une interception légale dans un réseau de télécommunication (100), le réseau de télécommunication (100) comprenant un réseau central (120) et un réseau d'accès (110), dans lequel un équipement d'utilisateur (20), domicilié sur le réseau de télécommunication (100), est activé pour la communication de dispositif à dispositif, dans lequel le réseau d'accès (110) du réseau de télécommunication (100) comprend une station émettrice-réceptrice de base (111), dans lequel l'équipement d'utilisateur (20) est connecté à la station émettrice-réceptrice de base (111), et la station émettrice-réceptrice de base (111) est activée pour permettre à l'équipement d'utilisateur (20) d'effectuer une communication de dispositif à dispositif, dans lequel un niveau de puissance d'émission minimale correspond à la puissance d'émission la plus faible que l'équipement d'utilisateur (20) utilise lorsqu'il émet un signal radio, dans lequel au cas où

- l'équipement d'utilisateur (20) fait l'objet d'une observation d'interception légale, et
- l'équipement d'utilisateur (20) envoie une demande (201), à la station émettrice-réceptrice de base (111), pour effectuer une communication de dispositif à dispositif,

un premier message (202) est envoyé par la station émettrice-réceptrice de base (111) à l'équipement d'utilisateur (20), dans lequel, le premier message (202) comprend l'indication d'une autorisation d'effectuer une communication de dispositif à dispositif par l'équipement d'utilisateur (20), dans lequel

- soit le premier message (202),

- soit un second message (203) envoyé par la station émettrice-réceptrice de base (111) à l'équipement d'utilisateur (20)

comprend en outre une information de puissance d'émission, dans lequel l'information de puissance d'émission indique la valeur de la puissance d'émission minimale de l'équipement d'utilisateur (20), lorsqu'il effectue une communication de dispositif à dispositif, de telle sorte que la puissance d'émission de l'équipement d'utilisateur (20) est réglée suffisamment haute par l'équipement d'utilisateur (20) pour permettre la réception de la communication de dispositif à dispositif au niveau de la station émettrice-réceptrice de base (111).

2. Procédé selon la revendication 1, dans lequel la demande (201) pour effectuer une communication de dispositif à dispositif est une demande pour envoyer une transmission de proximité (301).

3. Procédé selon l'une des revendications précédentes, dans lequel la demande (201) pour effectuer une communication de dispositif à dispositif est une demande pour établir une transmission en mode direct (305).

4. Procédé selon l'une des revendications précédentes, dans lequel un autre équipement d'utilisateur (21) est domicilié sur le réseau de télécommunication (100), l'autre équipement d'utilisateur (21) étant activé pour une communication de dispositif à dispositif, dans lequel l'autre équipement d'utilisateur (21) est connecté à la station émettrice-réceptrice de base (111) et la station émettrice-réceptrice de base (111) est activée pour permettre à l'autre équipement d'utilisateur (21) d'effectuer une communication de dispositif à dispositif, dans lequel dans le cas où l'autre équipement d'utilisateur (21) envoie une autre demande (211) à la station émettrice-réceptrice de base (111) pour effectuer une communication de dispositif à dispositif en mode direct avec l'équipement d'utilisateur (20) tandis que l'équipement d'utilisateur (20) fait l'objet d'une observation d'interception légale, un autre premier message (212) est envoyé par la station émettrice-réceptrice de base (111) à l'autre équipement d'utilisateur (21), dans lequel l'autre premier message (212) comprend l'indication d'une autorisation d'effectuer une communication de dispositif à dispositif, par l'autre équipement d'utilisateur (21), avec l'équipement d'utilisateur (20), dans lequel

- soit l'autre premier message (212),
- soit un autre second message (213) envoyé par la station émettrice-réceptrice de base (111) à l'équipement d'utilisateur (21)

comprend une autre information de puissance d'émission, dans lequel l'autre information de puissance d'émission indique la puissance d'émission minimale de l'autre équipement d'utilisateur (21) lorsqu'il effectue une communication de dispositif à dispositif en mode direct avec l'équipement d'utilisateur (20).

5. Équipement d'utilisateur (20) pour permettre une interception légale dans un réseau de télécommunication (100), le réseau de télécommunication (100) comprenant un réseau central (120) et un réseau d'accès (110), dans lequel l'équipement d'utilisateur (20), domicilié sur le réseau de télécommunication (100), est activé pour une communication de dispositif à dispositif, dans lequel l'équipement d'utilisateur (20) est connecté à une station émettrice-réceptrice de base (111) du réseau d'accès (110) du réseau de télécommunication (100), dans lequel la station émettrice-réceptrice de base (111) est activée pour permettre à l'équipement d'utilisateur (20) d'effectuer une communication de dispositif à dispositif, dans lequel l'équipement d'utilisateur (20) est configuré de telle sorte que

- dans le cas où l'équipement d'utilisateur (20) fait l'objet d'une observation d'interception légale, et l'équipement d'utilisateur (20) envoie une demande (201), à la station émettrice-réceptrice de base (111), pour effectuer une communication de dispositif à dispositif, un premier message (202) est reçu par l'équipement d'utilisateur (20) à partir de la station émettrice-réceptrice de base (111), dans lequel le premier message (202) comprend l'indication d'une autorisation d'effectuer une communication de dispositif à dispositif par l'équipement d'utilisateur (20), dans lequel l'équipement d'utilisateur (20) est configuré de telle sorte qu'un niveau de puissance d'émission minimale correspond à la puissance d'émission la plus faible que l'équipement d'utilisateur (20) utilise lorsqu'il émet un signal radio, et la puissance d'émission minimale est utilisée par l'équipement d'utilisateur (20) lorsqu'il effectue une communication de dispositif à dispositif, dans lequel la puissance d'émission minimale est

- indiquée par une information de puissance d'émission reçue par l'équipement d'utilisateur (20)

- soit par le premier message (202)

- soit par un second message (203) envoyé par la station émettrice-réceptrice de base (111) à l'équipement d'utilisateur (20), et

- de telle sorte que la puissance d'émission de l'équipement d'utilisateur (20) est réglée suffisamment haute par l'équipement d'utilisateur (20) pour permettre la réception de la commu-

nication de dispositif à dispositif au niveau de la station émettrice-réceptrice de base (111).

6. Équipement d'utilisateur (20) selon la revendication 5, dans lequel la demande (201) pour effectuer une communication de dispositif à dispositif est une demande pour envoyer une transmission de proximité (301).

7. Équipement d'utilisateur (20) selon la revendication 5 ou 6, dans lequel la demande (201) pour effectuer une communication de dispositif à dispositif est une demande pour établir une transmission en mode direct (305).

8. Station émettrice-réceptrice de base (111) pour permettre une interception légale dans un réseau de télécommunication (100), le réseau de télécommunication (100) comprenant un réseau central (120) et un réseau d'accès (110), dans lequel un équipement d'utilisateur (20), domicilié sur le réseau de télécommunication (100), est activé pour une communication de dispositif à dispositif, dans lequel l'équipement d'utilisateur (20) est connecté à la station émettrice-réceptrice de base (111) du réseau d'accès (110) du réseau de télécommunication (100), dans lequel la station émettrice-réceptrice de base (111) est activée pour permettre à l'équipement d'utilisateur (20) d'effectuer une communication de dispositif à dispositif, dans lequel un niveau de puissance d'émission minimale correspond à la puissance d'émission la plus faible que l'équipement d'utilisateur (20) utilise lorsqu'il émet un signal radio, dans lequel la station émettrice-réceptrice de base (111) est configurée de telle sorte que

- dans le cas où l'équipement d'utilisateur (20) fait l'objet d'une observation d'interception légale, et la station émettrice-réceptrice de base (111) reçoit une demande (201), par l'équipement d'utilisateur (20), pour effectuer une communication de dispositif à un dispositif, un premier message (202) est envoyé par la station émettrice-réceptrice de base (111) à l'équipement d'utilisateur (20), dans lequel le premier message (202) comprend l'indication d'une autorisation d'effectuer une communication de dispositif à dispositif par l'équipement d'utilisateur (20), dans lequel la station émettrice-réceptrice de base (111) est configurée de telle sorte que

- soit le premier message (202),

- soit un second message (203) envoyé par la station émettrice-réceptrice de base (111) à l'équipement d'utilisateur (20)

comprend en outre une information de puissance d'émission, dans lequel l'information de puissance

d'émission indique la puissance d'émission minimale de l'équipement d'utilisateur (20) lorsqu'il effectue une communication de dispositif à dispositif, de telle sorte que la puissance d'émission de l'équipement d'utilisateur (20) est réglée suffisamment haute par l'équipement d'utilisateur (20) pour permettre la réception de la communication de dispositif à dispositif au niveau de la station émettrice-réceptrice de base (111).

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9. Station émettrice-réceptrice de base (111) selon la revendication 8, dans lequel la demande (201) pour effectuer une communication de dispositif à dispositif est une demande pour envoyer une transmission de proximité (301).

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10. Station émettrice-réceptrice de base (111) selon la revendication 8 ou 9, dans lequel la demande (201) pour effectuer une communication de dispositif à dispositif est une demande pour établir une transmission en mode direct (305) .

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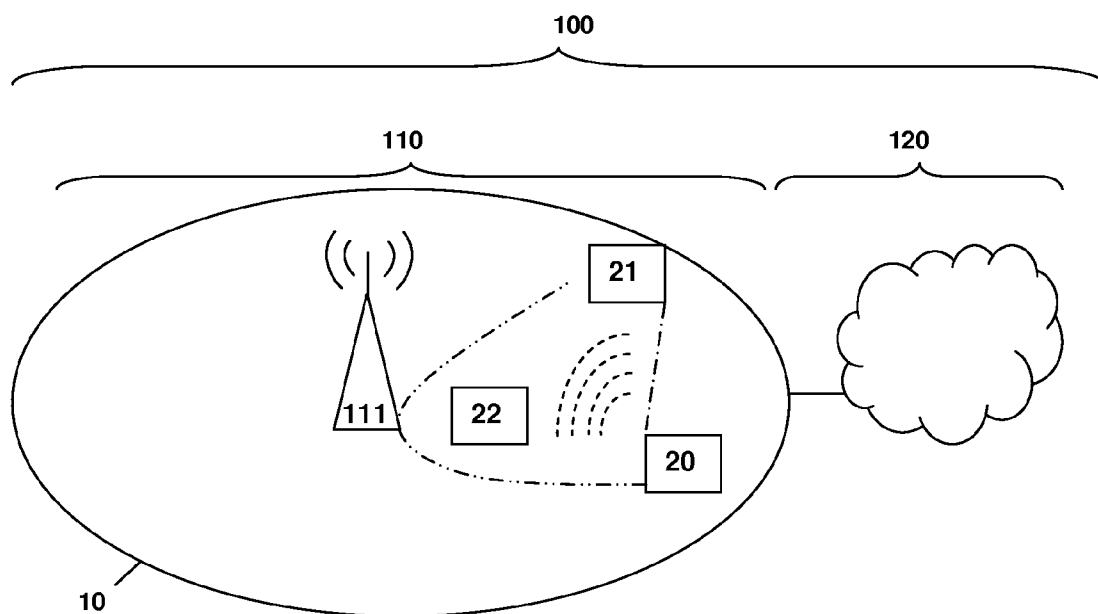


Fig. 1

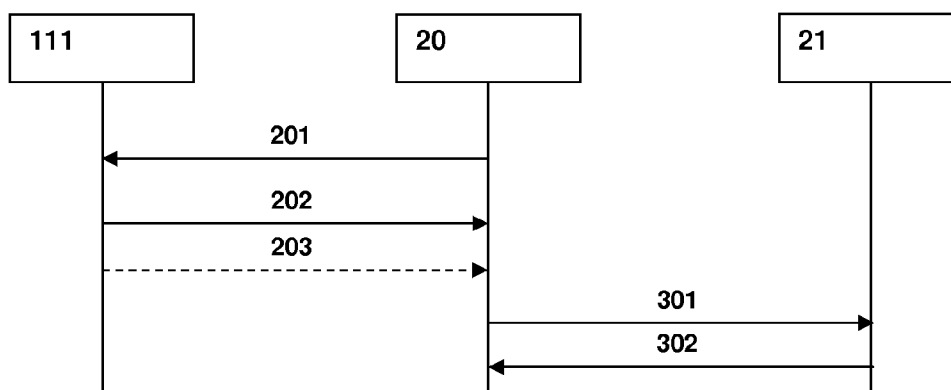


Fig. 2

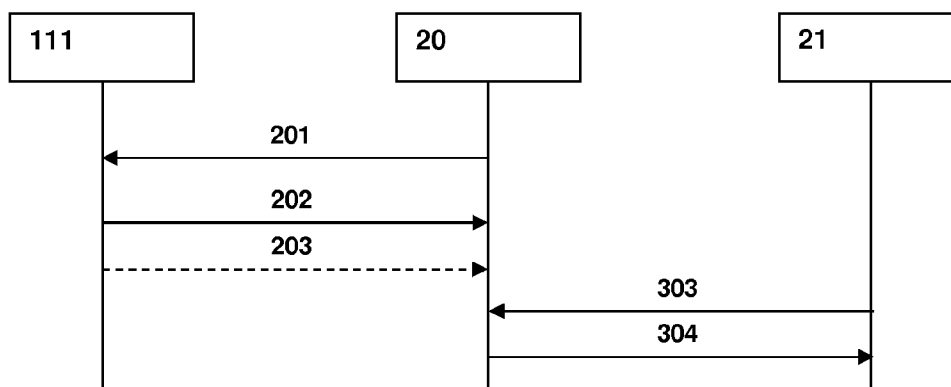


Fig. 3

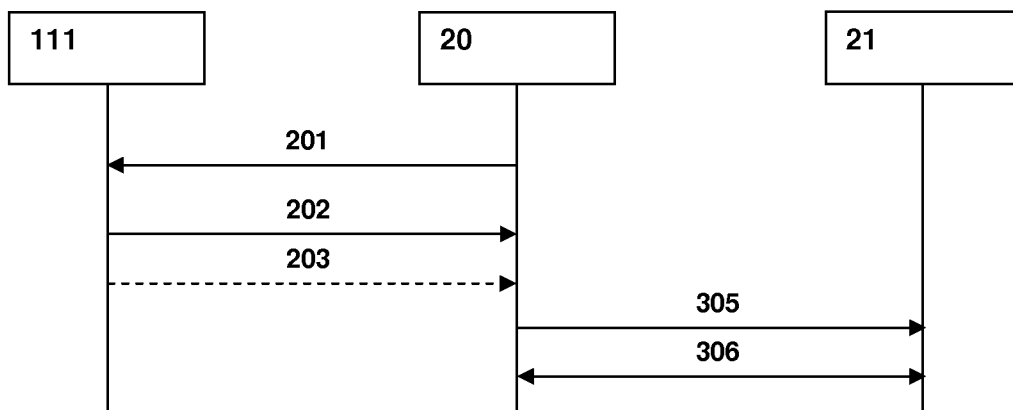


Fig. 4

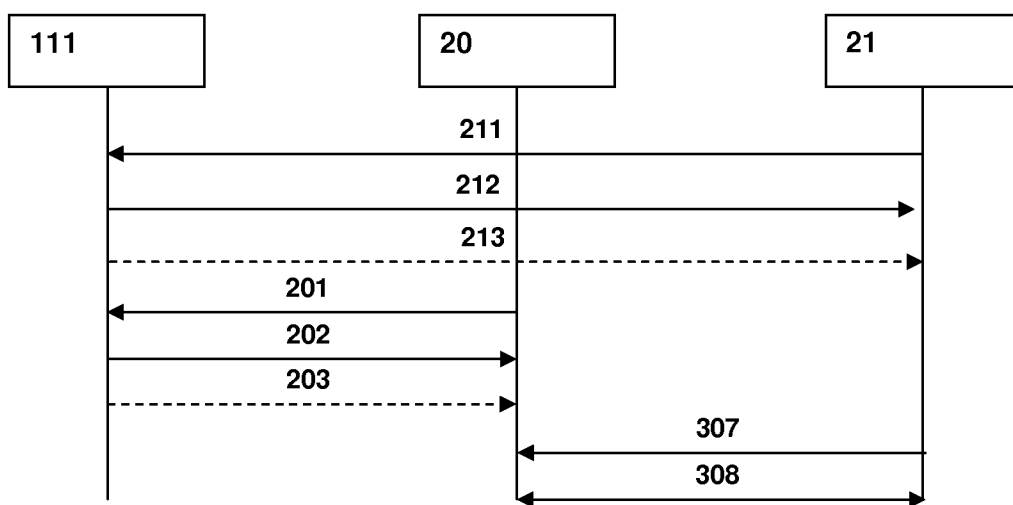


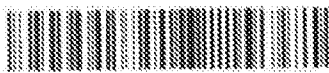
Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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KÖZVETLEN MÓDÚ KOMMUNIKÁCIÓ JOGSZERŰ ELLENŐRZÉSE EGY VEZETÉK NÉLKÜLI TÁVKÖZLÉSI HÁLÓZATBAN

Szabadalmi igénypontok

1. Eljárás jogszerű ellenőrzés (lehallgatás) lehetővé tételére egy távközlési hálózatban (100), ahol a távközlési hálózat (100) magában foglal egy maghálózatot (120) és egy hozzáférési hálózatot (110), ahol egy felhasználói berendezés (20), amely a távközlési hálózatban (100) tartózkodik, képessé van téve berendezés a berendezéssel (berendezések közötti) kommunikációra, ahol a távközlési hálózatnak (100) a hozzáférési hálózata (110) magában foglal egy adó-vevő bázisállomást (111), ahol a felhasználói berendezés (20) össze van kapcsolva az adó-vevő bázisállomással (111) és az adó-vevő bázisállomás (111) képessé van téve arra, hogy a felhasználói berendezés (20) számára legyen lehetővé téve, hogy berendezés a berendezéssel (berendezések közötti) kommunikáció legyen megvalósítva, ahol egy minimum adóteljesítmény-szint megfelel a legkisebb adóteljesítménynek, amelyet a felhasználói berendezés (20) használ, amikor egy rádiójelet küld (ad le), ahol abban az esetben, ha

- a felhasználói berendezés (20) egy jogszerű ellenőrző (lehallgató) megfigyelésnek van alávetve, és
- a felhasználói berendezés (20) egy kérést (201) küld az adó-vevő bázisállomásnak (111), hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció,

egy első üzenet (202) van küldve az adó-vevő bázisállomástól (111) a felhasználói berendezésnek (20), ahol az első üzenet (202) tartalmazza az utalást egy engedélyre, hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció a felhasználói berendezés (20) által, ahol

- vagy az első üzenet (202) vagy
- egy második üzenet (203), amely az adó-vevő bázisállomástól (111) van küldve a felhasználói berendezésnek (20)

továbbá tartalmaz egy adóteljesítmény-információt, ahol az adóteljesítmény-információ jelzi (mutatja) a felhasználói berendezés (20) minimum adóteljesítményének az értékét, amikor berendezés a berendezéssel (berendezések közötti) kommunikáció van megvalósítva, oly módon, hogy a felhasználói berendezésnek (20) az adóteljesítménye elegendően magasan van beállítva a felhasználói berendezés (20) által, hogy legyen lehetővé téve a berendezés a berendezéssel (berendezések közötti) kommunikációnak a vétele (fogadása) az adó-vevő bázisállomásnál (111).

2. Eljárás az 1. igénypont szerint, ahol a kérést (201), hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció, egy kérés képezi, hogy legyen küldve egy közelségi adás (közelségi átvitel, angolul: „proximity transmission”) (301).
3. Eljárás az előző igénypontok egyike szerint, ahol a kérést (201), hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció, egy kérés képezi, hogy legyen létrehozva egy közvetlen módú adás (közvetlen módú átvitel, angolul: „direct mode transmission”) (305).
4. Eljárás az előző igénypontok egyike szerint, ahol egy további felhasználói berendezés (21) tartózkodik a távközlési hálózatban (100), ahol a további felhasználói berendezés (21) képessé van téve berendezés a berendezéssel (berendezések közötti) kommunikációra, ahol a további felhasználói berendezés (21) össze van kapcsolva az adó-vevő bázisállomással (111) és az adó-vevő bázisállomás (111) képessé van téve arra, hogy a további felhasználói berendezés (21) számára legyen lehetővé téve, hogy

berendezés a berendezéssel (berendezések közötti) kommunikáció legyen megvalósítva, ahol abban az esetben, ha a további felhasználói berendezés (21) egy további kérést (211) küld az adó-vevő bázisállomásnak (111), hogy legyen megvalósítva egy közvetlen módú berendezés a berendezéssel (berendezések közötti) kommunikáció a felhasználói berendezéssel (20), amíg a felhasználói berendezés (20) egy jogszerű ellenőrző (lehallgató) megfigyelésnek van alávetve,

egy további első üzenet (212) van küldve az adó-vevő bázisállomástól (111) a további felhasználói berendezésnek (21), ahol a további első üzenet (212) tartalmazza az utalást egy engedélyre, hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció, a további felhasználói berendezés (21) által, a felhasználói berendezéssel (20), ahol

- vagy a további első üzenet (212) vagy
- egy további második üzenet (213), amely az adó-vevő bázisállomástól (111) van küldve a további felhasználói berendezésnek (21)

tartalmaz egy további adóteljesítmény-információt, ahol a további adóteljesítmény-információ jelzi (mutatja) a további felhasználói berendezésnek (21) a minimum adóteljesítményét, amikor a közvetlen módú berendezés a berendezéssel (berendezések közötti) kommunikáció van megvalósítva a felhasználói berendezéssel (20).

5. Felhasználói berendezés (20) jogszerű ellenőrzés (lehallgatás) lehetővé tételére egy távközlési hálózatban (100), ahol a távközlési hálózat (100) magában foglal egy maghálózatot (120) és egy hozzáférési hálózatot (110), ahol a felhasználói berendezés (20), amely a távközlési hálózatban (100) tartózkodik, képessé van téve berendezés a berendezéssel (berendezések közötti) kommunikációra, ahol a felhasználói berendezés (20) össze van kapcsolva a távközlési hálózat (100) hozzáférési hálózatának (110) egy adó-vevő bázisállomásával (111), ahol az adó-vevő bázisállomás (111) képessé van téve arra, hogy a felhasználói berendezés (20) számára legyen lehetővé téve, hogy berendezés a berendezéssel (berendezések közötti) kommunikáció legyen megvalósítva, ahol a felhasználói berendezés (20) oly módon van kialakítva, hogy

- abban az esetben, ha a felhasználói berendezés (20) egy jogszerű ellenőrző (lehallgató) megfigyelésnek van alávetve és a felhasználói berendezés (20) egy kérést (201) küld az adó-vevő bázisállomásnak (111), hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció,

egy első üzenet (202) van véve (fogadva) a felhasználói berendezés (20) által az adó-vevő bázisállomástól (111), ahol az első üzenet (202) tartalmazza az utalást egy engedélyre, hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció a felhasználói berendezés (20) által, ahol a felhasználói berendezés (20) oly módon van kialakítva, hogy egy minimum adóteljesítmény-szint megfelel a legkisebb adóteljesítménynek, amelyet a felhasználói berendezés (20) használ, amikor egy rádiójelet küld (ad le), és a minimum adóteljesítmény a felhasználói berendezés (20) által van használva, amikor berendezés a berendezéssel (berendezések közötti) kommunikáció van megvalósítva,

ahol a minimum adóteljesítmény

- egy adóteljesítmény-információ által van jelezve (mutatva), amely a felhasználói berendezés (20) által van véve (fogadva)
- vagy az első üzenet (202) által
- vagy egy második üzenet (203) által, amely az adó-vevő bázisállomástól (111) van küldve a felhasználói berendezésnek (20), és
- oly módon, hogy a felhasználói berendezésnek (20) az adóteljesítménye elegendően magasan van beállítva a felhasználói berendezés (20) által, hogy legyen lehetővé

téve a berendezés a berendezéssel (berendezések közötti) kommunikációnak a vétele (fogadása) az adó-vevő bázisállomásnál (111).

6. Felhasználói berendezés (20) az 5. igénypont szerint, ahol a kérést (201), hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció, egy kérés képezi, hogy legyen küldve egy közelségi adás (közelségi átvitel, angolul: „proximity transmission”) (301).
7. Felhasználói berendezés (20) az 5. vagy 6. igénypont szerint, ahol a kérést (201), hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció, egy kérés képezi, hogy legyen létrehozva egy közvetlen módú adás (közvetlen módú átvitel, angolul: „direct mode transmission”) (305).
8. Adó-vevő bázisállomás (111) jogszerű ellenőrzés (lehallgatás) lehetővé tételére egy távközlési hálózatban (100), ahol a távközlési hálózat (100) magában foglal egy maghálózatot (120) és egy hozzáférési hálózatot (110), ahol egy felhasználói berendezés (20), amely a távközlési hálózatban (100) tartózkodik, képessé van téve berendezés a berendezéssel (berendezések közötti) kommunikációra, ahol a felhasználói berendezés (20) össze van kapcsolva a távközlési hálózat (100) hozzáférési hálózatának (110) az adó-vevő bázisállomásával (111), ahol az adó-vevő bázisállomás (111) képessé van téve arra, hogy a felhasználói berendezés (20) számára legyen lehetővé téve, hogy berendezés a berendezéssel (berendezések közötti) kommunikáció legyen megvalósítva, ahol egy minimum adóteljesítmény-szint megfelel a legkisebb adóteljesítménynek, amelyet a felhasználói berendezés (20) használ, amikor egy rádiójelet küld (ad le), ahol az adó-vevő bázisállomás (111) oly módon van kialakítva, hogy
 - abban az esetben, ha a felhasználói berendezés (20) egy jogszerű ellenőrző (lehallgató) megfigyelésnek van alávetve és az adó-vevő bázisállomás (111) vételez (fogad) egy kérést (201), amely a felhasználó berendezés (20) általi, hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció, egy első üzenet (202) van küldve az adó-vevő bázisállomás (111) által a felhasználói berendezésnek (20), ahol az első üzenet (202) tartalmazza az utalást egy engedélyre, hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció a felhasználói berendezés (20) által, ahol az adó-vevő bázisállomás (111) oly módon van kialakítva, hogy
 - vagy az első üzenet (202) vagy
 - egy második üzenet (203), amely az adó-vevő bázisállomástól (111) van küldve a felhasználói berendezésnek (20)
 továbbá tartalmaz egy adóteljesítmény-információt, ahol az adóteljesítmény-információ jelzi (mutatja) a felhasználói berendezésnek (20) a minimum adóteljesítményét, amikor berendezés a berendezéssel (berendezések közötti) kommunikáció van megvalósítva, oly módon, hogy a felhasználói berendezésnek (20) az adóteljesítménye elegendően magasan van beállítva a felhasználói berendezés (20) által, hogy legyen lehetővé téve a berendezés a berendezéssel (berendezések közötti) kommunikációnak a vétele (fogadása) az adó-vevő bázisállomásnál (111).
9. Adó-vevő bázisállomás (111) a 8. igénypont szerint, ahol a kérést (201), hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció, egy kérés képezi, hogy legyen küldve egy közelségi adás (közelségi átvitel, angolul: „proximity transmission”) (301).
10. Adó-vevő bázisállomás (111) a 8. vagy 9. igénypont szerint, ahol a kérést (201), hogy legyen megvalósítva egy berendezés a berendezéssel (berendezések közötti) kommunikáció, egy kérés képezi, hogy legyen létrehozva egy közvetlen módú adás (közvetlen módú átvitel, angolul: „direct mode transmission”) (305).