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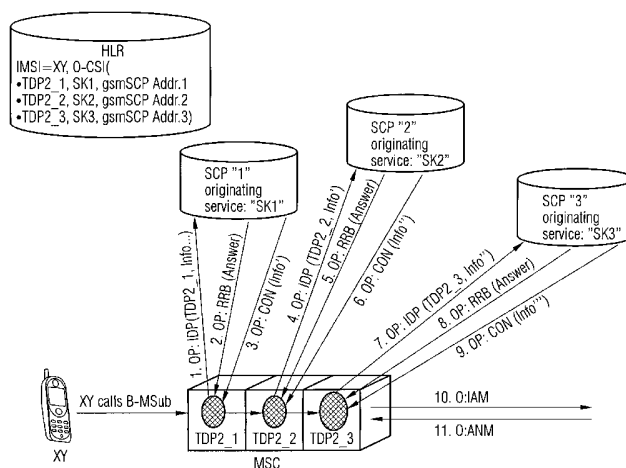
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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: METHOD AND MEANS FOR HANDLING MULTIPLE SERVICES OF AN INTELLIGENT NETWORK WITHIN
A MOBILE COMMUNICATION NETWORK



(57) **Abstract:** Method and apparatus means for handling multiple services of an Intelligent Network within a mobile communication network. The present invention comprises a method and apparatus means for handling multiple services of an Intelligent Network within a mobile communication network, comprising the steps of: - Sending service subscription information (O-CSI; T-CSI) comprising multiple service trigger detection points (TDP2 1, TDP2 2, TDP2 3; TDP12 1, TDP12 2, TDP12 3), wherein each detection point is associated with a determined service key and routing information, to the switching system (MSC) connected to a service control point of the Intelligent Network, and - invoking each said service by said switching system on their own trigger detection point according to a predefined order - prior to continuing routing an incoming call with service invocation to its destination. The present invention is based on the CAMEL standard which finds its application within an Intelligent Network environment, particularly in the GSM or UMTS mobile communication field.

**METHOD AND MEANS FOR HANDLING MULTIPLE SERVICES OF AN
INTELLIGENT NETWORK WITHIN A MOBILE COMMUNICATION
NETWORK**

The present invention relates to a method and apparatus means for handling multiple services of an intelligent network within a mobile communication network according to the independent claims.

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BACKGROUND OF INVENTION

This invention is particularly used in the environment of a GSM or UMTS mobile communication network.

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According to the architecture of Intelligent Networks (IN) there are Call Control Functions (CCF) defined in the Service Switching Point (SSP) which is associated with a Switching System, particularly a Mobile Switching Center (MSC). Call
20 Control Functions are standardised for triggering IN services. Socalled Trigger Detection Points (TDP) are defined. TDP1 means "Orig_Attempt_Authorized" concerning e.g. Off-Hook (emergency call or baby phone) which is normally not used in the mobile communication field. TDP2 means
25 "Collect_Information" concerning the origination parts of e.g. the Prepaid (PPS) service or the Virtual private network (VPN) service. TDP12 means "Terminating_Attempt_Authorised" concerning the terminating parts of e.g. the Prepaid (PPS) service or the Virtual private network (VPN) service. TDP3
30 means "Analyzed_Information" concerning e.g. Free Number or direct dialled services.

Using the CAMEL (Customized Applications for Mobile Network Enhanced Logic) standard, which is the feature in the GSM
35 standard to provide support for operator-specified services even for international roaming and to integrate IN features into the GSM architecture, it is not possible to trigger more

than one originating or more than two terminating IN services (one in the Gateway MSC and one in the Visited MSC) for the same subscriber. That means that a prepaid subscriber cannot subscribe another originating service. Especially with the new idea of third party applications there is a growing interest in being able to trigger several different originating services during one call. Also with the idea to introduce the service Virtual Private Network (VPN) as a mass service, there is the problem that Prepaid Service (PPS) and VPN cannot be triggered with CAMEL originating triggers for one and the same subscriber. The same problem occurs for the terminating service trigger, however due to the introduction of the Visited T-CSI, triggered in the VMSC, the situation is not so restricting.

Up to now the problem for the originating trigger was solved by abusing the dialled trigger: The first service is triggered at the Trigger Detection Point "DP_COLLECTED_INFORMATION" as it should be according to the standard using an originating CSI (O-CSI). Then a certain prefix, added to the destination routing address (by the MSC), or some other criteria leads to a dialled IN trigger for the second service. That means that the trigger detection point for the second service is not "DP_COLLECTED_INFO" (TDP2) but "DP_ANALYSED_INFORMATION" (TDP3). This again causes problems with the information, which is sent to the SCP (Service Control Point) in the operation InitialDetectionPoint. The information for TDP2 is different to the information sent in case of TDP3.

SUMMARY OF INVENTION

The present invention aims to develop methods and apparatus means which allow triggering multiple IN services following the CAMEL standardised method.

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Said problem is solved by the features mentioned in the independent claims. Preferred embodiments of the invention are described in the dependant claims.

- 5 An aspect of the invention is to introduce more than one trigger detection point.

According to the CAMEL standard REL 5 the Originating Subscription Information (O-CSI) looks like in the following
10 way:

O-CSI (according to Camel Phase 3 ; 3G TS 23.078, Rel. 99/ Rel4 / Rel5)

Parameter	values	Explanation
TDP List	DP_Collected_Info DP Route_Select_Failure	indicates, on which detection point triggering shall take place
GsmSCF address	E 164 number	addresses to be used to access the SCP for a particular subscriber Different gsmSCF addresses may be assigned to different TDPs

Service Key		identifies to the gsmSCF the service logic. Different Service Keys may be assigned to different TDPs
...	...	...

The O-CSI as it is suggested by the invention however looks like in the following way:

5

parameter	values	Explanation
TDP List	DP_Collected_Info_1 DP_Collected_Info_2 DP_Collected_Info_3 DP Route_Select_Failure	indicates, on which detection point triggering shall take place; the numbering defines the order of service invocation
gsmSCF address	E 164 number	addresses to be used to access the SCP for a particular subscriber

5

		Different gsmSCF addresses may be assigned to different TDPs
Service Key		identifies to the gsmSCF the service logic. Different Service Keys may be assigned to different TDPs
...	...	...

According to the CAMEL standard REL 5 the Terminating Subscription Information (T-CSI) looks like in the following way:

5

T-CSI (according to Camel Phase 3 ; 3G TS 23.078, Rel. 99/ Rel4 / Rel5)

parameter	values	Explanation
TDP List	DP Terminating_Attempt_Auth orised DP T_Busy DP T_No_Answer	indicates, on which detection point triggering shall take place

gsmSCF address	E 164 number	addresses to be used to access the SCP for a particular subscriber. Different gsmSCF addresses may be assigned to different TDPs
Service Key		identifies to the gsmSCF the service logic. Different Service Keys may be assigned to different TDPs
...	...	...

The T-CSI as it is suggested by the invention however looks
5 like in the following way:

parameter	values	Explanation
TDP List	DP Terminating_Attempt_Auth orised1 DP	indicates, on which detection point

	Terminating_Attempt_Auth orised2 DP Terminating_Attempt_Auth orised3 DP T_Busy DP T_No_Answer	triggering shall take place; the numbering defines the order of service invocation
gsmSCF address	E 164 number	addresses to be used to access the SCP for a particular subscriber Different gsmSCF addresses may be assigned to different TDPs
Service Key		identifies to the gsmSCF the service logic. Different Service Keys may be assigned to different TDPs
...	...	...

The proposed invention provides the following advantages:

The existing definition of the CAMEL Subscription Information and the existing trigger mechanism in the CAMEL standard is enhanced. It is possible to trigger not only one originating and/or two terminating services per call, but several in a CAMEL environment, i.e. in GSM and UMTS networks with IN. The result is a more flexible combination of different services. Together with an already implemented mechanism, which allows the different services to exchange information in forward as well as in backward direction for correlation purposes, this will be a powerful concept for a future MSC.

BRIEF DESCRIPTION OF THE DRAWINGS

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Preferred embodiments of the present invention will now be described with reference to the accompanying drawing in which:

20

Figure 1 is a schematic diagram of a part of a GSM or UMTS mobile communication network in which the present invention can be used, if multiple Trigger Detection Points are statically activated in case of an originating call.

25

Figure 2 is a schematic diagram of a part of a GSM or UMTS mobile communication network in which the present invention can be used, if multiple Event Detection Points (EDP) are dynamically activated during active IN dialogue in case of an originating call.

30

Figure 3 is a schematic diagram of a part of a GSM or UMTS mobile communication network in which the present invention can be used, if multiple Trigger Detection Points are statically activated in case of a terminating call.

35

Figure 4 is a schematic diagram of a part of a GSM or UMTS mobile communication network in which the present invention

can be used, if multiple Event Detection Points (EDP) are dynamically activated during active IN dialogue in case of a terminating call.

5 DETAILED DESCRIPTION OF THE DRAWINGS

The figures generally depict a part of a GSM or UMTS mobile communication network, wherein it is shown several network elements like a mobile phone XY, a Mobile Switching Centre MSC, several Service Control Points SCP and a Home Location Register HLR. The message flow of figure 1 and 3 describes the normal Situation, if multiple Trigger Detection Points are activated. The message flow of figure 2 and 4 concerns an extension of the "normal Situation", if multiple Event Detection Points are activated. The mentioned and shown messages flow among the network elements according to the numbering.

The handling is rather simple: the shown O-CSI is treated as before. During location update it is sent to not shown the Visited Location Register VLR, whose content is similar to the content of the shown Home Location Register HLR. It is sent from the Home Location Register HLR to the Mobile Switching Centre MSC during the interrogation, if there is call forwarding active or if a T-CSI is subscribed too and it is sent from the HLR to the Service Control Point SCP in case of Any Time Subscription Interrogation.

If in case of a mobile originating call or in case of call forwarding a TDP2 "DP_Collected_Info" is triggered and if there are multiple TDP2's - depicted as TDP2_1, TDP2_2, TDP2_3, possibly being more than shown - the DP_Collected_Info_1 is triggered at first. Any information, which is modified by the SCP during this IN dialogue shall be stored and shall be taken into consideration when the next originating service is triggered.

10

If different originating services (SK1, SK2 and SK3) have armed one and the same Event Detection Point (EDP), e.g. the EDP "Answer" (2 from SK1, 5 from SK2, 8 from SK3) and if this EDP is met (11), then the service, which was triggered as last shall be informed first (13 to SK3, 15 to SK2, 17 to SK1). Any modification shall be taken into consideration when passing the EDP backwards. I.e. if SCP 3 modifies the information, which it received with the ERB Answer (12) and sends this information to the MSC in the message CWA (13), the MSC will provide the modified information to SCP 2 in the message ERB Answer (14).

Concerning a mobile terminating call the above described message flow could be employed in an analogue manner.

15

The handling is rather simple: the T-CSI is treated as before, it is stored in the HLR and it is sent from the Home Location Register (HLR) to the Mobile Switching Centre (MSC) during the interrogation and from the HLR to the Service Control Point (SCP) in case of Any Time Subscription Interrogation.

If in case of a mobile terminating call a TDP12 "DP_Terminating_Attempt_Authorised" is triggered in the GMSC and if there are multiple TDP12s, the "DP Terminating_Attempt_Authorised1" is triggered at first. Any information, which is modified by the SCP during this IN dialogue shall be stored and shall be taken into consideration when the next terminating service is triggered.

30

If different terminating services (SK1, SK2 and SK3) have armed one and the same Event Detection Point (EDP), e.g. the EDP "Answer" (2 from SK1, 5 from SK2, 8 from SK3) and if this EDP is met (11), then the service, which was triggered as last shall be informed at first (13 to SK3, 15 to SK2, 17 to SK1). Any modification shall be taken into consideration when passing the EDP backwards.

The following applications of the invention are imaginable:

5 If VPN (Virtual Private Network) shall become a mass service,
i.e. if friends and families can build small VPNs, the PPS
service, which is a mass service too must interwork with VPN.
If additionally MNP (Mobile Number Portability) has to be
offered, this three originating dialogues can be handled
easily with the new concept.

10

The regulation body has forced the introduction of Mobile
Number Portability (MNP). It must be possible, to change the
operator while keeping the MSISDN for a subscriber. As the
tariff for Mobile Originating Calls (MOC) is less for
15 subscribers of one and same network, the prepaid service must
know, to which network the B subscriber belongs. Thus there
must be a MNP dialogue before the PPS dialogue. If there is a
VPN subscriber, the VPN dialogue must be triggered before the
MNP dialogue, because the MNP dialogue needs the long number.
20 If all three services are subscribed by one mobile subscriber
service triggering becomes really difficult. But this is what
the operator wants to do in future!

If the operators want to introduce third party services
25 (located inside or outside the networks trusted domain) these
services must be triggered. The order of the triggering of
the third party application service and PPS, MNP and/or VPN
service will depend on the kind of service. To be flexible,
the originating services may all be triggered via O-CSI and
30 the order may depend on the numbering of the defined TDPs.

ABBREVIATIONS

CAMEL	Customised Applications for Mobile network Enhanced Logic
CSI	CAMEL Subscription Information
EDP	Event Detection Point
GMSC	Gateway MSC
GSM	Global System for Mobile Telecommunication
gsmSCF	GSM Service Control Function
HLR	Home Location Register
IMSI	International Mobile Subscriber Identity
IN	Intelligent Network
ISDN	Integrated Services Digital Network
MNP	Mobile Number Portability
MOC	Mobile Originating Call
MSC	Mobile Switching Centre
MSISDN	Mobile Subscriber ISDN Number
MTC	Mobile Terminating Call
O:ANM	Order Answer Message
O:IAM	Order Initial Address Message
O-CSI	Originating CSI
OP:CON	INAP/ CAP operation "Connect"
OP:CWA	INAP/ CAP operation "ContinueWithArgument"
OP:ERB	INAP/ CAP operation "EventReportBCSM"
OP:IDP	INAP/ CAP operation "InitialDetectionPoint"
OP:RRB	INAP/ CAP operation "RequestReportBCSM"
PPS	PrePaid Service
SCF	Service Control Function
SCP	Service Control Point
SK	Service Key
T-CSI	Terminating Camel Subscription Information

TDP	Trigger Detection Point
TDP2	Trigger Detection Point "collected Info"
TDP3	Trigger Detection Point "analysed information"
TDP12	Trigger Detection Point "terminating attempt authorized"
UMTS	Universal Mobile Telecommunication System
VLR	Visited Location Register
VMSC	Visited MSC
VPN	Virtual Private Network
VT-CSI	VMSC T-CSI

CLAIMS

1. A method of handling multiple services of an Intelligent network within a mobile communication network, comprising
5 the steps of:
 - Sending service subscription Information (O-CSI; T-CSI) comprising multiple service trigger detection points (TDP2_1, TDP2_2, TDP2_3; TDP12_1, TDP12_2, TDP12_3),
10 wherein each detection point is associated with a determined service key and routing information, to the switching system (MSC) connected to a service control point (SCP) of the Intelligent Network, and
 - invoking each said service by said switching system on their own trigger detection point according to a
15 predefined order
 - prior to continuing routing an incoming call with service invocation to its destination.
2. A method according to claim 1, wherein the service
20 subscription Information (O-CSI; T-CSI) is defined according to the CAMEL standard.
3. A method according to claim 2, wherein an activated service trigger detection point has the value
25 DP_Collected_Info according to the CAMEL standard.
4. A method according to claim 2, wherein an activated service trigger detection point has the value
30 DP_Terminating_Attempt_Authorised according to the CAMEL standard.
5. A method according to any one of the previous claims, wherein each said service can be invoked at a so-called
35 Event Detection Point in the backward direction from said predefined order.

6. A database within a mobile communication network which is suitable for using the method according to any one of the previous claims, wherein the database provides means for storing a service trigger table comprising at least
5 information relating to multiple service trigger detection points, wherein each trigger detection point is associated with a determined service key and routing information.
7. A Home Location Register (HLR) within a mobile
10 communication network which is suitable for using the method according to any one of the claims 1 to 5, wherein the Home Location Register comprises means for providing a database as claimed in claim 6.
- 15 8. A Visited Location Register within a mobile communication network which is suitable for using the method according to any one of the claims 1 to 5, wherein the Visited Location Register comprises means for providing a database as claimed in claim 6.
- 20 9. A switching system (MSC) within a mobile communication network, which is suitable for using the method according to any one of the claims 1 to 5, wherein the switching system provides multiple service trigger detection points
25 (TDP2_1, TDP2_2, TDP2_3; TDP12_1, TDP12_2, TDP12_3) for invocation of multiple services.
10. A switching system (MSC) according to claim 9, wherein the service trigger detection points (TDP2_1, TDP2_2,
30 TDP2_3; TDP12_1, TDP12_2, TDP12_3) are defined according to the CAMEL standard.

FIG 1

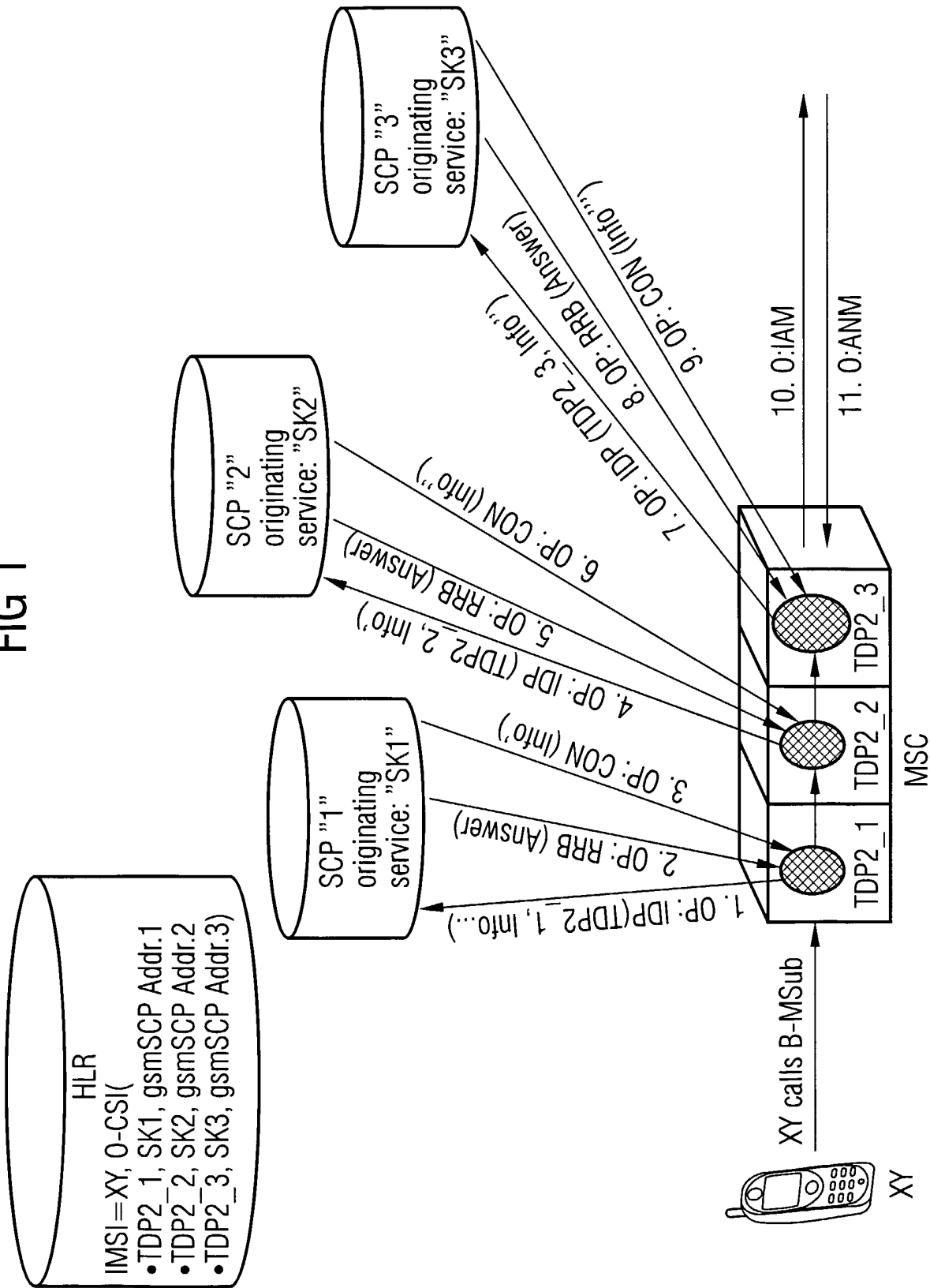


FIG 2

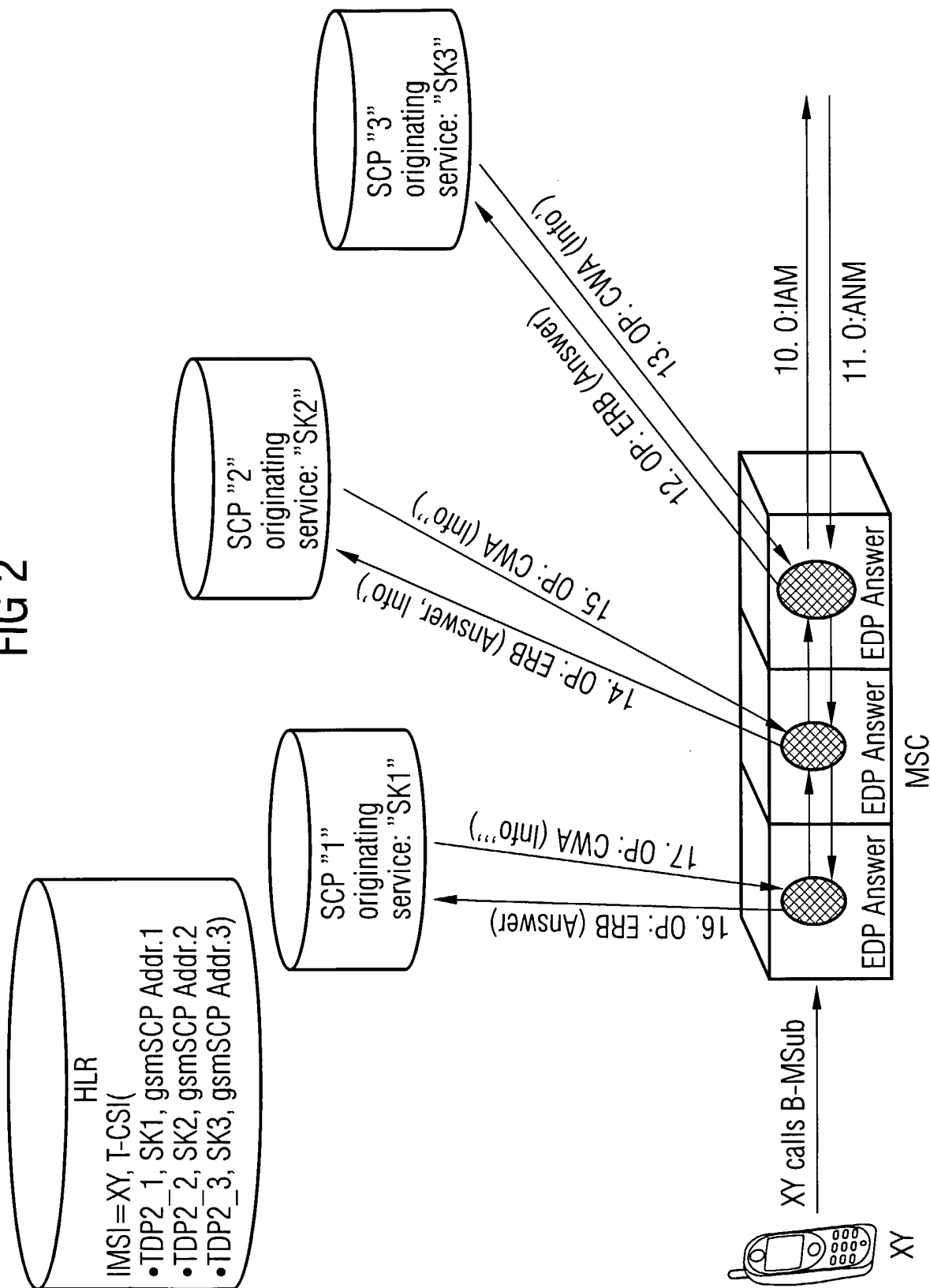


FIG 3

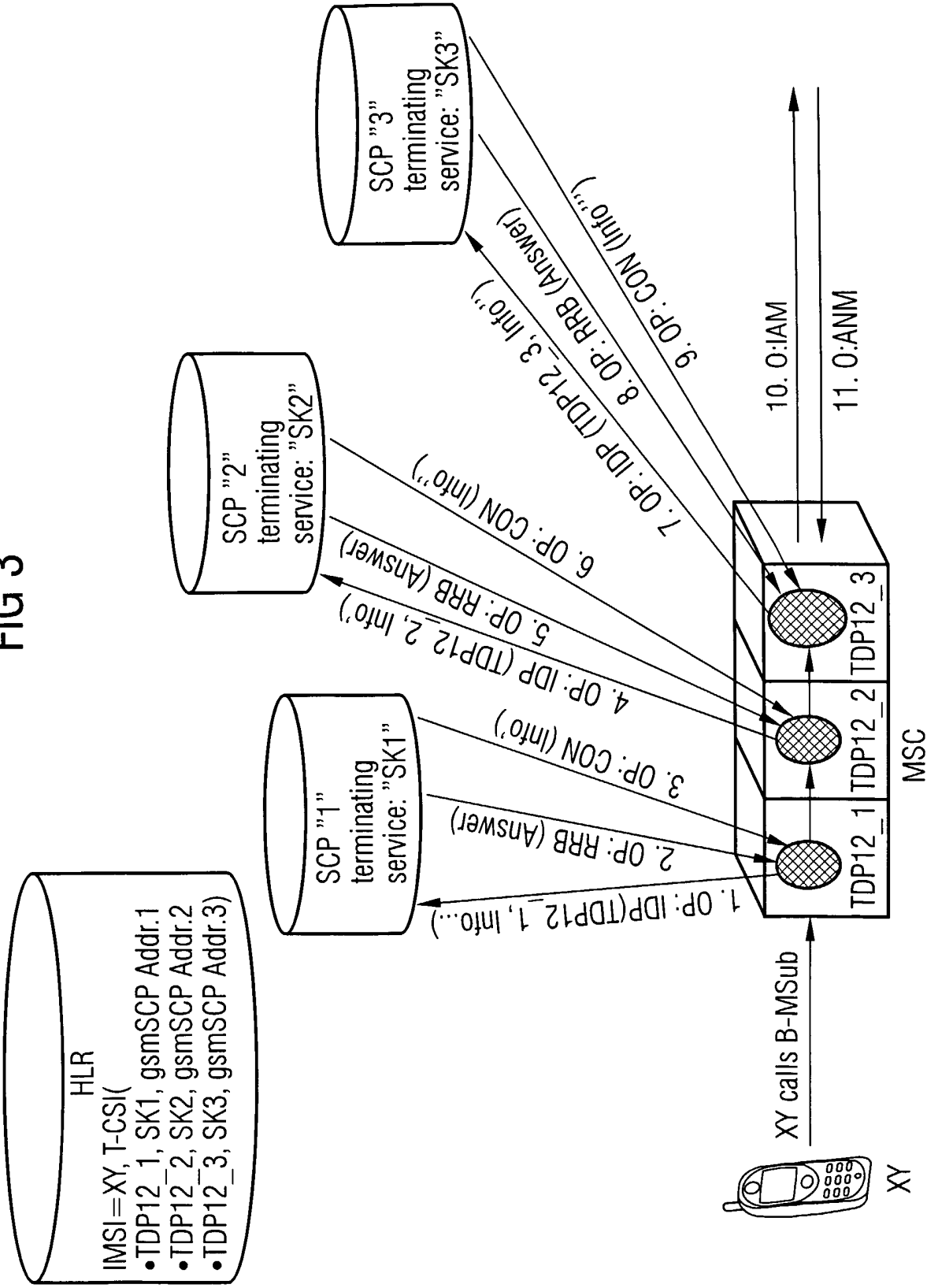
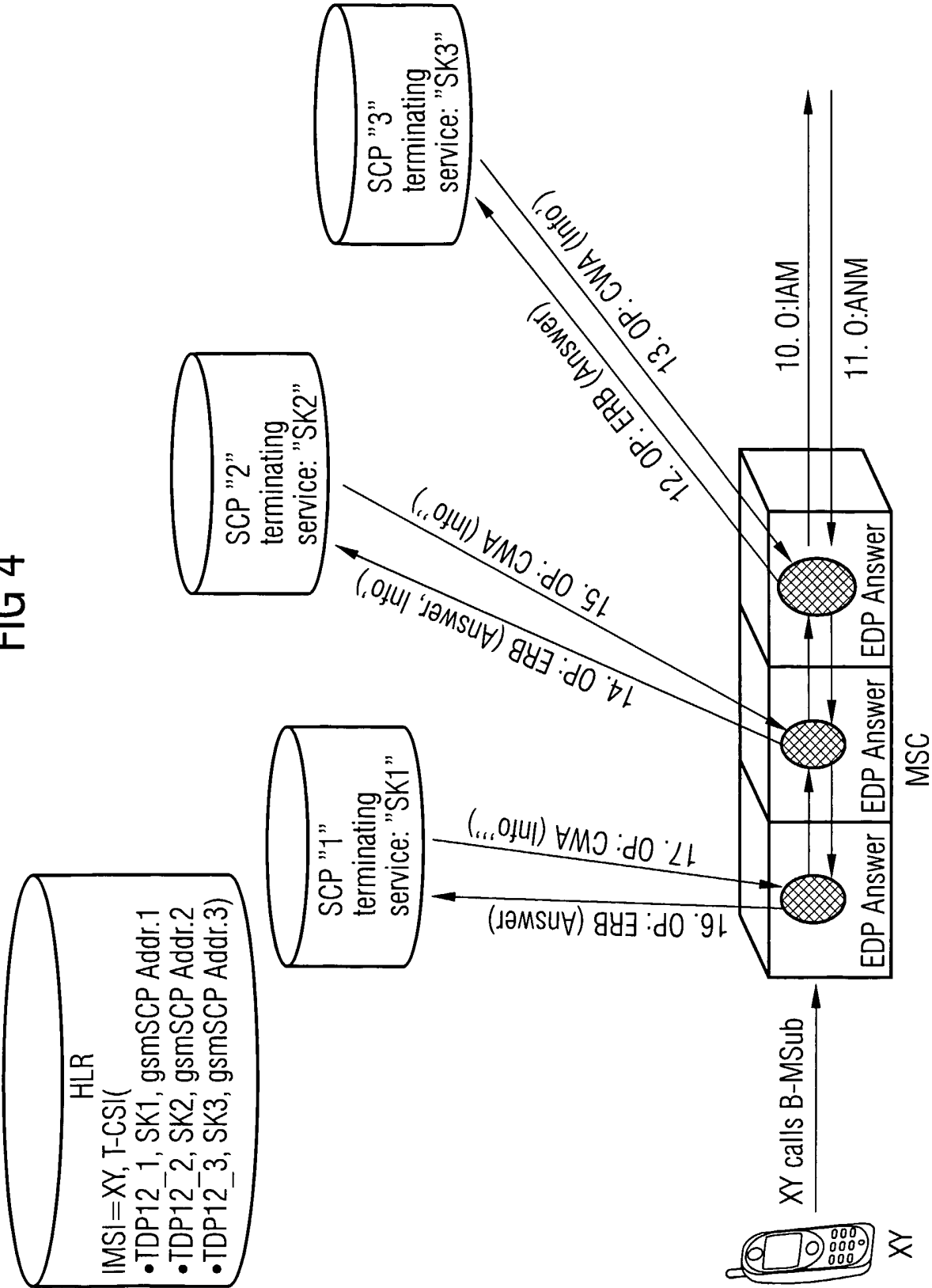


FIG 4



INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/05365

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H04Q7/24 H04Q3/00

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)
 IPC 7 H04Q

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

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>SUGIYAMA T ET AL: "A service logic program structure of UPT service in intelligent networks" UNIVERSAL PERSONAL COMMUNICATIONS, 1993. PERSONAL COMMUNICATIONS: GATEWAY TO THE 21ST CENTURY. CONFERENCE RECORD., 2ND INTERNATIONAL CONFERENCE ON OTTAWA, ONT., CANADA 12-15 OCT. 1993, NEW YORK, NY, USA, IEEE, 12 October 1993 (1993-10-12), pages 870-874, XP010198331 ISBN: 0-7803-1396-8 page 870, paragraphs 1-3 page 871, paragraph 4; figures 4.1, 4.2 page 872, left-hand column, line 9-13, paragraph 6 page 872, left-hand column, line 30-33, paragraph 6.2 page 870, right-hand column, line 7-20 -/--</p>	1-10

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

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	<p>page 873; figure 7.2 page 874, right-hand column, line 1-16, paragraph 8</p> <p>----</p>	
X	<p>US 2002/064274 A1 (EIKKULA JARI ET AL) 30 May 2002 (2002-05-30) page 1, paragraphs 4-6; figure 1 page 2, paragraphs 18-20 page 3, paragraphs 22,24,27-31 page 4, paragraph 35</p> <p>----</p>	1-10
A	<p>3GPP TSG CN WG4 MEETING #15, 3GPP TSG CN WG2 MEETING #25: "Change Request CR 057 to 3GPP 23.008 v.5.1.0 (2002-06)" 3GPP TS 23.008 V5.1.0, 29 July 2002 (2002-07-29) - 2 August 2002 (2002-08-02), pages 1-6, XP002254017 Helsinki page 3-4, paragraphs 2.14.1.1,2.14.1.2 page 5, paragraph 2.14.3</p> <p>-----</p>	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/05365

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