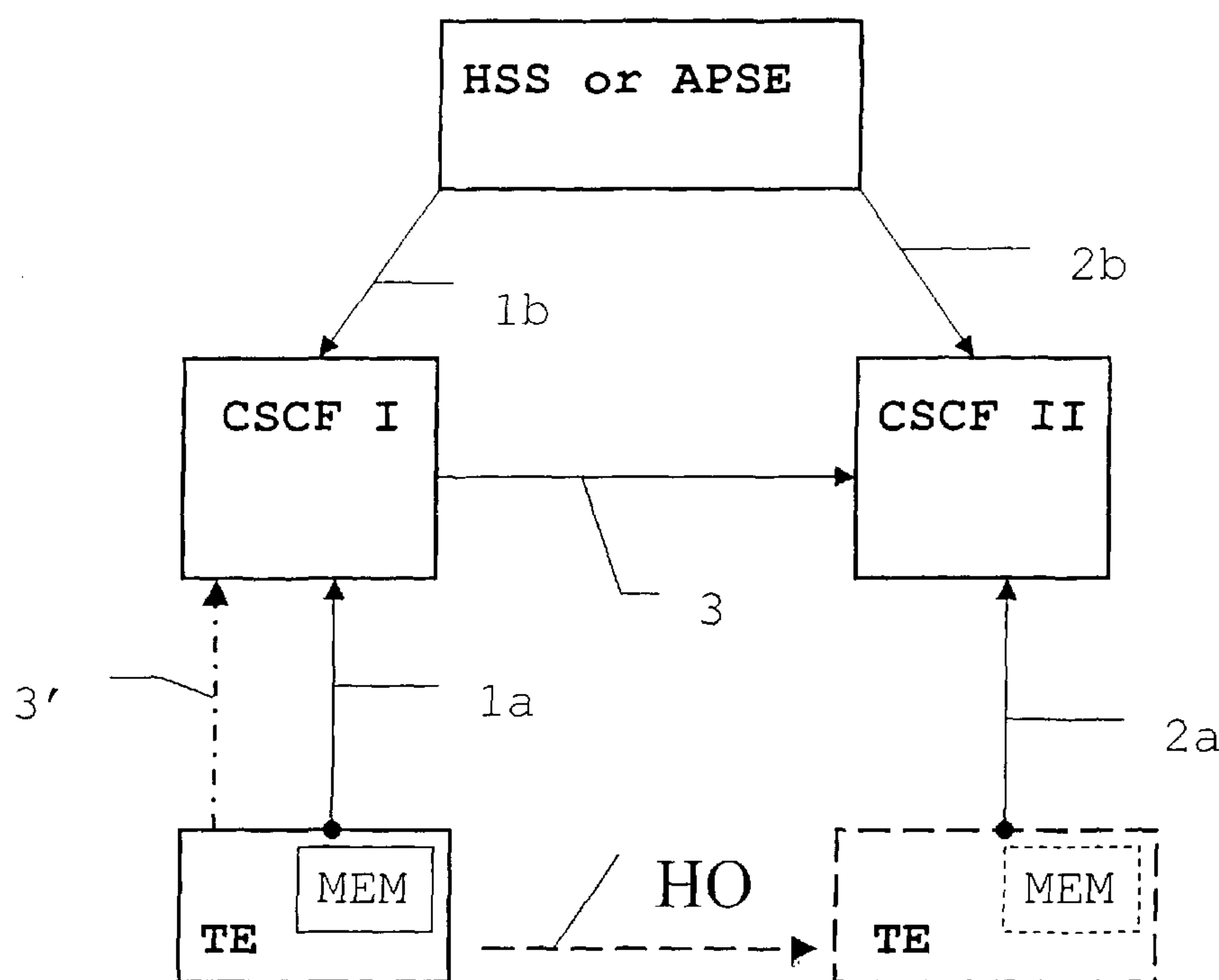




(86) Date de dépôt PCT/PCT Filing Date: 2000/09/01
(87) Date publication PCT/PCT Publication Date: 2002/03/07
(85) Entrée phase nationale/National Entry: 2003/02/28
(86) N° demande PCT/PCT Application No.: EP 2000/008589
(87) N° publication PCT/PCT Publication No.: 2002/019731

(51) Cl.Int.⁷/Int.Cl.⁷ H04Q 3/00
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(54) Titre : PROCEDE D'ACHEMINEMENT DE SCRIPTS DE SERVICE DANS UN RESEAU DE COMMUNICATION
(54) Title: METHOD FOR HANDLING SERVICE SCRIPTS IN A COMMUNICATION NETWORK



(57) **Abrégé/Abstract:**

The present invention proposes a method for handling sets of executable control data instructions in a communication network, said network comprising at least one network functional element of a first type (CSCF I, CSCF II) being imparted with a communication control functionality, the actual control functionality being determined by respective sets of said executable control data instructions which are temporarily storable in said functional element of a first type, with a terminal equipment (TE) being adapted to perform a communication via said communication network with a communication partner, said method comprising the steps of detecting that a registration condition for said terminal has occurred, and transferring at least one set of executable control data instructions allocated to said terminal to said at least one network functional element of a first type (CSCF I, CSCF II), via which the communication of said terminal equipment via said network is to be effected.



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

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 March 2002 (07.03.2002)

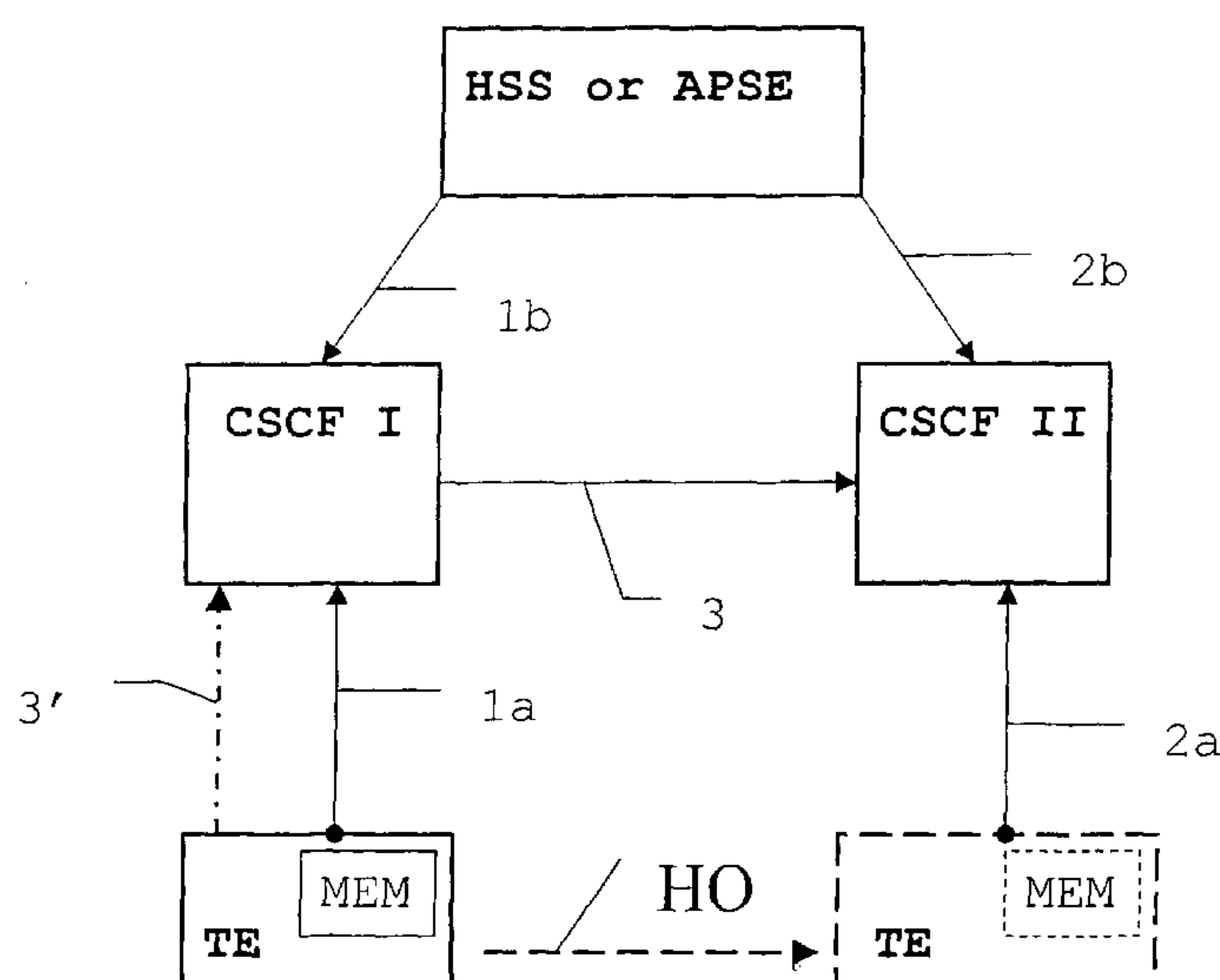
PCT

(10) International Publication Number
WO 02/19731 A1

- (51) International Patent Classification⁷: **H04Q 3/00** (74) Agents: **LESON, Thomas, Johannes, Alois** et al.; Tiedtke-Bühling-Kinne, Bavariaring 4, 80336 Munich (DE).
- (21) International Application Number: **PCT/EP00/08589**
- (22) International Filing Date:
1 September 2000 (01.09.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
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- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
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JYLHÄ-OLLILA, Markku [FI/FI]; Tilhitie 14 Bb, FIN-00730 Helsinki (FI).
- Published:**
— with international search report

[Continued on next page]

(54) Title: METHOD FOR HANDLING SERVICE SCRIPTS IN A COMMUNICATION NETWORK



(57) Abstract: The present invention proposes a method for handling sets of executable control data instructions in a communication network, said network comprising at least one network functional element of a first type (CSCF I, CSCF II) being imparted with a communication control functionality, the actual control functionality being determined by respective sets of said executable control data instructions which are temporarily storable in said functional element of a first type, with a terminal equipment (TE) being adapted to perform a communication via said communication network with a communication partner, said method comprising the steps of detecting that a registration condition for said terminal has occurred, and transferring at least one set of executable control data instructions allocated to said terminal to said at least one network functional element of a first type (CSCF I, CSCF II), via which the communication of said terminal equipment via said network is to be effected.

WO 02/19731 A1

WO 02/19731 A1



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

METHOD FOR HANDLING SERVICE SCRIPTS IN A COMMUNICATION NETWORK

5

FIELD OF THE INVENTION

The present invention relates to a method for handling sets of executable control data instructions in a communication
10 network operated.

BACKGROUND OF THE INVENTION

Throughout the subsequent specification, "sets of
15 executable control data instructions" are also referred to as "scripts". Scripts are defined using a so-called script language.

For example, **Call Processing Language** (CPL) is such a
20 script language that IETF has specified for call control purposes. (A "call" means a communication between a terminal equipment TE and a communication partner via a communication network.) Of course, the present invention is not limited to CPL as a script language, but is also
25 applicable to the usage of other script languages. Nevertheless, for explanation purposes, reference is made herein below only to CPL scripts.

A script language can be used to create services like "call
30 forwarding" etc. The CPL scripts as the chosen example scripts can be executed in the end system (terminal) or in the network server. Some of the scripts can only be run in the network, for example, scripts defining a kind of a service like "Call Forwarding on not reachable".

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- 2 -

For the present invention, focus is laid on those scripts that are to be executed in the network servers. A network server is a functional element of and represents a node of a communication network.

5

The currently existing specifications of the script language CPL do not specify how the CPL scripts are transmitted in the network. A reason therefor may reside in the fact that the Internet Engineering Taskforce (IETF) has not specifically considered mobile communication networks when creating CPL.

10

Hence, CPL does not describe any mechanisms that can be used to optimize the storage and mobility of the scripts.

15

Nevertheless, due to the nature of mobile communication networks, the scripts defined for a respective user (subscriber) (i.e. for his terminal equipment) should be available in the user's location within the network in order to make sure that his services function correctly.

20

(Note that scripts defined for a user may be network originated scripts which were initially created by the network operator and were individually configured by the user, or may be terminal originated scripts which were created and configured by the user himself using his terminal equipment.)

25

One way to cope with this requirement would be that the user himself would manually send his scripts to the server (serving network functional element) whenever it is necessary.

30

However, such a procedure would impose an unnecessary burden on the user and could be felt as uncomfortable,

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- 3 -

since services for the user would not work properly or would not work at all if the user has forgotten to send his scripts to the serving network functional element. Also, this would require that the user is aware of the fact to which server within the communication network he would have to send his scripts.

SUMMARY OF THE INVENTION

10 It is therefore an object of the present invention to provide an improved method for handling sets of executable control data instructions in a communication network, which method is free from the above drawbacks.

15 According to the present invention, the above object is, for example, achieved by a method for handling sets of executable control data instructions in a communication network operated, said network comprising at least one network functional element of a first type being imparted

20 with a communication control functionality, the actual control functionality being determined by respective sets of said executable control data instructions which are temporarily storable in said functional element of a first type, with a terminal equipment being adapted to perform a

25 communication via said communication network with a communication partner, said method comprising the steps of detecting that a registration condition for said terminal has occurred, and transferring at least one set of executable control data instructions allocated to said

30 terminal to said at least one network functional element of a first type, via which the communication of said terminal equipment via said network is to be effected.

According to further technical solutions:

- 4 -

- said registration condition is the initial registration of the terminal equipment to said network, and said at least one set of executable control data instructions is transferred from said terminal equipment to
5 said at least one network functional element of a first type;

- said network further comprises a network functional element of a second type being imparted with a database functionality, the database functionality providing a
10 register of sets of said executable control data instructions for respective terminal equipments that have subscribed to the network, and said registration condition is the initial registration of the terminal equipment to said network, and said at least one set of executable
15 control data instructions is transferred from said network functional element of a second type to said at least one network functional element of a first type;

- said registration condition is a handover of the terminal equipment from a first one of said at least one
20 network functional element of a first type to a second one of said at least one network functional element, and said at least one set of executable control data instructions is transferred from said terminal equipment to said second one of said at least one network functional element of a first
25 type;

- said registration condition is a handover of the terminal equipment from a first one of said at least one network functional element of a first type to a second one of said at least one network functional element, and said
30 at least one set of executable control data instructions is transferred from said network functional element of a second type to said second one of said at least one network functional element of a first type;

- said terminal equipment is adapted to create user
35 defined sets of executable control data instructions, and,

- 5 -

upon activation of at least one of said created user defined sets of executable control data instructions, loading the at least one activated set to a first one of said at least one network functional element of a first type, via which the terminal equipment currently communicates via the network, and wherein said registration condition is a handover of the terminal equipment from said first one of said at least one network functional element of a first type to a second one of said at least one network functional element, and said at least one activated set of executable control data instructions is transferred from said first one of said at least one network functional element of a first type to said second one of said at least one network functional element of a first type.

15

Also, the present invention relates to a computer system comprising an execution environment for running an application for handling sets of executable control data instructions in a communication network, as set out in the above described method.

20

Still further, the present invention relates to a computer program product, loadable into the memory of a digital computer and comprising software code portions for performing the steps as set out in the above described method.

25

Advantageously, according to the present invention, the user's CPL scripts can automatically be made available for his usage. Consequently, the whole process of making the user's service scripts available for the concerned network functional element is transparent for the user.

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- 6 -

The present invention is advantageously applicable in connection with IETF and 3GPP standards of communication networks.

5 BRIEF DESCRIPTION OF THE DRAWINGS

The present invention and its features and advantages will become more fully apparent when referring to the detailed description of the accompanying drawing, in which

10

Fig. 1 illustrates a basic network architecture of an communication network according to the present invention (for example, an IP based network or a so-called all-IP network) adapted to the script handling scenarios according to the present invention.

15

DETAILED DESCRIPTION OF THE DRAWING

Fig. 1 illustrates a basic network architecture of an communication network. It is however to be noted that in the drawing only those network functional elements are illustrated which are relevant for the present invention. Thus, so-called "last-step" access networks such as radio access networks (e.g. mobile communication network such as GPRS) establishing communication to and/from a terminal equipment are not shown in order to keep the drawing and explanation simple.

20

25

30

Fig. 1 shows network functional elements and their interconnections. However, it is to be noted that the arrows illustrating the interconnections do not represent the single possible data flow direction between the functional elements. Rather, the arrows merely denote the direction of the transfer of the sets of executable control

- 7 -

data instructions (scripts) in connection with the present invention in specific situations to be described later.

As regards the network functional elements, two types of
5 network functional elements have to be distinguished:

a first type being imparted with a communication control functionality, the actual control functionality being determined by respective sets of said executable control data instructions which are temporarily storable in
10 said functional element of a first type, the first type being also referred to as call state control functional element CSCF, and

a second type being imparted with a database functionality, the database functionality providing a
15 register of sets of said executable control data instructions for respective terminal equipments that have subscribed to the network, the second type being also referred to as home subscriber server HSS or as an application server APSE.

20

Within the call state control functional element CSCF a serving profile database SPD (not shown) is provided, which is adapted to store, at least temporarily, the scripts for a respective user. Nevertheless, in general, a database
25 inside the CSCF which database stores the scripts, and which needs not be identical to a SPD, may be sufficient. Also, within the home subscriber server HSS (or the Application server APSE), a subscriber profile database (not shown) is provided, which is adapted to store scripts
30 for a plurality of users having subscribed to the network.

A user of the communication network is represented as a terminal equipment TE (e.g. a wireless terminal). The terminal equipment is provided with a memory MEM at least
35 for storing scripts for the corresponding user.

- 8 -

During operation (i.e. while a communication (call) is ongoing), or between two consecutive points of time at which the user switches on his terminal and thus initially registers to the network, the terminal equipment may move, or may have moved, respectively, within the network. The movement is assumed to be of such an amount that a new call state control function element CSCF II is responsible for serving the user.

10

Although Fig. 1 shows a situation in which CSCF I as well as CSCF II are in the same network, it is of course also possible that a terminal moves from one network to another network. That is, CSCF I could belong to another network than CSCF II.

15

Stated in other words, during movement a handover HO (representing a registration condition) occurs (indicated in dashed lines) from the initially responsible CSCF I to the newly responsible CSCF II. Or, after a relocation of a switched off terminal, which thereafter newly registers (i.e. initially registers after being switched on again) to the network, a new call state control functional element (CSCF II) is responsible for serving the user (at the time of switching off, a CSCF different from the CSCF II (e.g. CSCF I) was serving the terminal.

20

25

Generally spoken, a registration condition for the terminal in the IP network may be represented by an "initial registration" of the terminal (e.g. upon terminal activation and subsequent "attachment" of the terminal to the network) or by a handover of the terminal.

30

With reference to the basic network architecture as described above, the method for providing mobility of the

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- 9 -

CPL scripts in the network, i.e. the method for handling sets of executable control data instructions in the communication network will be described with reference to different situations referred to by the numerals of the
5 arrows in Fig. 1.

Situation option #1: - Registration -

Situation 1a:

10

The terminal equipment TE of a subscriber to the network, which terminal is provided with its script memory MEM, newly (i.e. initially) registers to the network. Upon registration, a registration procedure is performed as the
15 network needs to have a knowledge of the location of the subscriber in order to properly serve the subscriber. Then, the terminal TE sends at least one script from its memory MEM to the serving call state control functional element CSCF I.

20

Thus, upon detecting that a registration condition for said terminal TE has occurred (here: initial registration), at least one set of executable control data instructions allocated to said terminal is transferred to said at least
25 one network functional element of a first type CSCF I, via which the communication of said terminal equipment via said network is to be effected.

Situation 1b:

30

In this situation, the terminal TE need not necessarily be provided with an own memory MEM as in situation 1a. Rather, in situation 1b, it is assumed that scripts for the respective terminal are stored in the home subscriber
35 server HSS (or APSE) and downloaded from the HSS (or APSE)

- 10 -

upon detection of the initial registration of the terminal to the network as a registration condition.

5 Stated in other words, in this situation, said at least one set of executable control data instructions (script) is transferred from said network functional element of a second type HSS (or APSE) to said at least one network functional element of a first type CSCF I.

10 It should be noted that the above explanations similarly hold in case the terminal newly (i.e. initially) registers to the CSCF II.

Situation option #2: - Handover (HO) -

15

The terminal TE is moving from the service region of the call state control functional element CSCF I to the service region of the call state control functional element CSCF II (indicated by the arrow labeled HO).

20

As mentioned above, although Fig. 1 shows a situation in which CSCF I as well as CSCF II are in the same network, it is of course also possible that a terminal moves from one network to another network. That is, CSCF I could belong to
25 another network than CSCF II.

Situation 2a:

Similar as in situation 1a, the terminal TE is provided
30 with its own script memory MEM. Then, upon detection that a registration condition is fulfilled due to the handover procedure having to be performed, the terminal TE sends at least one script from its memory MEM to the call state control functional element CSCF II, to which the handover
35 is performed.

- 11 -

Thus, as said registration condition is a handover of the terminal equipment TE from a first one CSCF I of said at least one network functional element of a first type to a
5 second one of said at least one network functional element CSCF II, said at least one set of executable control data instructions is transferred from said terminal equipment to said second one CSCF II of said at least one network functional element of a first type.

10

Situation 2b:

Similar as in situation 1b, the terminal TE need not necessarily be provided with an own memory MEM as in
15 situation 1a, 2a. Rather, in situation 2b, it is assumed that scripts for the respective terminal are stored in the home subscriber server HSS (or the application server APSE) and downloaded, upon detection of the handover (as a registration condition) of the terminal from the initially
20 serving call state control functional element CSCF I to the subsequently serving call state control functional element CSCF II, from the HSS (or the APSE) to the subsequently serving call state control functional element CSCF II.

25 Stated in other words, when said registration condition is a handover of the terminal equipment TE from a first one CSCF I of said at least one network functional element of a first type to a second one of said at least one network functional element CSCF II, said at least one set of
30 executable control data instructions is transferred from said network functional element of a second type (HSS or APSE) to said second one CSCF II of said at least one network functional element of a first type.

35 Situation option #3:

- 12 -

- Handover (HO) in case the scripts are user created and were created during an ongoing communication -

When the user of the terminal TE creates his own scripts
5 during an ongoing communication, he uploads the scripts to the serving call state control functional element CSCF I in order to be executed. This is illustrated by arrow 3'.

Those scripts are often only used during the individual
10 ongoing communication and are therefore not permanently stored, neither the memory MEM (if any) of the terminal TE nor in the database at the home subscriber server or application server. (Nevertheless, such scripts may of course be stored for further use. In such a case, the
15 handling methods as described in connection with situations 1 and/or 2 can be applied, depending on the storage location of the created scripts.)

Now, if a handover HO occurs from call state control
20 functional element CSCF I to CSCF II, the scripts for the terminal are transferred from call state control functional element CSCF I to CSCF II (arrow 3).

Stated in other words, if said terminal equipment TE is
25 adapted to create user defined sets of executable control data instructions, and upon activation of at least one of said created user defined sets of executable control data instructions (e.g. by the user), the at least one activated set is loaded to a first one CSCF I of said at least one
30 network functional element of a first type, via which the terminal equipment currently communicates via the network, and if said registration condition is a handover of the terminal equipment TE from said first one CSCF I of said at least one network functional element of a first type to a
35 second one of said at least one network functional element

- 13 -

CSCF II, said at least one activated set of executable control data instructions is transferred from said first one CSCF I of said at least one network functional element of a first type to said second one CSCF II of said at least one network functional element of a first type.

In this connection, it should be noted that scripts which are stored in the memory MEM of the terminal TE or in the home subscriber server HSS (or in the application server APSE) and of which a temporary copy for execution purposes is loaded to a serving call state control functional element CSCF may also be transferred in an inter-CSCF script transfer upon detection of a registration condition for the terminal.

15

Thus, as has been described herein above, this invention basically describes three methods that can be used in the mobile communication networks, which enable that the user scripts are available for the user in the location where he has roamed to.

20

These are basically the options according to the present invention how the CPL script mobility could be implemented :

1. The terminal would always load the user's scripts to the server (CSCF) when registering. This would require the terminal to have a storage for the CPL scripts.

25

2. The main storage of CPL scripts is the home subscriber server HSS or the application server APSE. The user's scripts are then loaded from the HSS or the APSE to the server (CSCF) when user registers to it.

30

3. For example in case the user creates a new CPL script, he uploads it to the serving CSCF. When location and serving CSCF is changed, the CSCFs communicate and the new CSCF (CSCF II) gets the scripts from the old one (CSCF I).

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- 14 -

This invention also relates to the general concept of service model. If the chosen service model is the one with registering always to the home network, the scripts
5 themselves are naturally not loaded to a visited network. However, since several CSCFs are assumed to be present in the home network and the serving CSCF could be chosen according to various parameters, there must be some way to make the user's CPL scripts available in the current
10 serving CSCF even when it can only be in the home network.

Accordingly, as has been described above, the present invention proposes a method for handling sets of executable control data instructions in a communication network, said
15 network comprising at least one network functional element of a first type CSCF I, CSCF II being imparted with a communication control functionality, the actual control functionality being determined by respective sets of said executable control data instructions which are temporarily
20 storable in said functional element of a first type, with a terminal equipment TE being adapted to perform a communication via said communication network with a communication partner, said method comprising the steps of detecting that a registration condition for said terminal
25 has occurred, and transferring at least one set of executable control data instructions allocated to said terminal to said at least one network functional element of a first type CSCF I, CSCF II, via which the communication of said terminal equipment via said network is to be
30 effected.

It should be understood that the above description and accompanying drawings are only intended to illustrate the present invention by way of example only. The preferred

- 15 -

embodiments of the present invention may thus vary within the scope of the attached claims.

Enclosure of October 30, 2002

PCT Patent Application No.: PCT/EP00/08589
Nokia Corporation
Our ref.: WO 28066

5

New claims 1 to 8

- 10 1. A method for handling sets of executable control data
instructions in a communication network,
said network comprising
at least one network functional element of a first
type (**CSCF I, CSCF II**) being imparted with a communication
15 control functionality, the actual control functionality
being determined by respective sets of said executable
control data instructions which are temporarily storable in
said functional element of a first type,
with a terminal equipment (TE) being adapted to perform a
20 communication via said communication network with a
communication partner,
said method comprising the steps of
detecting that a registration condition for said
terminal has occurred, and
25 transferring at least one set of executable control
data instructions allocated to said terminal to said at
least one network functional element of a first type (**CSCF**
I, CSCF II), via which the communication of said terminal
equipment via said network is to be effected,
30 wherein said at least one set of executable control
data instructions is transferred to said at least one
network functional element of a first type (**CSCF I, CSCF**
II) for execution at said network functional element of a
first type (**CSCF I, CSCF II**).
35
2. A method according to claim 1, wherein

- 2/4 -

said registration condition is the initial registration of the terminal equipment (**TE**) to said network, and

said at least one set of executable control data instructions is transferred from said terminal equipment to said at least one network functional element of a first type (**CSCF I**, **CSCF II**).

3. A method according to claim 1, wherein

said network further comprises a network functional element of a second type (**HSS**, **APSE**) being imparted with a database functionality, the database functionality providing a register of sets of said executable control data instructions for respective terminal equipments that have subscribed to the network, and

said registration condition is the initial registration of the terminal equipment (**TE**) to said network, and

said at least one set of executable control data instructions is transferred from said network functional element of a second type (**HSS**, **APSE**) to said at least one network functional element of a first type (**CSCF I**, **CSCF II**).

4. A method according to claim 1, wherein

said registration condition is a handover of the terminal equipment (**TE**) from a first one (**CSCF I**) of said at least one network functional element of a first type to a second one of said at least one network functional element (**CSCF II**), and

said at least one set of executable control data instructions is transferred from said terminal equipment to said second one (**CSCF II**) of said at least one network functional element of a first type.

- 3/4 -

5. A method according to claim 1, wherein

said registration condition is a handover of the terminal equipment (**TE**) from a first one (**CSCF I**) of said at least one network functional element of a first type to
5 a second one of said at least one network functional element (**CSCF II**), and

said at least one set of executable control data instructions is transferred from said network functional element of a second type (**HSS, APSE**) to said second one
10 (**CSCF II**) of said at least one network functional element of a first type.

6. A method according to claim 1, wherein

said terminal equipment (**TE**) is adapted to create user
15 defined sets of executable control data instructions, and,
upon activation of at least one of said created user defined sets of executable control data instructions, loading the at least one activated set to a first one (**CSCF I**) of said at least one network functional element of a
20 first type, via which the terminal equipment currently communicates via the network, and wherein

said registration condition is a handover of the terminal equipment (**TE**) from said first one (**CSCF I**) of said at least one network functional element of a first
25 type to a second one of said at least one network functional element (**CSCF II**), and

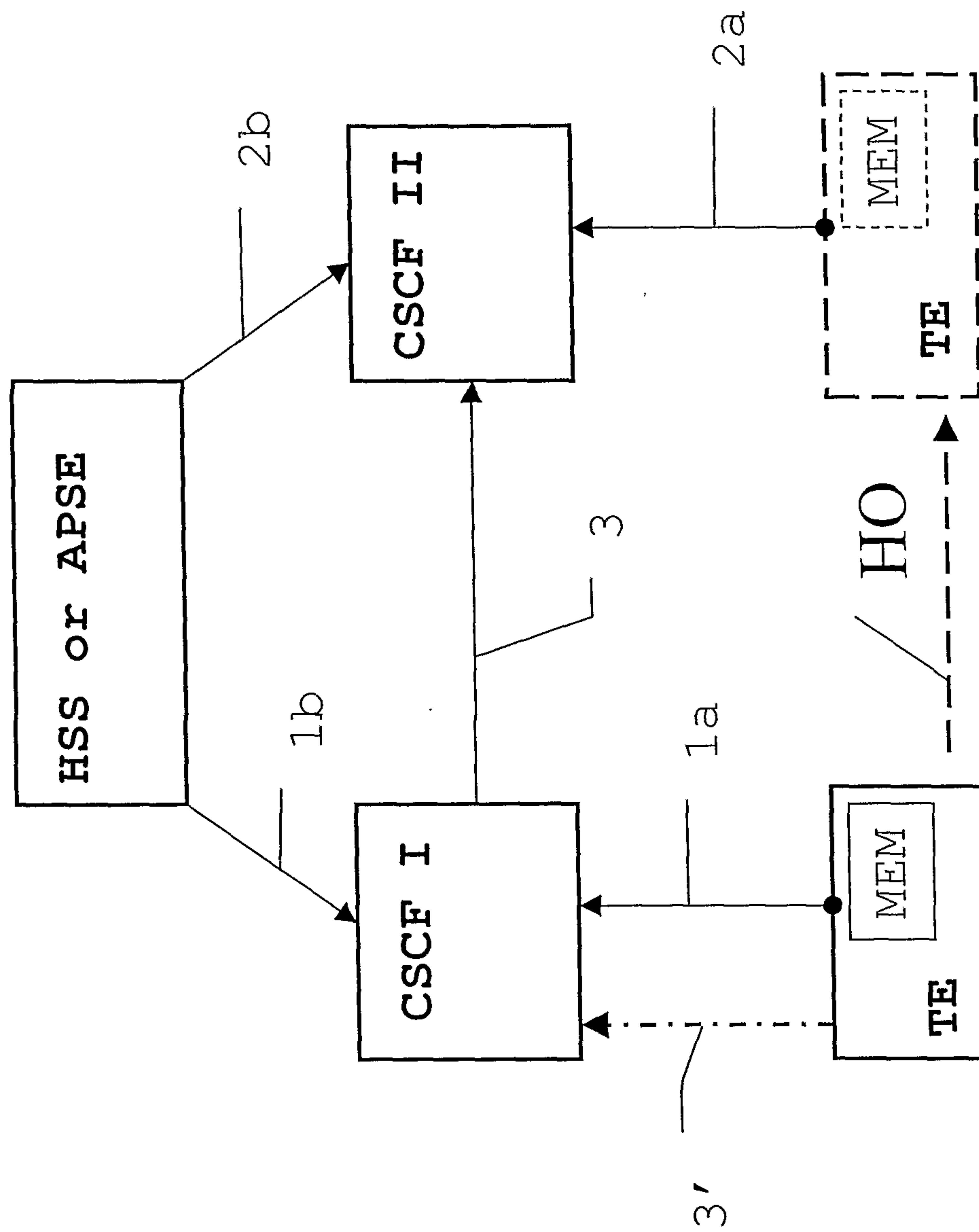
said at least one activated set of executable control data instructions is transferred from said first one (**CSCF I**) of said at least one network functional element of a
30 first type to said second one (**CSCF II**) of said at least one network functional element of a first type.

7. A computer system comprising an execution environment for running an application for handling sets of executable

- 4/4 -

control data instructions in a communication network,
according to any of claims 1 to 6.

8. A computer program product, loadable into the memory of
5 a digital computer and comprising software code portions
for performing the steps of any of claims 1 to 6.

**FIG. 1**

