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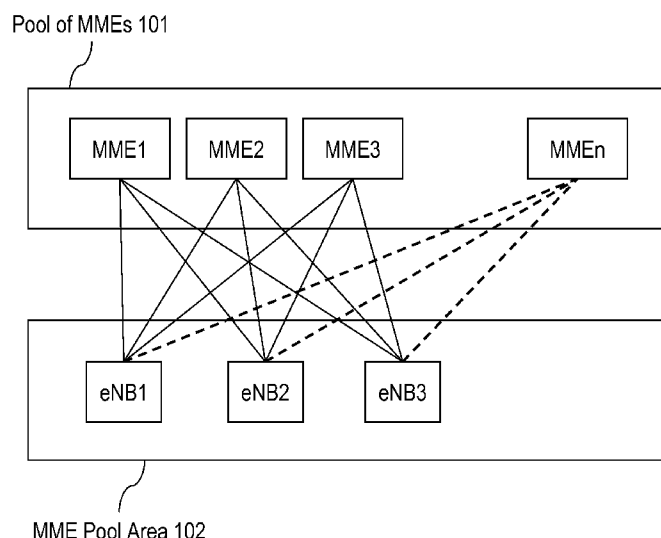
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(54) Title: METHOD AND DEVICE FOR CHANGING AT LEAST ONE FIRST NETWORK ELEMENT IN A POOL OF FIRST NETWORK ELEMENTS AND COMMUNICATION SYSTEM COMPRISING SUCH DEVICE

Fig.1



(57) Abstract: A method and a device are provided for changing at least one first network element in a pool of first network elements, wherein said pool of first network elements is associated with at least one second network element, the method comprising the steps of (i) the at least one second network element is identified; and (ii) an interface between the at least one first network element and the at least one second network element is configured or set up. Furthermore, a communication system is suggested comprising said device.

Description

Method and device for changing at least one first network
element in a pool of first network elements and communication
5 system comprising such device

The invention relates to a method and to a device for
changing at least one first network element in a pool of
first network elements and to a communication system
10 comprising such device.

In many countries mobile network services are broadly
available, in some markets these services are even reaching a
stage of saturation. Therefore, Mobile Network Operators
15 (MNOs) are not only focusing on increasing the number of
subscribers and increasing their average revenue per user
(ARPU), they are also trying to improve their cost position
by reducing operational expenditures (OPEX). In industrial
countries the costs for operating the network is exceeded by
20 the costs for the operating personnel. Thus, there is an
increasing need for reducing the human workload in an already
deployed network and enabling the MNOs to shift the human
workload to more profitable issues like, e.g., service
management and marketing of the services.

25 For a new network technology to be deployed or provided such
requirement may be met by avoiding a certain degree of
complexity in a design of the system's architecture and of
its components (cf., e.g., a simplified EPS (E-UTRAN/EPC)
30 network architecture and simplified system functions). Also,
features can be provided for network elements and their
management system to cope with the system's complexity and to
avoid errors of human operators, i.e., assuring that the
network is well configured, optimized and substantially
35 fault-free. The investment in such features (results in an
increased CAPEX) can thus be traded off against OPEX
reduction feasible.

Next Generation Mobile Networks (NGMNs) may result in a parallel operation of GSM, UMTS and NGMN with substantially the same number of operating personnel. However, in NGMNs the number of network nodes will significantly increase regarding
5 E-UTRAN in comparison to 2G and 3G systems. Hence, in E-UTRAN/EPC there is a requirement for self-configuring and self-optimizing systems.

A Mobility Management Entity (MME) is a network element that
10 supports a "pooling" concept, wherein an evolved NodeB (eNB) can be connected to or associated with one or more MME(s) (via an S1-interface). A **Pool of MMEs** is provided for several MMEs having the same MME Group ID (MMEGI). For the Pool of MMEs there is a **MME Pool Area** comprising at least one eNB (in
15 particular a lot of such eNBs), wherein preferably each eNB of the MME Pool Area is connected to each MME of the Pool of MMEs.

The MME Pool Area may preferably be understood as an area
20 within which a user equipment (UE) may be served without any need to change the serving MME. The MME Pool Area may be supplied by one or more MMEs (constituting said "Pool of MMEs") in parallel. MME Pool Areas are a collection of complete Tracking Areas. MME Pool Areas may further overlap
25 with one another.

A Globally Unique MME Identifier (GUMMEI) may comprise a Mobile Country Code (MCC), a Mobile Network Code (MNC) and an MME Identifier (MMEI). Furthermore, the MMEI may comprise the
30 MME Group ID (MMEGI) and an MME Code (MMEC), i.e. the MME Identifier can be noted as

$$\text{GUMMEI} = \text{MCC} \parallel \text{MNC} \parallel \text{MMEGI} \parallel \text{MMEC}$$

35 When an MME is introduced (as first member of a pool) or added to an already existing Pool of MMEs, the S1-interfaces between this MME and the eNBs of the associated MME Pool Area need to be established. This requires significant

configuration effort to provide a consistent configuration to the MME and all eNBs of the MME Pool Area. Considering the huge number of eNBs associated with the MME Pool Area (up to 10.000), this is a huge task to be performed manually by the operator.

In existing systems, OAM interfaces of the MMEs and of the eNBs allow for a configuration of the network nodes. The operator has to manually ensure consistency for any status change or use case. In the example stated above, the operator has to manually update the new MME as well as all eNBs of the associated MME Pool Area. This approach is error-prone, costly and it may require an intricate exchange of information between radio and core management systems, which still is bulky and often "paper"-based.

The **problem** to be solved is to overcome the disadvantages stated above and in particular to provide an efficient approach of changing or adding a member of a pool of first network elements regarding its relationship to an associated group of second network elements.

This problem is solved according to the features of the independent claims. Further embodiments result from the depending claims.

In order to overcome this problem, a method is provided for changing at least one first network element in a pool of first network elements, wherein said pool of first network elements is associated with at least one second network element, comprising the steps:

- the at least one second network element is identified;
- an interface between the at least one first network element and the at least one second network element is configured or set up.

This approach advantageously allows for an automation of adding a new network element, e.g., a new MME to an MME Pool. By changing such MME, updates are due to be processed for numerous network elements. The operator may just introduce
5 the new MME, the updates required are performed by the system via, e.g., means of self-configuration.

If, e.g., S1-interfaces from eNBs to the changed MME have to be set up, the MME is configured including setting up its
10 MMEGI. The eNBs associated with the particular MME Pool Area are supplied with the information required for establishing a S1-interface to this changed MME, e.g., its IP address. Then, the eNBs may set up the S1-interfaces.

15 It is noted that changing the MME may comprise adding, replacing, moving, deleting, updating, restarting, etc. an MME.

It is noted that the first network elements may be or be
20 associated with MMEs; alternatively, the first network elements may be or be associated with eNBs. Accordingly, the second network elements are of type eNB or of type MME.

In an embodiment, changing the at least one first network
25 element comprises:

- adding said at least one first network element;
- replacing said at least one first network element;
- moving said at least one first network element;
- removing said at least one first network element.

30

"Changing" the at least one first network element may reflect any sort of physical or logical change, amendment, replacement, update or the like; it may also refer to a change of the network element's identity or identification,
35 e.g., the GUMMEI.

It is also possible that the second network element is changed (e.g., added, replaced, moved, removed, updated or the like).

5 For example, regarding a removal of a network element, be it a first or a second network element, the yet established interface may be utilized for conveying a message from the at least one first network element to the at least second network element or vice versa indicating that the sending
10 network element will be removed. Then, the receiving network element may deactivate the interface to this network element (which is (to be) removed).

Hence, in addition or as an alternative to OAM mechanisms,
15 the established interface can be configured by messages conveyed via said interface.

In another embodiment, the first network element is a mobility management entity (MME).
20

In a further embodiment, the second network element is a base station, a radio station or a NodeB, in particular an evolved NodeB (eNB).

25 In a next embodiment, the method comprises the step:
– the at least one second network element is identified and is provided with information regarding the at least one first network element.

30 It is also an embodiment that the method comprises the step:
– the at least one second network element is identified and the at least one first network element is provided with information regarding the at least one second network element.

35 Pursuant to another embodiment, the interface comprises an S1-interface between each second network element and between the at least one first network element.

According to an embodiment, a configuration function is provided, wherein the at least first network element registers with said configuration function and/or wherein the
5 at least second network element registers with said configuration function.

It is also an embodiment that an OAM system or a central entity is used for updating said configuration function.
10

In yet another embodiment the said configuration function is updated by at least one notification.

According to a further embodiment, upon a change of the first
15 network elements, the at least one second network elements is informed by the configuration function.

According to another embodiment, upon a change of the first network elements, the at least one second network elements is
20 informed by the configuration function.

In yet another embodiment, upon a change of the second network elements, the at least one first network elements is informed by the configuration function.
25

According to an embodiment, upon a change of the second network elements, the at least one second network element is informed by the configuration function.

30 The problem stated above is also solved by a device comprising a and/or being associated with a processor unit and/or a hard-wired circuit and/or a logic device that is arranged such that the method as described herein is executable on said processor unit.

35 According to an embodiment, the device is a communication device, in particular a or being associated with a network element or an operation and maintenance component.

The problem stated supra is further solved by a communication system comprising the device as described herein.

5 Embodiments of the invention are shown and illustrated in the following figures:

Fig.1 shows a diagram comprising MMEs gathered in a Pool of MMEs and eNBs gathered in a MME Pool Area, wherein
10 each MME has an interface to each eNB;

Fig.2 shows an information flow diagram between an eNB and an MME-PA-SCF;

15 Fig.3 depicts an information flow diagram comprising an MME and the MME-PA-SCF;

Fig.4 shows the eNB, the MME and the MME-PA-SCF in an information flow diagram.
20

The approach provided herein may be applicable in particular regarding various use cases, e.g., adding, moving, replacing, removing a network element of a first type from a pool of network elements of said first type. Each such network
25 element of first type is in particular associated with at least one further network element of a second type, e.g., an evolved NodeB (eNB), establishing a Pool Area for the network elements of the first type (constituting the Pool of network elements of said first type).

30 Hereinafter, the network elements of first type are exemplary chosen to be Mobility Management Entities (MMEs) with a particular MME Group ID (MMEGI) thereby constituting a Pool of MMEs 101 according to **Fig.1**. With regard to the example
35 depicted in Fig.1, several eNBs (eNB1 to eNB3) build an MME Pool Area 102, wherein each such eNB1 to eNB3 is connected to each MME1 to MME3 of the Pool 101. If, e.g., a further MME is connected to the Pool 101, the eNBs of the MME Pool Area

102 need to get aware of this MMEN and vice versa. According to the approach provided, adding said MMEN is sufficient to automatically establish all interfaces required between the MMEN and all eNBs of the Pool Area 102. The interfaces
5 between the eNBs and the MMEs are preferably S1-interfaces.

The use case "Addition of a new MME to an MME Pool Area (including the case where the first MME of a MME Pool is introduced" is just an example. The approach provided is
10 applicable to various other use cases as well, e.g., replace, delete, move, update of a network element, e.g. a MME and/or a eNB. It is further noted that more than one MME may be processed accordingly.

15 The scenario described herein can be applied vice versa in the same manner, i.e. a eNB can be changed and the at least one MME is updated accordingly. There may as well be a Pool of eNBs associated with a eNB Pool Area.

20 The approach provided allows a consistent provision of identical and/or dependent data sets for different Network Elements (NEs) or it may enable an update of NEs due to changes in another NE. Hence, consistency of data is provided automatically throughout the system at a significant
25 reduction of OPEX. In particular, only one NE may be configured, changed (also replaced or removed) or installed by an operator and affected NEs are automatically identified and updated and/or configured by the system itself.

30 The approach suggests a logical function called "MME Pool Area Self-Configuration Function" (MME-PA-SCF). With this function, the operator needs to configure only the MMEGI for the new MME or the operator assigns the new MME to a certain MME Pool. The rest is advantageously processed in an
35 automated fashion by the MME-PA-SCF.

It is noted that such MME-PA-SCF is an exemplary functionality that may be deployed or be associated with at

least one network element and/or a central component of the system providing the automated functionality as described herein. It may, e.g., be arranged in a way to actively or passively communicate with network elements and/or it may be
5 arranged to process notifications of an OAM entity.

This MME-PA-SCF may in particular provide the following:

- 10 (a) An ability to learn and to store information related to eNBs, MMEs, MME Pools and MME Pool Areas. Examples may comprise learning and storing
 - the IP addresses of eNBs and MMEs,
 - which MMEs are member of an MME Pool and
 - which eNBs belong to an MME Pool Area.
- 15 (b) An ability to identify eNBs belonging to an MME Pool Area associated with an MME Pool.
- 20 (c) A functionality to provide either the new MME (to be added to the pool) or the identified eNBs with information required to set up interfaces, in particular S1-interfaces.

25 Logical MME Pool Area Self-Configuration Function (MME-PA-SCF)

Update of the MME-PA-SCF with MME-related information

30 When a new MME is added to the network, the MME-PA-SCF may be provided with related information. Preferably, the GUMMEI and the IP address of the new MME are provided. The GUMMEI may be

GUMMEI = MCC || MNC || MMEGI || MMEC.

35 There are several possibilities to update the MME-PA-SCF with MME-related information, for example:

(a) Each MME registers itself at the MME-PA-SCF, providing its assigned GUMMEI and its IP address. The MME may have been configured before registration with classical OAM mechanisms.

5

(b) The OAM system configuring the MME may also update the MME-PA-SCF with MME related information.

(c) Notifications available in classical OAM systems regarding the newly installed MME are used in order to update the MME-PA-SCF.

10

The MME-PA-SCF may set up and/or modify a table as follows comprising information from a eNB registration message.

Hence, the table comprises for every MME the MME Pool it is associated with as well as its IP address.

15

MME Table:

MME_1	GUMMEI_1	MCC MNC MMEGI_A MMEC_1	IP_1
MME_2	GUMMEI_2	MCC MNC MMEGI_A MMEC_2	IP_2
MME_3	GUMMEI_3	MCC MNC MMEGI_B MMEC_1	IP_3
MME_4	GUMMEI_4	MCC MNC MMEGI_B MMEC_2	IP_4

20

When MME-related information stored also in the MME-PA-SCF is changed, the MME-PA-SCF is updated as well.

Update of the MME-PA-SCF with eNB related information

25

When a new eNB is added to the network, the MME-PA-SCF may be provided with related information, preferably, the MMEGI and the IP address of the new eNB.

As shown in the scenario for the MME above, there are several possibilities to update the MME-PA-SCF with eNB-related information. The examples provided supra may apply here as well.

30

The MME-PA-SCF may set up a table as follows comprising information from the eNB registration message. Hence, the table comprises for every eNB the MME Pool serving this eNB (with the MMEGI) and its IP address.

5

eNB Table:

eNB 1	eNB-ID 1	MMEGI A	IP 1
eNB 2	eNB-ID 2	MMEGI B	IP 2
eNB 3	eNB-ID 3	MMEGI B	IP 3
eNB 4	eNB-ID 4	MMEGI A	IP 4
eNB 5	eNB-ID 5	MMEGI B	IP 5

When eNB-related information stored also in the MME-PA-SCF is changed, the MME-PA-SCF is updated as well.

10

MME Pool Area Self-Configuration (eNB triggered S1 set-up)

With a new MME being announced to the MME-PA-SCF, in particular the following steps may be processed:

15

(a) The MME-PA-SCF checks the MMEGI presented in the registration message for matches in the eNB-Table. In other words, the eNBs of the MME Pool Area associated to the MME Pool identified via the MMEGI are identified.

20

(b) The MME-PA-SCF informs the identified eNBs about the presence of a new MME in their MME Pool and about the MME IP address. This may be achieved, e.g., as follows:

25

(b1) The eNBs are informed directly by the MME-PA-SCF.

(b2) The MME-PA-SCF configures the information in/for a (already existing) "master" MME of the same pool, said master forwarding the information to the identified eNBs.

30

(b3) The MME-PA-SCF uses OAM mechanisms to update the eNBs.

- (c) The eNB sets up an S1-interface to the new MME using the supplied IP address.

Example:

5

A new MME_5 is announced with the following information at the MME-PA-SCF

MME_5	GUMMEI_5	MCC MNC MMEGI_B MMEC_3	IP_5
-------	----------	--	------

- 10 This means that the new MME_5 will be a member of the MME Pool identified by MMEGI_B. The eNBs of the associated MME Pool Area are eNB_2, eNB_3 and eNB_5, see table below:

eNB_1	eNB-ID_1	MMEGI_A	IP_1
eNB_2	eNB-ID_2	MMEGI_B	IP_2
eNB_3	eNB-ID_3	MMEGI_B	IP_3
eNB_4	eNB-ID_4	MMEGI_A	IP_4
eNB_5	eNB-ID_5	MMEGI_B	IP_5

- 15 These eNBs (eNB_2, eNB_3 and eNB_5) need to be informed about the presence of the new MME_5 and about its IP address IP_5.

MME Pool Area Self-Configuration (MME triggered S1 set-up)

- 20 With a new MME being announced to the MME-PA-SCF, in particular the following steps may be processed:
- (a) The MME-PA-SCF checks the MMEGI presented in the registration message for matches in the eNB-Table. In other words, the eNBs of the MME Pool Area associated to the MME Pool identified via the MMEGI are identified
- (b) The MME-PA-SCF informs the MME about the identified eNBs and their IP addresses. This may be achieved, e.g., as follows:
- (b1) The MME is informed directly by the MME-PA-SCF.
- 25
- 30

(b2) The MME-PA-SCF uses OAM mechanisms to update the MME.

(c) The MME sets up the S1-interface to the identified eNBs.

5

Architectural Options for the Implementation of the MME-PA-SCF

Possibility A: MME-PA-SCF implemented in the Network Management (NM)

10

Scenario 1: Core and Radio Network operated by one MNO

In this scenario it is assumed that there is one NM managing the radio and core network. The MME-PA-SCF can be implemented and/or logically associated with the NM.

15

Scenario 2: Core and Radio Network operated by different MNOs

In this scenario it is assumed that the DM/EM and NM of different vendors are not connected with each other. Hence, the OAM system of the core operator has no knowledge about the radio network and vice versa. In such case, the MME-PA-SCF is implemented in the NM in particular if information exchange is established or allowed between the OAM systems.

20

25

Possibility B: New Node for the MME-PA-SCF

The MME-PA-SCF may be implemented also in a new node connected via direct and/or standardized interfaces to the MMEs and/or to the eNBs.

30

For example, Fig.2 to Fig.4 show information flow diagrams in case the MME-PA-SCF is implemented in a new node and that the NEs register directly with this node.

35

Hence, **Fig.2** shows an information flow diagram between an eNB and an MME-PA-SCF. The eNB sends a message via, e.g., an

application layer protocol, "eNB self announcement" comprising as parameters the eNB-Id, the MMEGI and its own IP address. The MME-PA-SCF sends a eNB self announcement response for, e.g., confirmation purposes. Hence, according to Fig.2, the eNB registers at the MME-PA-SCF.

Fig.3 depicts an MME that sends an MME self announcement message comprising the GUMMEI and its own IP address as parameters to the MME-PA-SCF. The MME-PA-SCF conveys an MME self announcement response thereby confirming registration of the MME with the MME-PA-SCF.

Furthermore, **Fig.4** shows the eNB, the MME and the MME-PA-SCF in an information flow diagram. The MME-PA-SCF pushes information of the MMEs' IP addresses to the eNB. The eNB provides a response for confirmation purposes. Next, the eNB sends a eNB S1-interface setup request to the MME and receives a response for confirmation purposes.

Advantages of the MME Pool Area Self-Configuration Function

Only the new MME needs to be initially set with the GUMMEI (= MCC || MNC || MMEGI || MMEC). The impacted eNBs are identified automatically by the MME-PA-SCF. The new MME and the identified eNBs are updated automatically with the required information. The S1-interfaces are set up automatically.

List of Abbreviations:

	ARPU	average revenue per user
	CAPEX	Capital Expenditures
5	DM	Domain Manager
	eNB	evolved NodeB
	EM	Element Manager
	EPC	Evolved Packet Core
	EPS	Evolved Packet System
10	E-UTRAN	Evolved UTRAN
	GSM	Global System for Mobile communications
	GUMMEI	Globally Unique MME Identifier
	MCC	Mobile Country Code
	MME PA SCF	MME Pool Area Self Configuration Function
15	MME	Mobility Management Entity
	MMEC	MME Code
	MMEGI	MME Group ID
	MMEI	MME Identifier
	MNC	Mobile Network Code
20	MNO	Mobile Network Operator
	NE	Network Element
	NGMN	Next Generation Mobile Networks
	NM	Network Management
	OAM	Operation and Maintenance
25	OPEX	Operational Expenditures
	SCTP	Stream Control Transmission Protocol (RFC 2960)
	SON	Self Organizing
	UE	User Equipment
30	UMTS	Universal Mobile Telecommunications System
	UTRAN	UMTS Terrestrial Radio Access Network

Claims:

1. A method for changing at least one first network element
in a pool of first network elements, wherein said pool
5 of first network elements is associated with at least
one second network element, comprising the steps:
 - the at least one second network element is
identified;
 - an interface between the at least one first network
10 element and the at least one second network element
is configured or set up.
2. The method according to claim 1, wherein changing the at
least one first network element comprises:
15
 - adding said at least one first network element;
 - replacing said at least one first network element;
 - moving said at least one first network element;
 - removing said at least one first network element.
- 20 3. The method according to any of the preceding claims,
wherein the first network element is a mobility
management entity.
4. The method according to any of the preceding claims,
25 wherein the second network element is a base station, a
radio station or a NodeB, in particular an evolved
NodeB.
5. The method according to any of the preceding claims,
30 comprising the step:
 - the at least one second network element is identified
and is provided with information regarding the at
least one first network element.
- 35 6. The method according to any of the preceding claims,
comprising the step:
 - the at least one second network element is identified
and the at least one first network element is

provided with information regarding the at least one second network element.

- 5 7. The method according to any of the preceding claims, wherein the interface comprises an S1-interface between each second network element and between the at least one first network element.
- 10 8. The method according to any of the preceding claims, wherein a configuration function is provided, wherein the at least first network element registers with said configuration function and/or wherein the at least second network element registers with said configuration function.
- 15 9. The method according to claim 8, wherein an OAM system or a central entity configures the at least first network element and registers with and/or updates said configuration function.
- 20 10. The method according to claim 8, wherein an OAM system or a central entity is used for updating said configuration function by at least one notification.
- 25 11. The method according to any of claims 8 to 10, wherein upon a change of the first network elements, the at least one second network elements is informed by the configuration function.
- 30 12. The method according to any of claims 8 to 10, wherein upon a change of the second network elements, the at least one first network elements is informed by the configuration function.
- 35 13. The method according to any of claims 8 to 10, wherein upon a change of the second network elements, the at least one second network element is informed by the configuration function.

14. A device comprising a and/or being associated with a
processor unit and/or a hard-wired circuit and/or a
logic device that is arranged such that the method
5 according to any of the preceding claims is executable
thereon.
15. The device according to claim 14, wherein said device is
a communication device, in particular a or being
10 associated with a network element or an operation and
maintenance component.
16. Communication system comprising the device according to
any of claims 14 or 15.
15

Fig.1

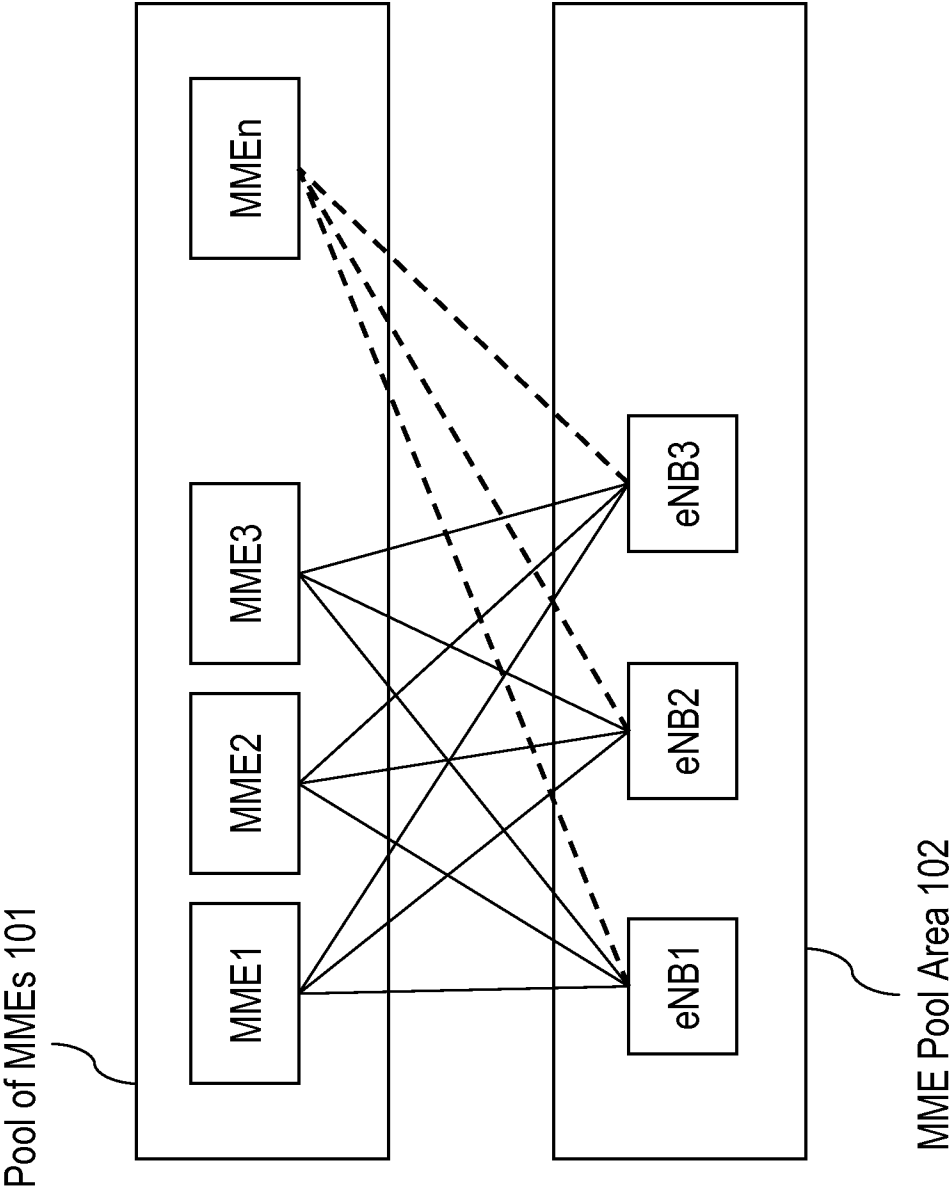


Fig.2

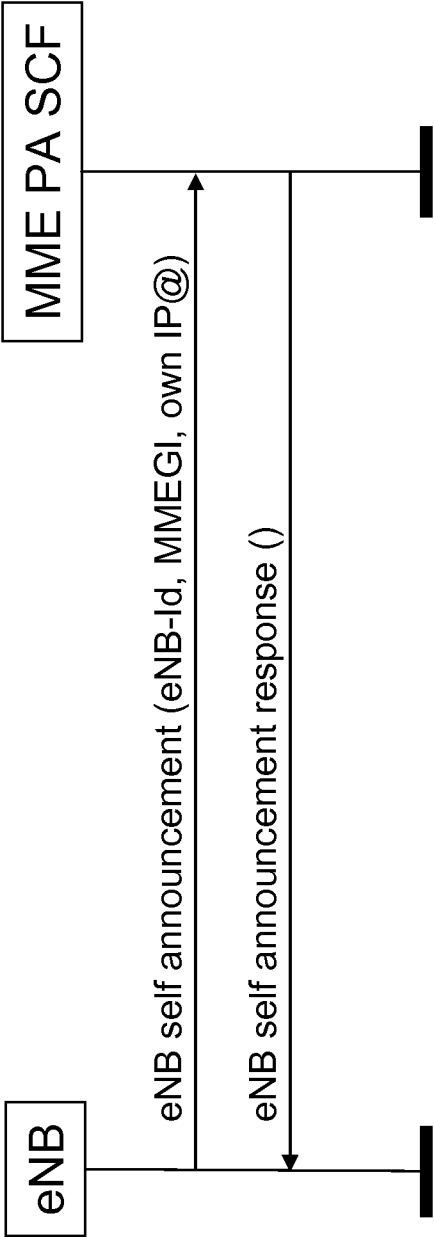


Fig.3

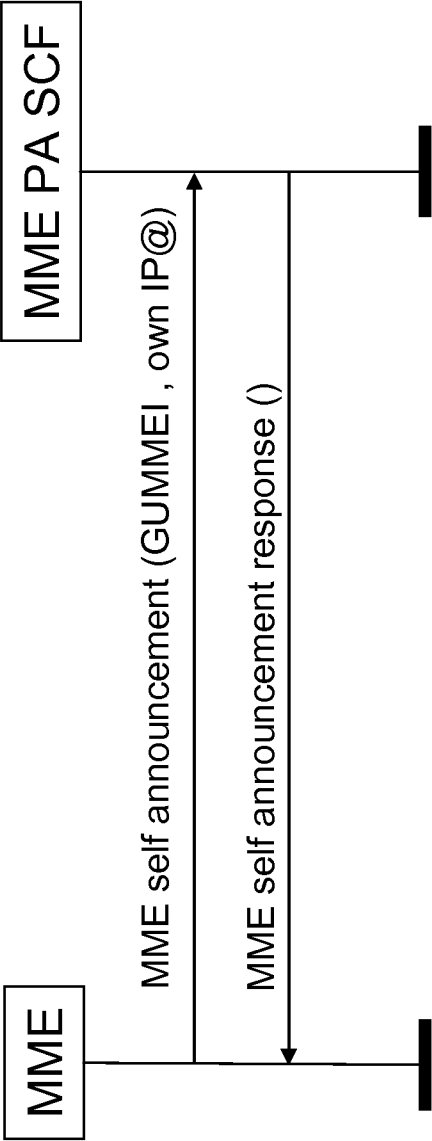
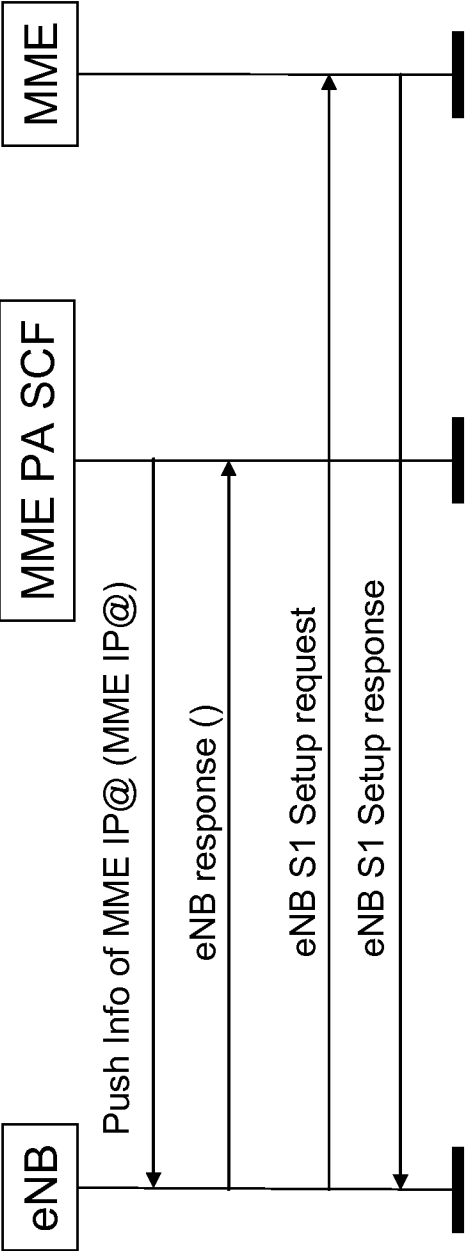


Fig.4



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2008/058799

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04L12/24 H04W24/02 H04W92/04

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L H04W

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NOKIA SIEMENS NETWORKS ET AL: "Aspects for MME pool configuration updates and eNB Introduction" 3GPP DRAFT; R3-081299, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. tsq_sa\WG5_TM\TSGS5_60\Docs, no. Sophia Antipolis, France; 20080707, 29 April 2008 (2008-04-29), XP050307648 page 1 - page 3 ----- -/--	1-16

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

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

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

3 April 2009

Date of mailing of the international search report

22/04/2009

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/058799

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NOKIA SIEMENS NETWORKS (FINALLY RAN3): "Draft LS on MME pool configuration" 3GPP DRAFT; R3-081498, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. tsg_ran\WG3_Iu\TSGR3_60\docs, no. Kansas City, USA; 20080505, 9 May 2008 (2008-05-09), XP050164659 page 1	1-8, 11-16
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X	NSN ET AL: "MME pool configuration" 3GPP DRAFT; R3-081300, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. tsg_ran\WG3_Iu\TSGR3_60\docs, no. Kansas City, USA; 20080505, 29 April 2008 (2008-04-29), XP050164475 page 2 - page 3	1,3-8, 11,14-16
A	-----	2,9,10, 12,13