

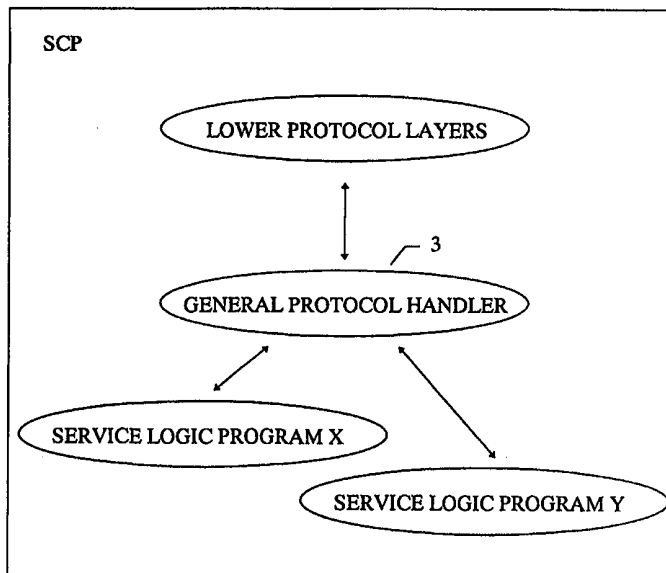


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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**(54) Title:** GENERAL PROTOCOL FOR SERVICE CONTROL POINT**(57) Abstract**

The present invention discloses a general protocol for a service control point (SCP) in a network system. The network system comprises at least one network element of a first type (SCP) and at least one network element of a second type (SSP) for transmitting messages to the first type network elements (SCP), each of the second type network elements (SSP) using a specific protocol of a plurality of protocols for transmitting the messages. The first type network elements (SCP) are able to process the received protocol-specific messages and to transmit messages to said second type network elements by using service logic programs (SLP) included in each of the first type network elements (SCP). In addition, the system comprises a definition means (1) for defining protocol definitions of the plurality of protocols, which protocol definitions are related to one message, into a general protocol definition for the message, and for providing general protocol definitions for all possible messages transmitted by the second type network elements (SSP) and the first type network elements (SCP) for each of the first type network elements (SCP). Each of the first type network elements (SCP) in the system comprises a conversion means (2) for converting the provided general protocol definitions into one general message set that is used in the respective first type network element (SCP), and a selection means (3) for selecting converted protocol definitions in the converted general protocol definition for a received protocol-specific message and for a message to be transmitted by the respective first type network element out of the general message set, and for providing the selected converted protocol definitions for the received message to the service logic programs (SLP) for processing the received message, and for transmitting the selected converted protocol definitions for the message to be transmitted.



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## GENERAL PROTOCOL FOR SERVICE CONTROL POINT

## 5 FIELD OF THE INVENTION

The present invention relates to a network system and a method for processing protocol-specific messages in a network element, such as a service control point, and in particular to a general protocol for a service control point.

## BACKGROUND OF THE INVENTION

15 In an intelligent network system, Service Control Point (SCP) network elements provide a platform for executing Service Logic Programs (SLP) to implement value-added services in the intelligent network system. Other network elements in the intelligent network system, so called Service Switching Point (SSP) network elements are linked for call processing purposes to the SCP network elements.

In particular, the SCP network elements handle messages, i.e. operation instructions, which are communicated from the SSP network elements. However, the SSP network elements use different signaling protocols such as Signaling System No. 7 (SS7) protocols for transmitting/receiving the messages towards/from the SCP network elements. Therefore, the SCP network elements must be able to process the different signaling protocols. For example, these protocols can be the Intelligent Network Application Protocol (INAP) with various manufacturer specific extensions or versions such as fixed network extensions and mobile network extensions, the Mobile Application Protocol (MAP) and the Customized Application Protocol for Mobile Networks

(CAMEL). Hence, the SCP network elements must be able to handle phone calls in mobile networks and in fixed networks.

- 5 In processing the messages, the SCP network elements use the service logic programs which, for example, can be programmed by means of a Service Logic Execution Language (SLEL) used in Hewlett Packard SCP implementation.
- 10 Every new protocol or protocol version is imported to the SCP network elements as a new message set. Message sets are made by converting protocol definitions such as ASN.1 definitions of the protocols using a Message Set Compiler (MSC) or an other ASN.1 compiler. Different message sets  
15 are created for the different protocols or protocol versions, respectively. The different message sets are separated by message set name and version number. The message set name and version number are also used in service logic program code in order to indicate which  
20 service logic program belongs to which message set. The service logic programs use this information to select the appropriate encoding and decoding routines for the message sets.
- 25 Fig. 9 shows the conventional architecture in an SCP network element, in which service logic programs registered to different protocols X and Y communicate with lower protocol layers such as Transaction Capabilities Application Parts (TCAP), etc.
- 30 Thus, if a service logic program is registered to a message set named INAP which message set is not installed in the respective SCP network element, it is not possible to compile the service logic program in the SCP network  
35 element.

Furthermore, if the number or version of protocols  
processed in the SCP network elements changes, the service  
logic programs registered to the protocols are immediately  
5 affected. Or if an old protocol is removed from the SCP  
network elements, the code of the service logic programs  
registered to this protocol has to be modified and  
recompiled.

10 Since the amount of services in the SCP network elements is  
very high, changes or modifications to the service logic  
programs require a lot of work.

It is therefore an object of the present invention to  
15 provide general, protocol-independent service logic  
programs in the SCP network elements in order to avoid the  
implementation of service logic programs in the SCP network  
elements for every protocol or protocol version used in the  
SCP network elements and, thus, the registration of service  
20 logic programs to one or several protocols which results in  
repetition of same code.

#### SUMMARY OF THE INVENTION

25 According to the present invention, this object is achieved  
by a network system which comprises at least one network  
element of a first type (SCP) and at least one network  
element of a second type (SSP) for transmitting messages to  
the first type network elements, wherein each of the second  
30 type network elements uses a specific protocol of a  
plurality of protocols for transmitting the messages. In  
this system, the first type network elements are able to  
process the received protocol-specific messages and to  
transmit messages to the second type network elements by  
35 using service logic programs (SLP) which are included in

each of the first type network elements. The system further comprises a definition means for defining protocol definitions of the plurality of protocols, which protocol definitions are related to one message, into a general  
5 protocol definition for the message, and for providing general protocol definitions for all possible messages transmitted by the second type network elements and the first type network elements for each of the first type network elements. In addition, each of the first type  
10 network elements in the system comprises a conversion means for converting the provided general protocol definitions into one general message set that is used in the respective first type network element, and a selection means for selecting converted protocol definitions in the converted  
15 general protocol definition for a received protocol-specific message and for a message to be transmitted by the respective first type network element out of the general message set, and for providing the selected converted protocol definitions for the received message to said  
20 service logic programs for processing the received message, and for transmitting the selected converted protocol definitions for the message to be transmitted.

Furthermore, according to the present invention, the above-  
25 mentioned object is achieved by a method for processing protocol-specific messages in a network element of a first type (SCP), wherein messages are transmitted to the first type network element by at least one network element of a second type (SSP), each of the second type network elements  
30 using a specific protocol of a plurality of protocols for transmitting the messages. Using service logic programs (SLP) which are included in the first type network element, the protocol-specific messages can be processed by the first type network element and messages can be transmitted  
35 by the first type network element to the second type

network elements. This method comprises a definition step, in which protocol definitions of the plurality of protocols, which protocol definitions are related to one message, are defined into a general protocol definition for the message, and a provision step, in which general protocol definitions for all possible messages transmitted by the second type network elements and the first type network element are provided for the first type network element. In addition, the method comprises a conversion step, in which the provided general protocol definitions are converted into one general message set that is used in the first type network element, a selection step, in which converted protocol definitions in the converted general protocol definition for a received protocol-specific message and for a message to be transmitted by the first type network element are selected out of the general message set, and a provision step, in which the selected converted protocol definitions for the received message are provided to the service logic programs for processing the received message and in which the selected converted protocol definitions for the message to be transmitted are transmitted.

According to the present invention, the service logic programs register only to the general message set. Changes in the general message set are not visible to the service logic programs. From the viewpoint of the service logic programs, the number of used protocols does not change and the protocol name is stable.

Further developments of the present invention are defined in the respective appended subclaims.

In the following, a preferred embodiment of the present invention is described by taking into account the

accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

5 Fig. 1 shows a schematic configuration of an intelligent network system.

Fig. 2 shows an internal structure of an SCP network element according to a preferred embodiment of the present  
10 invention.

Fig. 3 shows a process for creating a general message set for the SCP network element according to the preferred embodiment of the present invention.

15

Fig. 4 shows an architecture in the SCP network element according to the preferred embodiment of the present invention.

20 Fig. 5 shows an architecture of a TCP/IP network element in which the present invention can be applied.

Fig. 6 shows a flowchart illustrating the process when the SCP network element according to the preferred embodiment  
25 of the present invention receives a message from an SSP network element.

Fig. 7 shows a flowchart illustrating the process when a message is transmitted by the SCP network element according  
30 to the preferred embodiment of the present invention to an SSP network element.

Fig. 8 shows a flowchart illustrating the operation according to the preferred embodiment of the present  
35 invention.



Fig. 9 shows a conventional architecture in an SCP network element.

## 5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 shows a schematic configuration of an intelligent network system which comprises at least one network element of a first type (referred to in the following as SCP  
10 (Service Control Point) network element) and at least one network element of a second type (referred to in the following as SSP (Service Switching Point) network element). The SSP network elements transmit/receive messages to/from the SCP network elements, for which  
15 purpose there are used a plurality of different protocols such as SS7 (Signaling System No. 7) protocols and different versions thereof. As is shown in Fig. 1, among these protocols there are INAP (Intelligent Network Application Protocol) for fixed network extensions and for  
20 mobile network extensions, CAMEL (Customized Application Protocol for Mobile Networks) and MAP (Mobile Application Protocol) as examples for such SS7 protocols.

Fig. 2 shows the internal structure of one of the SCP  
25 network elements which, according to a specific implementation in an arbitrary example, is based on HP (Hewlett Packard) platform. Connectivity to the SS7 network, i.e. the SSP network elements operating according to SS7 protocols, is provided by an SS7 stack.

30 According to Fig. 2, service logic programs (SLPs) are registered to a general message set. The service logic programs which, for example, can be created using a service logic execution language (SLEL) in Hewlett Packard  
35 implementation are located in a service logic execution

environment (SLEE). Service logic programs can of course be executed in different environments which depends on the language used in programming the service logic programs and on the hardware in which the SCP network element is  
5 located.

In Fig. 2 there is also shown a definition means 1 communicating with the SCP network element, the operation of which will be described in the following.  
10

The service logic programs shown in Fig. 2 are general, protocol-independent service logic programs which are registered to only one general message set.

15 In the following, the creation of the general message set is described by referring to Fig. 3.

In general, protocol definitions such as ASN.1 definitions provided by the definition means 1 shown in Fig. 2 to the  
20 SCP network elements are converted in the SCP network elements by using a conversion means 2, i.e. a protocol definition compiler such as a Message Set Compiler (MSC) or an other ASN.1 compiler. The ASN.1 compiler 2 uses the ASN.1 description of a protocol as an input, and outputs a  
25 file which includes the encoding and decoding routines for the protocol.

In order to obtain the general message set as shown in Fig. 3, general protocol definitions for all possible PDUs  
30 (protocol data units or messages) which are used in SCP "outside world" communication must be provided.

This is accomplished by the definition means 1. In the definition means 1, several ASN.1 protocol definitions are  
35 combined into one definition. This is shown in Fig. 3, in

which several ASN.1 definitions of a plurality of protocols 1, 2,.. for one PDU or message are defined in a general ASN.1 definition for this PDU.

5 Then, the general ASN.1 definitions for all possible PDUs 1, 2,.. are supplied to the SCP network elements in which they are converted into the general message set via the ASN.1 compiler 2 or an other ASN.1 compiler and are rendered operative at the SCP network elements.

10

Annex 1 shows an example of a general ASN.1 definition for one PDU for several protocol versions. In this general definition, INAP message (PDU) "ConnectToResource" is defined for a mobile network and a fixed network, i.e.

15 there are definitions for the mobile network and definitions for the fixed network. In addition, some definitions in the general definition are common for both protocols.

20 As can be seen from this example, the message name "ConnectToResource" exists in INAP for fixed network and in INAP for mobile network. That is, same message names (PDU names) can exist in several protocols or protocol versions. Thus, a tool is required for separating the messages and  
25 for selecting the appropriate ASN.1 definitions in the general ASN.1 definition for the respective message out of the general message set, which is transmitted to or from an SSP network element using a specific protocol or protocol version.

30

As can be seen from Fig. 4, this is accomplished by a general protocol handler 3 which is included in each of the SCP network elements and communicates with lower protocol layers and the service logic programs in the respective SCP  
35 network element. According to Fig. 4, the service logic

programs X and Y register to only one message set and are selected by the general protocol handler 3 which will be described in detail below.

5 For separating the messages, the general protocol handler 3 provides an identifier such as a prefix for the converted ASN.1 definitions in the general message set. Since the filling of the PDUs, i.e. the filling of the general ASN.1 definitions is effected by the general protocol handler 3,  
10 the identifier is not visible for the service logic programs.

With respect to Fig. 6, in receiving a protocol-specific message (a PDU of a protocol X) (S61) transmitted by an SSP  
15 network element, from a lower layer, the general protocol handler 3 calls a decoding routine corresponding to the protocol X from the general message set (S62) and fills the protocol independent general ASN.1 definition corresponding to the decoding output (S63). That is, the protocol handler  
20 selects the appropriate converted or compiled ASN.1 definitions of the converted general ASN.1 definition for the received message out of the general message set. Further, the protocol handler selects the service logic programs having the requested functionality for processing  
25 the received message (S64) and provides the selected ASN.1 definitions to the selected service logic programs via a protocol-independent interface (S65).

Moreover, with respect to Fig. 7, in transmitting a message  
30 from the SCP network element to an SSP network element, that is in case the general protocol handler receives a protocol independent message from a service logic program (S71), the general protocol handler 3 selects the protocol to be used (S72) and fills the protocol PDU corresponding  
35 to the protocol independent message (S73). Then, the

protocol handler 3 calls the appropriate encoding routines for the protocol PDU (S74) from the general message set and sends the protocol PDU to the lower layers (S75).

5 For example, if the SCP network element transmits the message "ConnectToResouce" to an SSP network element handling messages using the INAP for mobile network, the general protocol handler 3 selects the definition for mobile network INAP in the general protocol definition as  
10 set out in Annex 1 for encoding the protocol independent message "ConnectToResource".

With respect to Fig. 8, the overall operation according to the preferred embodiment of the present invention is shown.  
15 In step S81, the protocol definitions of the plurality of protocols are defined into the general protocol definitions for all possible messages transmitted to and from the SCP network elements and are provided to the respective SCP network elements in step S82. In the SCP network elements,  
20 the general protocol definitions are converted into the general message set as shown in step S83. When a message is received or has to be transmitted by the SCP network elements, converted protocol definitions corresponding to this message are selected from the general message set in  
25 step S84. Finally, in step S85, the selected converted protocol definitions are provided to the service logic programs or are transmitted.

This enables the service logic programs in the SCP network  
30 elements to register to only one message set, i.e. the general message set. Hence, changes in the message set are not visible to the service logic programs. Since there is only one protocol, i.e. a general protocol, from the viewpoint of the service logic programs, the number of used  
35 protocols does not change and the name of the protocol is

stable.

In the above-described intelligent network system, the message set can, for example, be implemented as a header  
5 file in which the encoding and decoding routines are algorithmic or software functions, or as a dynamic linkable library such as a DLL file in Windows systems. Furthermore, the service logic programs can be implemented as executable binaries or code which is interpreted in runtime. The ASN.1  
10 definitions are translated into the general message set and are used in all network elements which are going to communicate with each other, wherein the implementation can differ in the network elements but the definition has to be the same. In case of different definitions, the network  
15 elements would not understand each other. Finally, according to the intelligent network system, the general protocol handler is implemented as an executable binary or code which is interpreted in runtime. The general protocol handler is compiled by means of the message set or uses the  
20 message set as a dynamic library.

The present invention is not limited to the use in connection with protocols for mobile and fixed intelligent networks for processing phone calls but can be used in  
25 every protocol stack where ASN.1 is used in the representation layer, for example in connection with SNMPs (Simple Network Management Protocols) in LANs (Local Area Networks). That is, the intelligent network IN according to the above description can be replaced by a TCP/IP  
30 (Transmission Control Protocol/Internet Protocol) network which comprises network management stations and network elements. The network management stations execute management applications which monitor and control the network elements, wherein connectivity is provided by a  
35 TCP/IP stack. The network elements contain management

agents which are responsible for performing the network management functions requested to them, wherein SNMP is used to communicate management information between the management applications and the agents. For example, a  
5 message transmitted by a network element can be a PDU "GetRequest" corresponding to the above-mentioned PDU "ConnectToResource".

In this context, Fig. 5 shows an architecture of a TCP/IP  
10 network element to which the present invention is applied. According to Fig. 5, a general protocol handler corresponding to the general protocol handler 3 in Fig. 4 communicates with lower protocol layers and SNMP agents for different versions. On one hand, the general protocol  
15 handler receives version independent messages to be transmitted from the SNMP agents and, on the other hand, selects SNMP agents for processing received version-specific messages and provides selected ASN.1 definitions for the received messages to the selected SNMP agents.

20 While the invention has been described with reference to a preferred embodiment, the description is illustrative of the invention and is not to be construed as limiting the invention. Various modifications and applications may occur  
25 to those skilled in the art without departing from the true spirit and scope of the invention as defined by the appended claims.

**Annex 1**

Example of a general ASN.1 definition for message (PDU)

"ConnectToResource":

DEFINITIONS::=

BEGIN

-- Definition for Mobile network INAP

MobileConnectToResourceArg ::= SEQUENCE {

ResourceAddress CHOICE {

IpRoutingAddress [0] IPRoutingAddress,

None [3] NULL

},

MobileAddition INTEGER (1..255),

extensions [4] ExtensionArray OPTIONAL,

}

-- Definition for Fixed network INAP

FixedConnectToResourceArg ::= SEQUENCE {

ResourceAddress CHOICE {

IpRoutingAddress [0] IPRoutingAddress,

None [3] NULL

},

extensions [4] ExtensionArray OPTIONAL,

}

-----  
-- Common definitions for both protocols

IPRoutingAddress ::= CalledPartyNumber

ExtensionArray ::= SEQUENCE SIZE (1..numOfExtensions) OF ExtensionField

ExtensionField ::= SEQUENCE {

ExType INTEGER (1..255),

Criticality ENUMERATED {

Ignore (0),

Abort (1)

} DEFAULT ignore,

value [1] ANY DEFINED by exType

}

END



## CLAIMS:

- 5 1. A network system comprising:  
at least one network element of a first type (SCP),  
and  
at least one network element of a second type (SSP)  
for transmitting messages to said first type network  
10 elements, each of said second type network elements using a  
specific protocol of a plurality of protocols for  
transmitting the messages,  
wherein said first type network elements are able to  
process the received protocol-specific messages and to  
15 transmit messages to said second type network elements by  
using service logic programs (SLP) included in each of said  
first type network elements; said system further  
comprising:  
a definition means (1) for defining protocol  
20 definitions of said plurality of protocols, which protocol  
definitions are related to one message, into a general  
protocol definition for the message, and for providing  
general protocol definitions for all possible messages  
transmitted by said second type network elements and said  
25 first type network elements for each of said first type  
network elements; and wherein each of said first type  
network elements comprises:  
a conversion means (2) for converting the provided  
general protocol definitions into one general message set  
30 that is used in the respective first type network element,  
and

a selection means (3) for selecting converted protocol definitions in the converted general protocol definition for a received protocol-specific message and for a message to be transmitted by the respective first type network element out of the general message set, and for providing the selected converted protocol definitions for the received message to said service logic programs for processing the received message, and for transmitting the selected converted protocol definitions for the message to be transmitted.

2. The system according to claim 1, wherein said definition means defines common protocol definitions in the general protocol definitions, the common protocol definitions being common for several protocol definitions.

3. The system according to claim 1, wherein said definition means defines protocol definitions of a protocol for a mobile network and protocol definitions of a protocol for a fixed network in the general protocol definitions.

4. The system according to claim 1, wherein said selection means selects the service logic programs used for processing the received message.

5. The system according to claim 1, wherein said selection means receives the messages to be transmitted by said first type network elements from the service logic programs as protocol independent messages.

6. The system according to claim 1, wherein said selection means provides an identifier for each converted protocol definition of the respective converted general protocol definitions in the general message set, which identifier  
5 indicates to which protocol of said plurality of protocols each converted protocol definition belongs.
7. The system according to claim 1, wherein said selection means provides the selected converted protocol definitions  
10 to said service logic programs via a protocol-independent interface.
8. The system according to claim 6, wherein said identifier is a prefix.  
15
9. The system according to claim 1, wherein said conversion means converts general protocol definitions which are represented in ASN.1 definitions.
- 20 10. The system according to claim 9, wherein said conversion means performs the conversion using a message set compiler.
11. The system according to claim 1, wherein said plurality  
25 of protocols comprises SS7 signaling protocols and TCP/IP signaling protocols.
12. The system according to claim 11, wherein said SS7 signaling protocols comprise INAP, MAP and CAMEL signaling  
30 protocols and different versions thereof.

13. The system according to claim 1, wherein said selection means accesses encoding and decoding routines in the general message set.

5 14. The system according to claim 1, wherein the general message set includes encoding and decoding routines for said plurality of protocols.

10 15. The system according to claim 1, wherein said first type network elements are capable of processing phone calls in mobile networks and in fixed networks.

15 16. A method for processing protocol-specific messages in a network element of a first type (SCP), wherein messages are transmitted to said first type network element by at least one network element of a second type (SSP), each of said second type network elements using a specific protocol of a plurality of protocols for transmitting the messages, and wherein, by using service logic programs (SLP) included in  
20 said first type network element, the protocol-specific messages can be processed by said first type network element and messages can be transmitted by said first type network element to said second type network elements; said method comprising the steps of:

25 defining (S81) protocol definitions of said plurality of protocols, which protocol definitions are related to one message, into a general protocol definition for the message,

30 providing (S82) general protocol definitions for all possible messages transmitted by said second type network

elements and said first type network element for said first type network element,

converting (S83) the provided general protocol definitions into one general message set that is used in  
5 said first type network element,

selecting (S84) converted protocol definitions in the converted general protocol definition for a received protocol-specific message and for a message to be transmitted by the first type network element out of the  
10 general message set, and

providing (S85) the selected converted protocol definitions for the received message to said service logic programs for processing the received message, and transmitting the selected converted protocol definitions  
15 for the message to be transmitted.

17. The method according to claim 16, wherein said defining step comprises the step of:

defining common protocol definitions in the general  
20 protocol definitions, the common protocol definitions being common for several protocol definitions.

18. The method according to claim 16, wherein said defining step comprises the step of:

25 defining protocol definitions of a protocol for a mobile network and protocol definitions of a protocol for a fixed network in the general protocol definitions.

19. The method according to claim 16, comprising the  
30 further step of:

providing an identifier for each converted protocol definition of the respective converted general protocol definitions in the general message set, which identifier indicates to which protocol of said plurality of protocols each converted protocol definition belongs.

5

20. The method according to claim 16, wherein the service logic programs are selected for processing the received message.

10

21. The method according to claim 16, wherein the messages to be transmitted by said first type network element are presented by the service logic programs as protocol independent messages.

15

22. The method according to claim 16, wherein the selected converted protocol definitions are provided to said service logic programs via a protocol-independent interface.

20 23. The method according to claim 19, wherein said identifier is a prefix.

24. The method according to claim 16, wherein the general protocol definitions are represented in ASN.1 definitions.

25

25. The method according to claim 24, wherein the ASN.1 definitions are converted using a message set compiler.

26. The method according to claim 16, wherein said plurality of protocols comprises SS7 signaling protocols and TCP/IP signaling protocols.

30

27. The method according to claim 26, wherein said SS7 signaling protocols comprise INAP, MAP and CAMEL signaling protocols and different versions thereof.

5

28. The method according to claim 16, wherein said selection means accesses encoding and decoding routines in the general message set.

10 29. The method according to claim 16, wherein the general message set includes encoding and decoding routines for said plurality of protocols.

15 30. The method according to claim 16, wherein phone calls in mobile networks and in fixed networks can be processed by said first type network element.

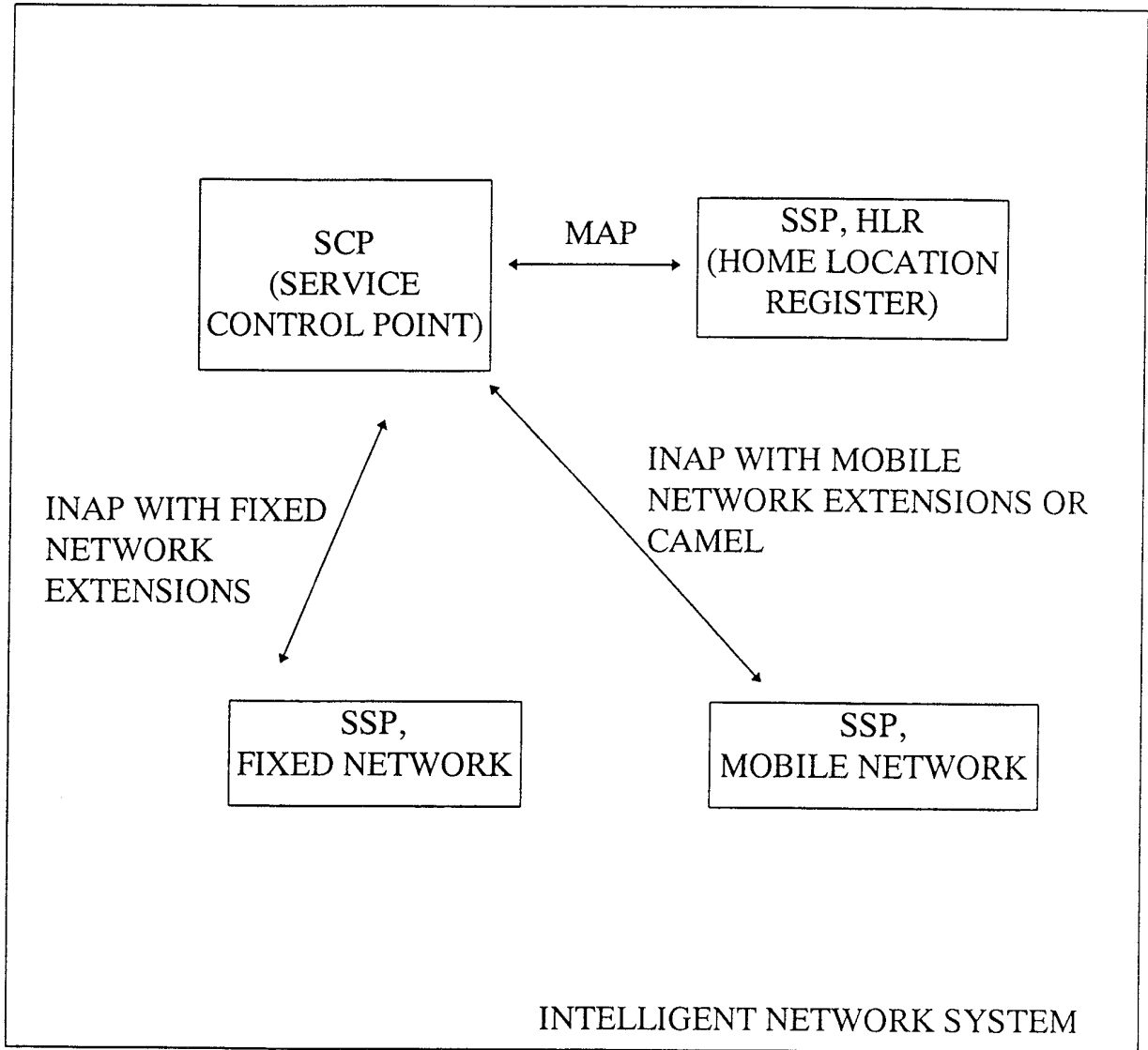


FIG. 1



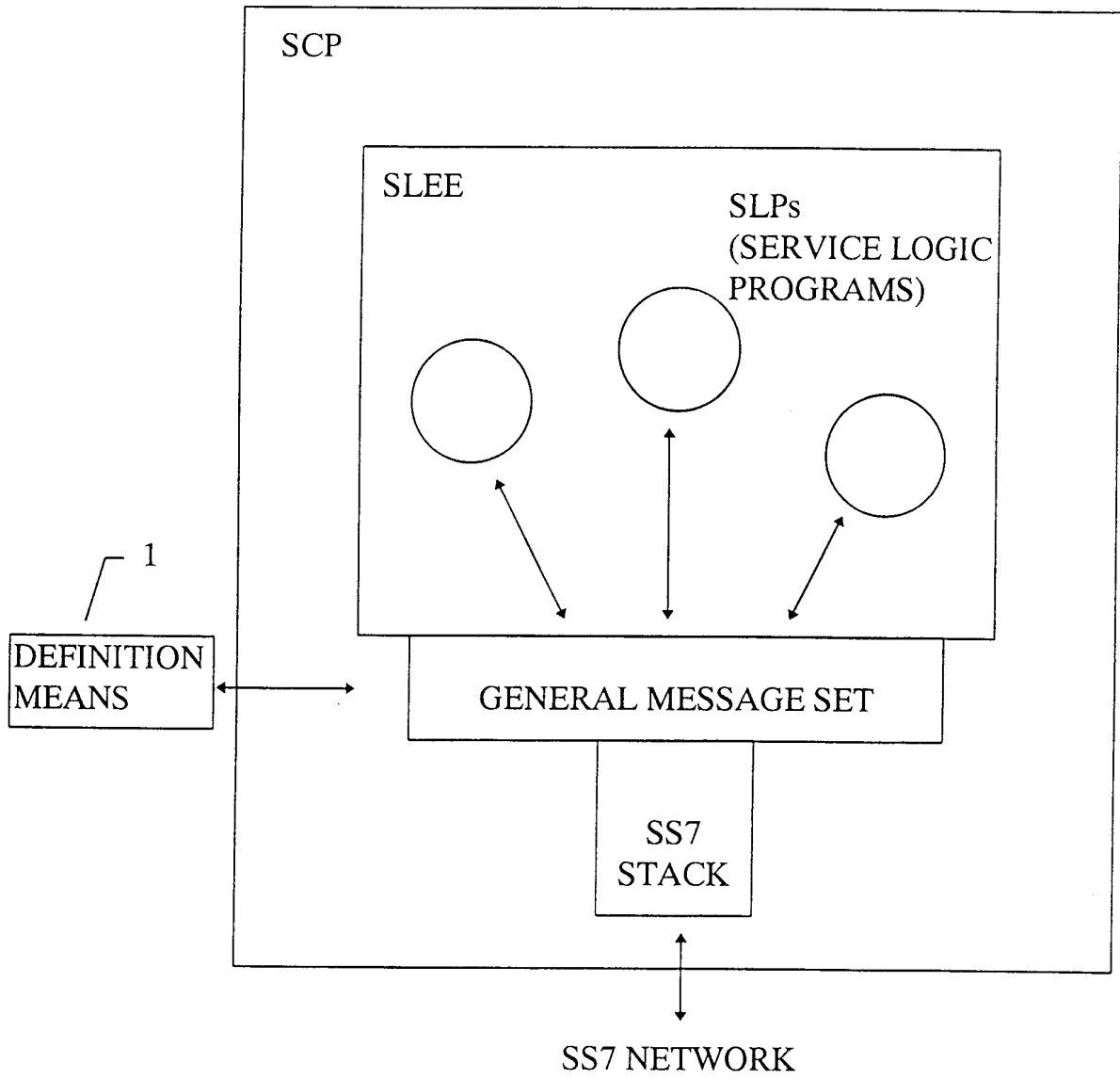


FIG. 2

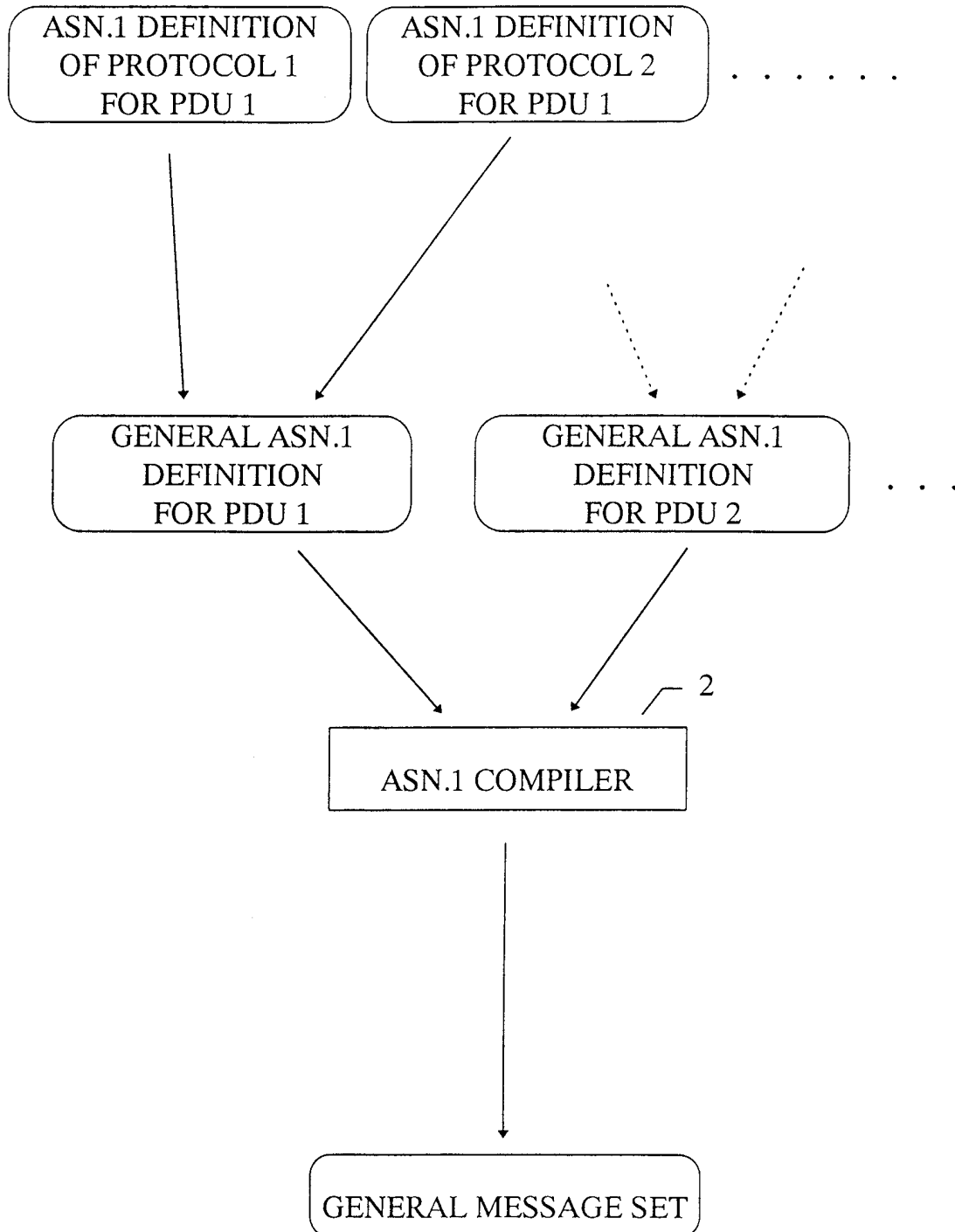


FIG. 3

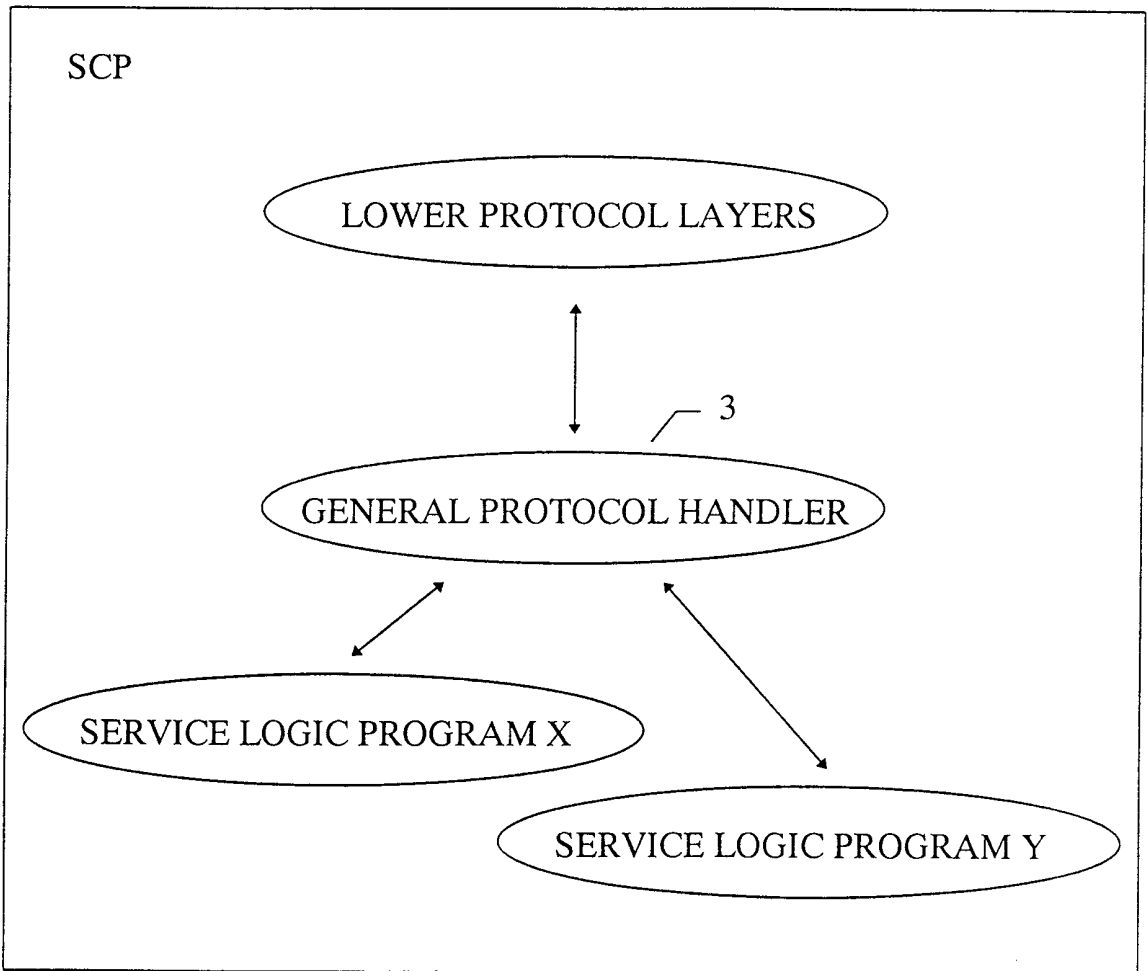


FIG. 4

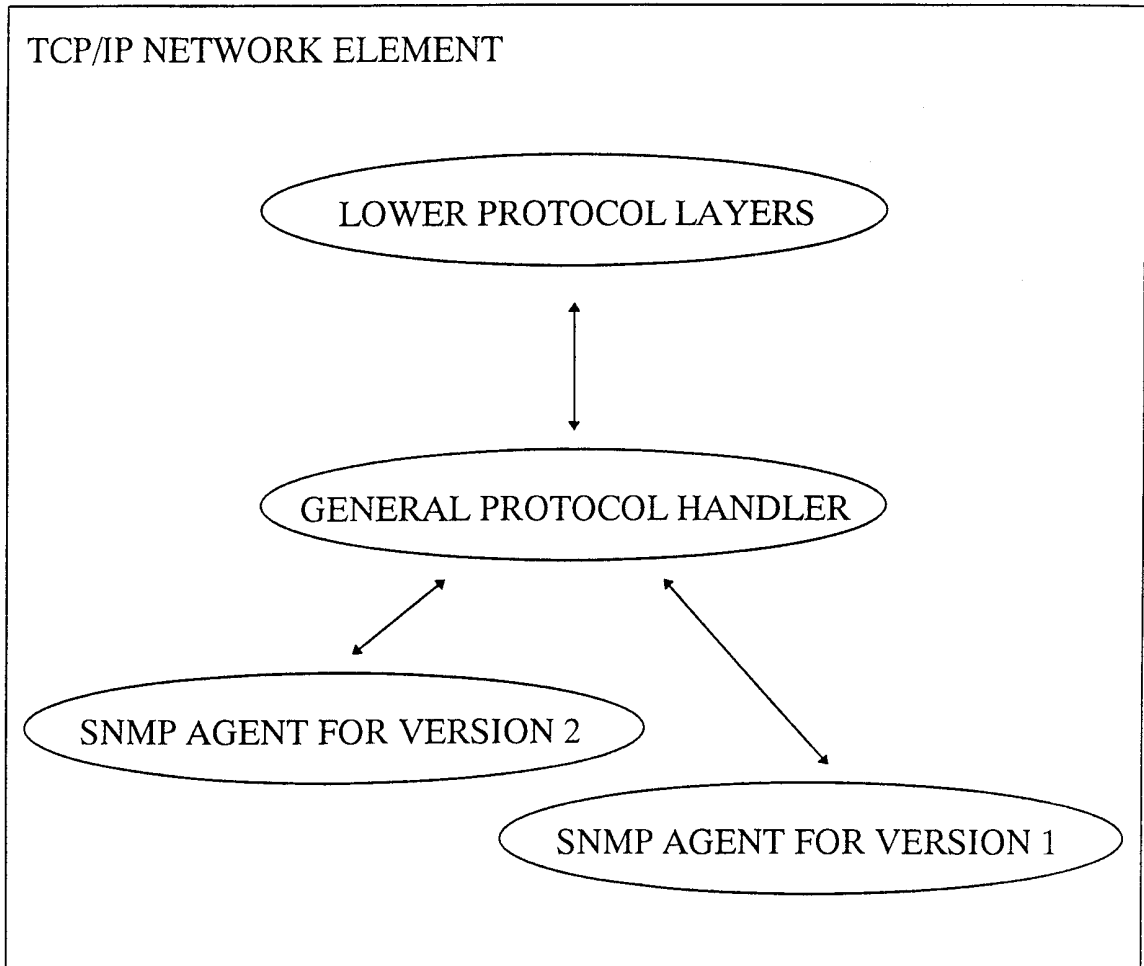


FIG. 5

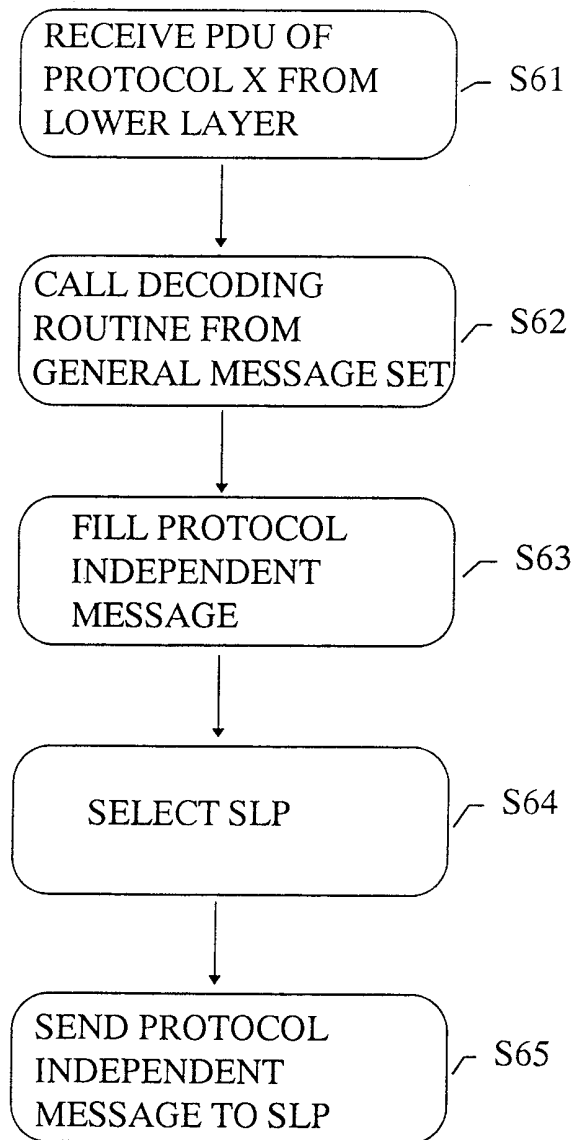


FIG. 6

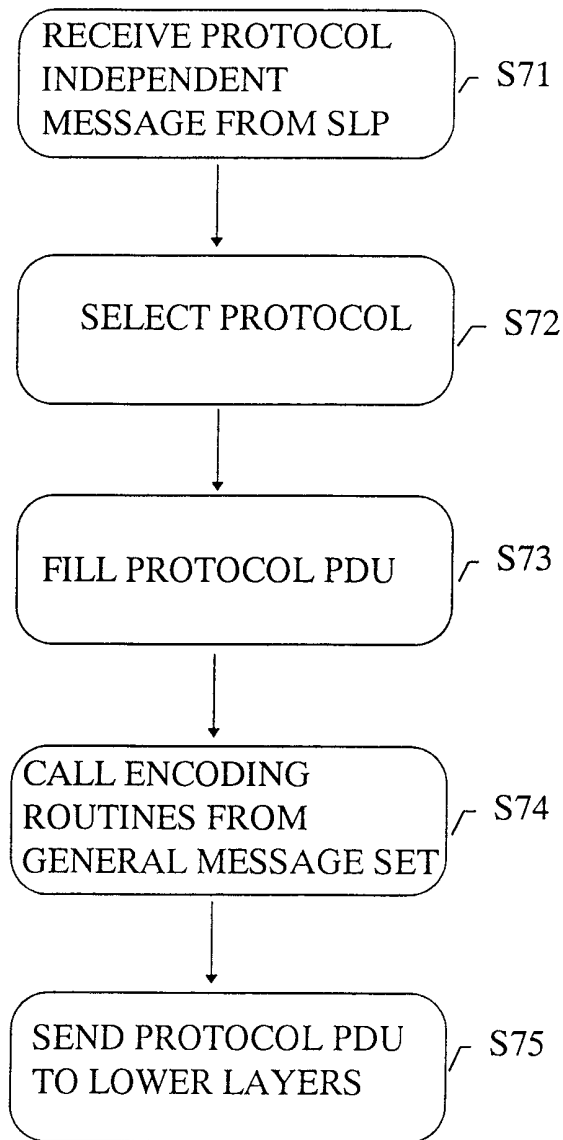


FIG. 7

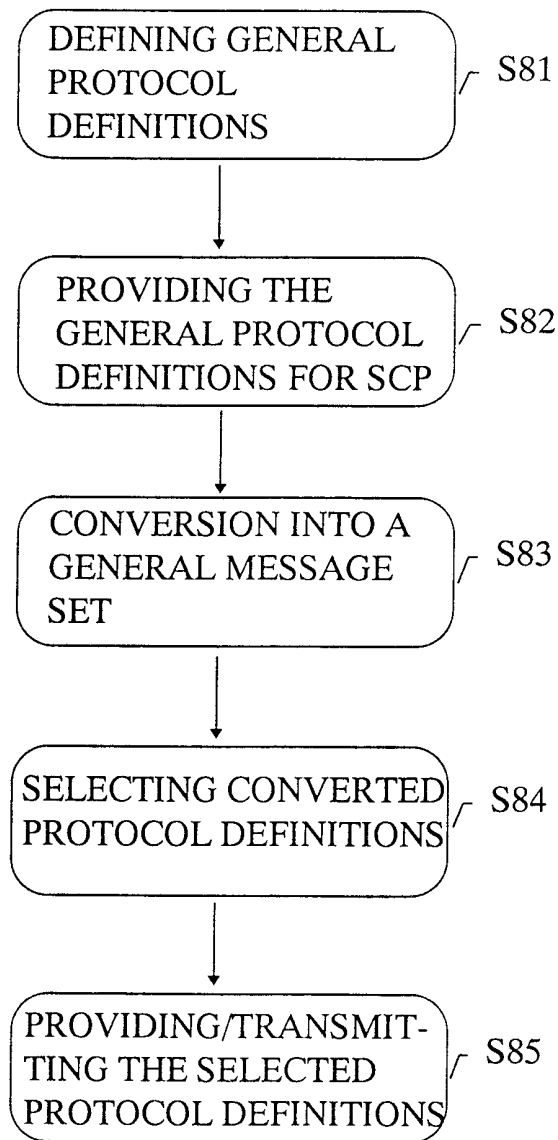


FIG. 8

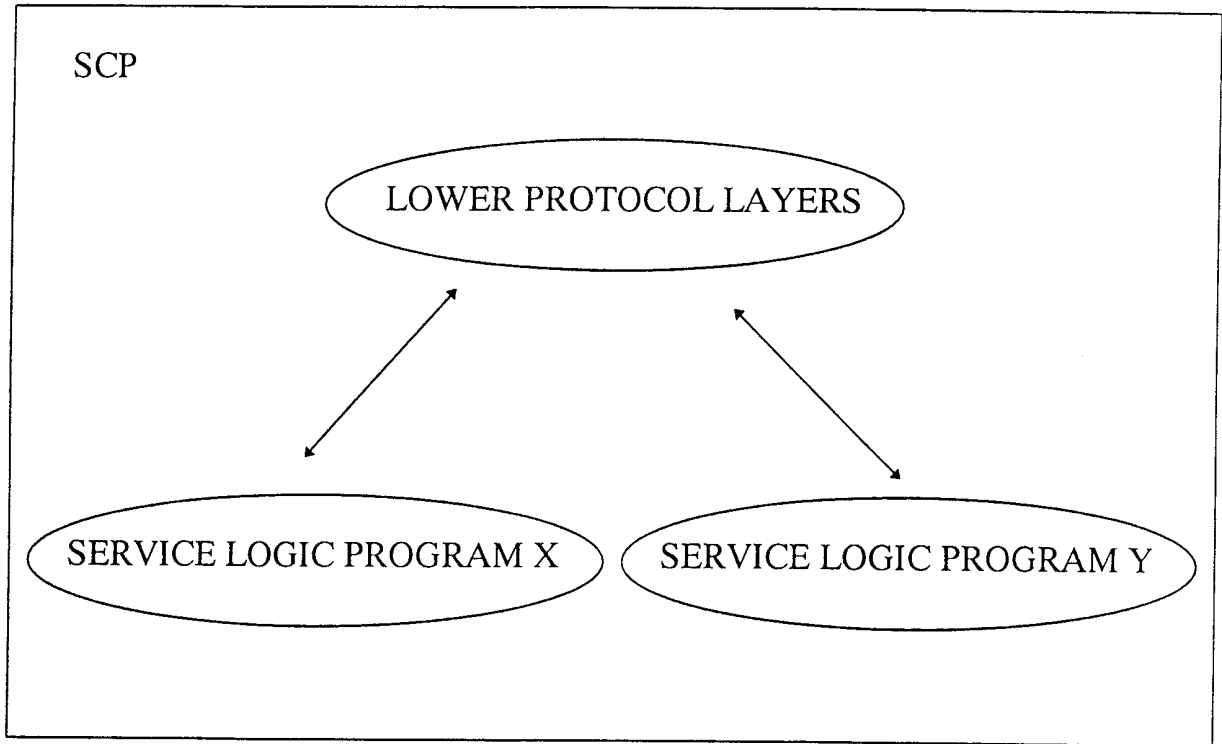


FIG. 9



INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/00178

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 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

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 726 682 A (AT & T CORP) 14 August 1996 (1996-08-14) column 2, line 30 - line 54 column 7, line 2 - column 8, line 27 claims 1-20 figures 4-6	1-30
A	US 5 629 974 A (AALTONEN KARI ET AL) 13 May 1997 (1997-05-13) column 4, line 9 - column 5, line 9 claims 1-21	1-30
A	WO 98 51097 A (GLOBAL MOBILITY SYSTEMS INC) 12 November 1998 (1998-11-12) page 10, line 11 - page 14, line 1 page 16, line 1 - page 18, line 28	1-30
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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

7 September 1999

Date of mailing of the international search report

15/09/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

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INTERNATIONAL SEARCH REPORT

International Application No

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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.
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