If the eNBs loose or cannot ensure their connection with the EPC (or with different EPCs connected with each other), for example during a catastrophe or in a mobility scenario of the eNBs, there then can no longer be any exchanges between them or between their UEs (whether these are handled by a single eNB or borne by several different eNBs), and this even when said eNBs are within radio range (LTE) with each other.

For finding a remedy to this problem, physical links between an eNB and the network core EPC, called « backhaul links » may be positioned, but they require the installation of specific radio links.

Moreover there exist in the LTE architecture of the relay nodes (“relay nodes”), capable of communicating both with UEs and with an eNB, called a “Donor eNB” or DeNB. These relay nodes give the possibility of extending the coverage of an eNB and of improving the capacity thereof. But these relay nodes are not capable of handling alone UEs, they depend on their DeNB which provides them access to the EPC and they can only connect to a single eNB.

To this end, according to a first aspect, the invention proposes a base station of the aforementioned type and wherein the base station further comprises a management unit adapted for generating a plurality of second user terminals, said generated second terminal users being virtual user terminals adapted for communicating according to said radio protocol with base stations neighboring said base station, by using the radio interface module.

Such a base station gives the possibility of generating a meshed network of base stations and of directly transmitting between base stations data according to for example the LTE protocol.

In embodiments, the base station according to the invention further includes one or several of the following features:

- the management unit is adapted for selectively distributing the use of the radio interface module between the control block, for communication between said control block and said at least one first user terminal, and the second virtual terminals for their communication with neighboring base stations;

- the management unit assigns to each second virtual terminal a respective identifier;

- said communication protocol is compliant with the LTE standard;

- a second virtual user terminal is adapted for regularly carrying out a radio scan and for detecting neighboring base stations and for indicating to the management unit said detected neighboring stations, said management unit being adapted for, when one

According to a second aspect, the present invention proposes a method for treatment in a base station for a radiocommunications network comprising a set of base stations and first user terminals, said base station comprising a radio interface module and a control block, comprising the following steps:

- emission and reception of radiofrequency data by the adapted radio interface module; and
- establishing a communication link through the control block and communication by the control block on said link with at least one first user terminal according to a radio protocol comprising a radio protocol section specific to the base stations and a radio protocol section specific to the user terminals, by using said radio interface module, wherein said method comprises a step for generating, through a management unit of said base station, a plurality of second virtual user terminals adapted for communicating according to said radio protocol with neighboring base stations of said base station, by using said radio interface module.

These features and advantages of the invention will become apparent upon reading the description which follows, only given as an example, and made with reference to the appended drawings, wherein:

- Fig. 1 represents a view of a telecommunication LTE system in the prior art;
- Fig. 2 illustrates a functional view of a base station in an embodiment of the invention;
- Fig. 3 is a view of a network of base stations in an embodiment of the invention.

Fig. 2 illustrates a functional view of a base station adapted for communicating with radio user terminals, UEs, according to a communication protocol, in an embodiment of the invention.

In the relevant particular case, this base station is adapted for communicating with the UEs according to the radio protocol LTE (« Long Term Evolution ») defined by the 3GPP consortium.

In a known way, the LTE protocol defines communication rules specific to the user terminals and communication rules specific to the base stations.

The base station according to the invention is called an e2NB station (« enhanced eNB »).

The e2NB comprises a block eNB 1, a set 2 of vUE(s), a management unit 3, an MME block 4, an HSS (for « Home Subscriber Server ») block 5 and a router 6.

CLAIMS

1.- A base station for a radiocommunications network comprising an assembly of base stations and of first user terminals,

said base station comprising:

- a radio interface module adapted for emitting and receiving radiofrequency data; and
- a control block adapted for establishing a communication link and communicating over said link with at least one first user terminal according to a radio protocol comprising a radio protocol section specific to the base stations and a radio protocol section specific to the user terminals, by using said radio interface module,

wherein said base station further comprises a management unit adapted for generating a plurality of second user terminals, said second user terminals generated being virtual user terminals adapted for communicating according to said radio protocol with neighboring base stations of said base station, by using said radio interface module.

2.- The base station according to claim 1, wherein the management unit is adapted for selectively distributing the use of the radio interface module between the control block, for the communication between said control block and said at least one first user terminal, and the second virtual terminals for their communication with neighboring base stations.

3.- The base station according to claim 1 or 2, wherein the management unit assigns to each second virtual terminal a respective identifier.

4.- The base station according to any of the preceding claims, wherein said communication protocol is compliant with the LTE standard.

5.- The base station according to any of the preceding claims, wherein a second user virtual terminal is adapted for regularly carrying out a radio scan and for detecting the neighboring base stations and for indicating to the management unit said detected neighboring stations,

said management unit being adapted for, when one of the detected neighboring base stations is not part of the neighboring base stations having a link established with

the second virtual terminals, generating a new second virtual terminal for applying communications between said new second virtual terminal and said detected neighboring base station.

6.- The base station according to any of the preceding claims, including a mobility management block and a base of authentication information relative to the first and second user terminals, said mobility management block being adapted for, when the control block receives, from a first user terminal, a request for applying a communication link with said base station according to said communication protocol, for proceeding with the authentication of said first user terminal according to authentication elements indicated in the request and authentication information in the base relative to said first user terminal;

and wherein the management unit is adapted, when it generates a second virtual user terminal, for providing to said second virtual user terminal, authentication elements specific to said second virtual terminal,

each second virtual terminal being adapted for, when it emits a request for applying a communication link intended for a neighboring base station according to said communication protocol, inserting, in said request, said authentication elements provided by the management unit.

7.- The base station according to any of the preceding claims, wherein the management unit is adapted for storing a list of the neighboring base stations connected to said base station, and

- each second virtual terminal is adapted for indicating to the management unit the neighboring base station with which it has an established current communication link, and the management unit is adapted for updating the list of neighboring base stations connected to said base station, by inserting into the list, said neighboring base station indicated, matched, in the list, with said second virtual terminal;

- the control block is adapted for indicating to the management unit said first terminals with which it has established a current communication link, and when one of said first terminals is a virtual terminal of a neighboring base station of said base station, the management unit is adapted for updating the list by inserting therein said neighboring base station matched in the list, with said first virtual terminal.

8.- The base station according to claim 7, comprising a router and wherein the management unit is adapted for updating routing rules according to said

updated list of the neighboring base stations connected to said base station, said router being adapted for routing, according to routing rules updated by the management unit, selectively data towards the control block for emission towards the first user terminals or towards the second virtual terminals for emission towards neighboring base stations.

9.- A treatment method in a base station for a radiocommunications network comprising an assembly of base stations and of first user terminals, said base station comprising a radio interface module and a control block, comprising the following steps:

- emission and reception of radiofrequency data by the adapted radio interface module; and

- establishment of a communication link by the control block and communication by the control block over said link with at least one first user terminal according to a radio protocol comprising a radio protocol section specific to the base stations and a radio protocol section specific to the user terminals, by using said radio interface module,

wherein said method comprises a step for generating, by a management unit of said base station, a plurality of virtual second user terminals adapted for communicating according to said radio protocol with neighboring base stations of said base station, by using said radio interface module.

10.- The treatment method in a base station, according to claim 9, comprising a selective distribution step, by the management unit, of the use of the radio interface module between the control block, for the communication between said control block and said at least one first user terminal, and the second virtual terminals for their communication with neighboring base stations.

11.- The treatment method in a base station according to claim 9 or 10, according to which the management unit assigns to each second virtual terminal a respective identifier.

12.- The treatment method in a base station according to any of claims 9 to 11, according to which said communication protocol is compliant with the LTE standard.

13.- The treatment method in a base station according to any of claims 9 to 12, according to which a second virtual user terminal regularly carries out a radio scan, detects neighboring base stations and indicates to the management unit said detected neighboring stations,

and according to which when one of the detected neighboring base stations is not part of the neighboring base stations having a link established with the second virtual terminals, said management unit generates a new second virtual terminal for applying communications between said new second virtual terminal and said detected neighboring base station.

14.- The treatment method in a base station according to any of claims 9 to 13, according to which, when the control block receives, from a first user terminal, a request for applying a communication link with said base station according to said communication protocol, a mobility management block of the base station proceeds with the authentication of said first user terminal according to authentication elements indicated in the request and of authentication information relative to said first user terminal and stored in a base of the base station comprising authentication information relative to the first and second user terminals;

according to which the management unit, when it generates a second virtual user terminal, provides said second virtual user terminal, authentication elements specific to said second virtual terminal,

each second virtual terminal, when it emits a request for applying a communication link intended for a neighboring base station according to said communication protocol, inserts, in said request, said authentication elements provided by the management unit.

15.- The treatment method in a base station according to any of claims 9 to 14, according to which the management unit stores a list of the neighboring base stations connected to said base station, and

- each second virtual terminal indicates to the management unit the neighboring base station with which it has established a current communication link, and the management unit updates the list of the neighboring base stations connected to said base station, by inserting into the list, said indicated neighboring base station, matched, in the list, with said second virtual terminal;

- the control block indicates to the management unit said first terminals with which it has established a current communication link, and when one of said first

terminals is a virtual terminal of a neighboring base station of said base station, the management unit updates the list by inserting therein said neighboring base station, matched, in the list, with said first virtual terminal.

16.- The treatment method in a base station according to claim 15, according to which the management unit updates routing rules according to said list updated with the neighboring base stations connected to said base station, and a router of the base station routes, according to routing rules updated by the management unit, selectively data towards the control block for emission towards the first user terminals or towards second virtual terminals for emission towards neighboring base stations.