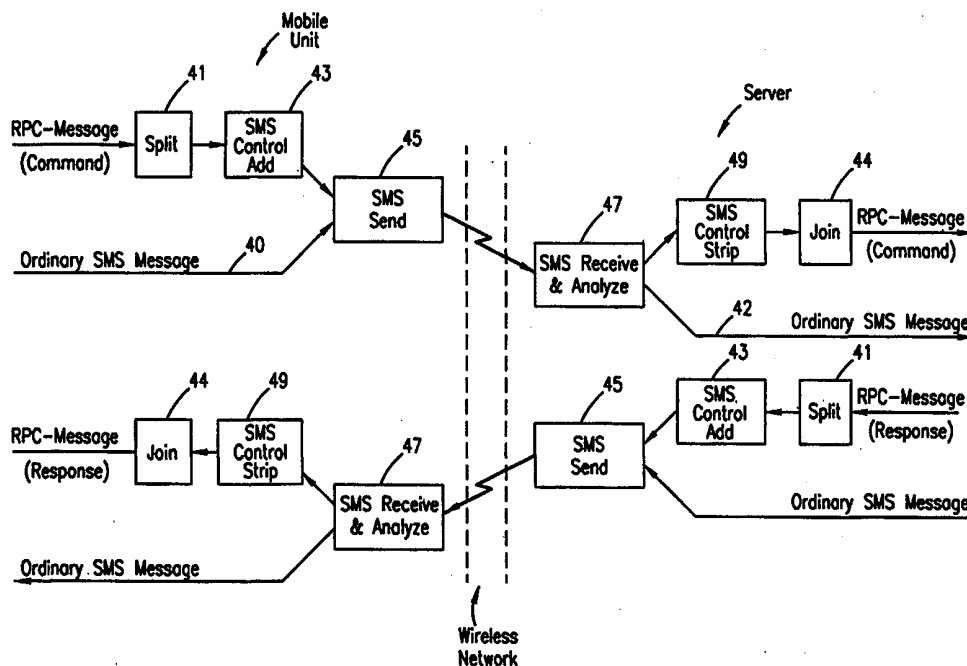




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | |
|--|------------------|---|
| <p>(51) International Patent Classification ⁶ : H04Q 7/22</p> | <p>A1</p> | <p>(11) International Publication Number: WO 99/29128 (43) International Publication Date: 10 June 1999 (10.06.99)</p> |
| <p>(21) International Application Number: PCT/SE98/02077 (22) International Filing Date: 17 November 1998 (17.11.98) (30) Priority Data: 08/982,054 1 December 1997 (01.12.97) US (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). (72) Inventors: HALL, Hans; Hjulgatan 5, 2trp, S-754 20 Uppsala (SE). WILLEHADSON, Stefan; Spetsvägen 22, S-757 57 Uppsala (SE). (74) Agent: ERICSSON RADIO SYSTEMS AB; Common Patent Dept., S-164 80 Stockholm (SE).</p> | | <p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, 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).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> |

(54) Title: REMOTE PROCEDURE CALLS USING SHORT MESSAGE SERVICE



(57) Abstract

A procedure in a remote server (35) is accessed via a wireless telecommunications network. At least one Short Message Service message is produced (43), which message represents a command that (RPC), if applied to the server, will invoke the procedure. The at least one message is sent to the server via the wireless telecommunications network. At the server, the command is reproduced from the at least one message.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

| | | | | | | | |
|-----------|--------------------------|-----------|--|-----------|--|-----------|--------------------------|
| AL | Albania | ES | Spain | LS | Lesotho | SI | Slovenia |
| AM | Armenia | FI | Finland | LT | Lithuania | SK | Slovakia |
| AT | Austria | FR | France | LU | Luxembourg | SN | Senegal |
| AU | Australia | GA | Gabon | LV | Latvia | SZ | Swaziland |
| AZ | Azerbaijan | GB | United Kingdom | MC | Monaco | TD | Chad |
| BA | Bosnia and Herzegovina | GE | Georgia | MD | Republic of Moldova | TG | Togo |
| BB | Barbados | GH | Ghana | MG | Madagascar | TJ | Tajikistan |
| BE | Belgium | GN | Guinea | MK | The former Yugoslav Republic of Macedonia | TM | Turkmenistan |
| BF | Burkina Faso | GR | Greece | ML | Mali | TR | Turkey |
| BG | Bulgaria | HU | Hungary | MN | Mongolia | TT | Trinidad and Tobago |
| BJ | Benin | IE | Ireland | MR | Mauritania | UA | Ukraine |
| BR | Brazil | IL | Israel | MW | Malawi | UG | Uganda |
| BY | Belarus | IS | Iceland | MX | Mexico | US | United States of America |
| CA | Canada | IT | Italy | NE | Niger | UZ | Uzbekistan |
| CF | Central African Republic | JP | Japan | NL | Netherlands | VN | Viet Nam |
| CG | Congo | KE | Kenya | NO | Norway | YU | Yugoslavia |
| CH | Switzerland | KG | Kyrgyzstan | NZ | New Zealand | ZW | Zimbabwe |
| CI | Côte d'Ivoire | KP | Democratic People's Republic of Korea | PL | Poland | | |
| CM | Cameroon | KR | Republic of Korea | PT | Portugal | | |
| CN | China | KZ | Kazakstan | RO | Romania | | |
| CU | Cuba | LC | Saint Lucia | RU | Russian Federation | | |
| CZ | Czech Republic | LI | Liechtenstein | SD | Sudan | | |
| DE | Germany | LK | Sri Lanka | SE | Sweden | | |
| DK | Denmark | LR | Liberia | SG | Singapore | | |
| EE | Estonia | | | | | | |

REMOTE PROCEDURE CALLS USING SHORT MESSAGE SERVICE

FIELD OF THE INVENTION

5 The invention relates generally to wireless telecommunications networks and, more particularly, to the use of a wireless mobile communication device to access a remote server via a wireless telecommunications network.

BACKGROUND OF THE INVENTION

10 With the increasing popularity and widespread use of wireless mobile telecommunication devices in wireless telecommunications networks, it is becoming increasingly important for such devices to provide as many services as possible.

15 However, wireless mobile communication devices such as mobile telephones typically do not use a powerful data processor. Also, there is not much extra space in the typical wireless mobile communication device to add additional hardware. It is therefore difficult for the mobile device to provide locally services that require data processor intensive calculations.

20 In some circumstances, a modem is connected to the mobile phone, for example, to revise the phone book database of the mobile phone, but there is no convenient way to automatically update data or program memory within the mobile phone other than by doing so manually.

 It is therefore desirable to provide a wireless mobile communication device which provides to the user the capability of ordering and receiving the results of data processor intensive calculations.

25 It is also desirable to provide for automatic updating and modification of program and data memory within a wireless mobile communication device.

30 The present invention permits the user of a wireless mobile communication device to invoke and receive the results of data processor intensive calculations and to update and otherwise modify program and data memory within the mobile communication device. These features are provided by a Short Message Service (SMS) interface between the wireless mobile communication device and an appropriate resource that is available via a wireless network.

-2-

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a block diagram which illustrates remote procedure calls in a conventional distributed computer system.

5 FIGURE 2 illustrates a remote procedure call that can be invoked in the server of FIGURE 1 by the main computer of FIGURE 1.

FIGURE 3 is a block diagram which illustrates an SMS-based interface between a wireless mobile communication device and a remote server according to the present invention.

10 FIGURE 4 illustrates one embodiment of the SMS-based interface of FIGURE 3 in greater detail.

FIGURE 5 illustrates an example output from the splitting functions of FIGURE 4, and likewise illustrates an input to the joining functions of Figure 4.

FIGURE 6 illustrates a header portion of FIGURE 5 in greater detail.

FIGURE 7 illustrates another header portion of FIGURE 5 in greater detail.

15 FIGURE 8 illustrates an example output from the SMS control adding sections of FIGURE 4, and likewise illustrates an input to the SMS control stripping sections of FIGURE 4.

FIGURE 9 is a block diagram which illustrates another exemplary embodiment of the SMS-based interface of FIGURE 3.

20 DETAILED DESCRIPTION OF THE DRAWINGS

The present invention applies the Remote Procedure Call (RPC) technique of conventional distributed computer systems to a wireless telecommunications network. Prior art FIGURE 1 illustrates a conventional distributed computer system. In FIGURE 1, the main computer 11 accesses a remote server at 13 in order to invoke
25 procedures supported by the server 13 to invoke the desired remote procedure. The main computer 11 sends an RPC command to the server 13 to invoke the desired remote procedure. The server 13 then executes the requested procedure in execution unit 37 and provides an RPC response back to the main computer.

30 Example FIGURE 2 illustrates one example of a procedure on server 13 which might be invoked by main computer 11, namely, a procedure wherein the server 13 provides weather information relative to various geographic locations. The procedure

-3-

is identified as Weather, and the desired geographic locations are set forth as operands separated by commas within parentheses. The remote server 13 executes the Weather procedure relative to the various geographic locations listed as operands.

5 Example FIGURE 3 illustrates one example of how the present invention uses Short Message Service (SMS) to implement remote procedure calls in a wireless network. When the mobile user requests an operation for which the wireless mobile communication unit has inadequate data processing facilities, or for which an external database must be accessed, the I/O control section 31 of the mobile unit determines that a remote procedure call to a remote server is necessary. The I/O control section
10 then outputs an RPC command which can, in a conventional manner, be marshalled so as to have a serialized format such as the format of the prior art RPC command in FIGURE 2. This RPC command passes through an SMS-based interface 33 and ultimately arrives at the remote server 35. The desired procedure is executed by the remote server 35, and its RPC response is provided back to the SMS-based interface
15 33 for ultimate delivery to the I/O control section 31 of the mobile unit.

Thus, to the I/O control section 31 of the mobile unit, the operation appears identical to that seen by the main computer 11 of prior art FIGURE 1, namely, the I/O control section outputs an RPC command and thereafter receives the corresponding RPC response.

20 Exemplary FIGURE 4 illustrates one embodiment of the SMS-based interface 33 of FIGURE 3. The operation of FIGURE 4 will be described with respect to the RPC command format illustrated in FIGURE 2 and described above. When an RPC command such as shown in FIGURE 2 is output from the I/O control section 31 of FIGURE 3 and received at the splitting function 41 of the mobile unit, the splitting
25 function splits the RPC command into as many SMS messages as are required to convey the entire command.

Example FIGURE 5 illustrates the output of the splitting function 41. The informational portion of a conventional SMS message is limited to 160 characters and, in this example, 10 of those characters are reserved for an RPC header as shown at 51
30 and 53. Accordingly, if the RPC command is longer than 150 characters, then more than one SMS message will be required in FIGURE 5. The splitting function provides the 10 characters for the RPC header, and allocates the next 150 characters to the first

-4-

150 characters of the RPC command of FIGURE 2. The remaining characters of the RPC command must be handled in additional SMS messages as shown in FIGURE 5. In the example of FIGURE 5, two 160-character SMS messages are adequate to accommodate the entire RPC command. The X characters are "don't care" characters.

5 As shown in FIGURE 5, each SMS message provided by the splitting function 41 includes a ten character RPC header. The example header 51 of FIGURE 5 is illustrated in more detail in FIGURE 6, and the example header 53 of FIGURE 5 is illustrated in more detail in FIGURE 7. The header 51 includes three characters that identify the SMS message as an RPC command. The fourth character of the header
10 is a comma, and the fifth character is an identification (ID) number which identifies the message in which the header 51 appears as the first (ID=1) message of the RPC command. The sixth character of the header 51 is another comma, and the seventh character identifies the number of SMS messages in this RPC command, in this example, 2.

15 The header 53 of FIGURE 7 is similar to the header 51 of FIGURE 6, but the ID = 2 (see the fifth character) in this instance because the header 53 is associated with the second message of the RPC command. The header 53 also indicates that there are a total of two SMS messages in this RPC command (seventh character = 2). In the examples of FIGURES 5-7, the final three characters of the RPC headers 51 and 53
20 are shown as "don't care" characters (X). It should be clear, however, that the size and informational content of the RPC headers can vary as required by the particular application.

 In the example of FIGURES 5-7, the two SMS messages have ID = 1 and ID = 2, respectively. However, any desired identification scheme for ordering the SMS
25 messages properly can be used. For example, if the first message has an ID = c, wherein c is a rational number, then the second message could have an ID = s(c), the third message could have an ID = s(s(c)), and so on, where s is a successor function that provides the respective ID numbers for the messages. In the example of FIGURES 5-7, c = 1, and s(c) = c+1. As mentioned above, any type of identification
30 scheme can be used to identify and order the SMS messages to insure that the RPC command is received and interpreted properly at the remote server. This will be discussed in more detail below.

-5-

The SMS control adding function 43 of the mobile unit in FIGURE 4 receives as input the 160-character SMS messages (see FIGURE 5) from the splitting function 41, and adds to these 160 informational characters the conventional SMS control characters which insure that the 160-character informational content of each message will traverse the conventional SMS data communication path properly. An example SMS message output from the function 43 is shown in example FIGURE 8. The SMS control information is added by the function 43 to each of the SMS messages (FIGURE 5) provided from the splitting function 41. Thus, the function 43 outputs a complete SMS message having the format of a conventional SMS message, including both SMS informational content and SMS control content as shown in FIGURE 8. Each message output from the splitting function 41 (see FIGURE 5) occupies the SMS informational field, and the SMS control adding function 43 adds the SMS control content. FIGURE 8 illustrates the SMS format, produced by the function 43, which results when the function 43 receives the message having ID = 1 in FIGURE 5. Each message received by function 43 is put into conventional SMS format in similar fashion to that shown in FIGURE 8.

The SMS Send function 45 of the mobile unit in FIGURE 4 receives the complete SMS messages from the function 43, and sends the SMS messages out in the conventional manner over a conventional SMS data communication path through the wireless network. The ordinary SMS message input 40 is held inactive by mobile I/O control 31 (FIGURE 3) during processing of RPC commands through the SMS Send function, and the RPC command input is held inactive by mobile I/O control 31 (FIGURE 3) during processing of an ordinary SMS message through the SMS Send function.

At the remote server, the SMS message is received and analyzed by the SMS Receive and Analyze function 47. This section can detect the presence or absence of the RPC header and thus identify whether the SMS messages constitute a remote procedure call. If no remote procedure call is detected, then the SMS message(s) is routed to the ordinary SMS channel 42. If a remote procedure call is identified, then the receive and analyze section 47 forwards the received SMS messages to the SMS control stripping function 49. The function 49 strips the SMS control portion (see FIGURE 8) from the messages, and then forwards the remaining 160 characters to the

-6-

joining function at 44. The joining function stores all of the messages of the RPC command in a memory, and then strips off the RPC header and sends the 150-character messages of FIGURE 5 in the correct order to the remote procedure in the server.

5 The joining function applies the successor function $s(c)$ to the ID in the RPC header of the first message received, and determines the proper ordering of the messages by subsequent application of $s(c)$ as described above. The joining function can thus organize the 150-character messages into the appropriate order to reconstruct the RPC command that was originally received at the input of the splitting function
10 41 in the mobile unit. As mentioned above, both the splitting function 41 and the joining function 49 must utilize the same successor function so that the message can be split up and re-joined accurately. One or more successor functions can be stored in both the splitting function and the joining function. If more than one successor function is available, then the splitting function can insert into the RPC header a code
15 which identifies which successor function is to be used in conjunction with the current RPC command. The joining function determines the proper successor function by inspecting the code in the RPC header.

 The remote procedure in the server receives the RPC command in exactly the same format (see FIGURE 2) as it would receive the RPC command in the
20 conventional distributed computer system of FIGURE 1. After the remote server has executed the desired procedure, it provides the RPC response, again in the same format as would be provided in the conventional system of FIGURE 1.

 Thereafter, the splitting function 41 and SMS control adding function 43 of the server, which can be identical to the splitting and SMS control adding functions in the
25 mobile unit, provide an SMS message to the SMS Send function 45, which may also be identical to the SMS Send function in the mobile unit. Similarly, the SMS Receive and Analyze function 47 of the mobile unit which receives the SMS message from the wireless network may be identical to the SMS Receive and Analyze function of the server. The SMS control stripping function and the join function of the mobile unit
30 can also be identical to the SMS control stripping function and join function described above with respect to the server. Thus, the RPC response from the remote server is split, provided with SMS control information, sent through the wireless network

-7-

conventionally as one or more conventionally formatted SMS messages, received and analyzed and identified as an RPC response, and then the SMS control information is removed, and the SMS information fields are joined to reproduce the RPC response as it was originally provided by the remote server. This handling of the server's RPC response can thus mirror exactly the above-described handling of the RPC command.

Thus, and referring again to FIGURE 3, the SMS-based interface 33 is transparent to the I/O control section 31 of the mobile unit. The I/O control section sees only that its conventional RPC commands receive conventional RPC responses in the same manner as seen by the main computer 11 in the prior art system of FIGURE 1. The SMS-based interface 33 makes this possible as described above. The I/O control section 31 can now easily notify the source that necessitated the RPC, for example, the mobile user or a program in the mobile unit, that the RPC response is available.

Exemplary FIGURE 9 illustrates two conventional SMS channels 92 and 94 through the wireless network, each including a conventional Short Message Service Center (SMSC). One SMSC 91 handles ordinary SMS messages, and the other SMSC 93 handles the RPC commands and responses in the form of SMS messages. Because two distinct SMSCs are used, one for RPC commands/responses and another for ordinary SMS messages, the RPC header of FIGURES 5-7 need not indicate that the message is an RPC command or response, because the RPC commands and responses will be routed through their own SMSC 93, and therefore need not be distinguished from the ordinary SMS messages which are routed through SMSC 91. Thus, the SMS receive and analyze functions 47 of FIGURE 4 are not needed in FIGURE 9. Note that only one conventional SMS channel with one conventional SMSC (not shown) is used in the wireless network in the FIGURE 4 example. Thus, the FIGURE 4 example requires the SMS receive and analyze functions and the RPC indication in the RPC header. The SMS send/receive blocks 95 of FIGURE 9 each include conventional SMS send and receive channels.

It will be evident to workers in the art that the above-described joining, splitting, I/O control, SMS control add, SMS control strip, and SMS receive and analyze functions can be readily implemented in hardware circuits and/or software in the data processing section of a conventional wireless mobile communication device.

-8-

Although the Weather procedure is disclosed in the above examples, other types of procedures can also be accessed, such as procedures that download databases or database entries or computer programs, or procedures that perform other desired functions, such as a digital signing algorithm, foreign language translations, name
5 look-up in a remote database, stock reports, travel directions, and a weather forecast for the current location of the mobile unit, and any function that does not have real-time constraints.

Although exemplary embodiments of the present invention have been described above in detail, this does not limit the scope of the invention, which can be
10 practiced in a variety of embodiments.

WHAT IS CLAIMED IS:

1. A wireless mobile communication device, comprising:
 - a controller having an output that produces a command for invoking a procedure in a server that is accessible to said wireless mobile communication device via a wireless telecommunications network, said command including first information indicative of the procedure and second information indicative of an operand associated with the procedure; and
 - an interface having an input coupled to said controller output to receive said command, said interface for expressing the command as at least one Short Message Service message, and said interface having an output that outputs the least one Short Message Service message to the wireless telecommunications network.
2. The device of Claim 1, wherein said interface includes a further input that receives from the wireless telecommunication network a response produced by the procedure that said command invoked and expressed as at least one Short Message Service message, said interface having a further output which provides said response of the procedure invoked by said command, said controller having an input coupled to said further interface output.
3. The device of Claim 2, wherein said interface includes an analyzer coupled to said further input to detect whether a Short Message Service message received at said further input represents said response, said analyzer having a first output to which the Short Message Service message is forwarded if it represents said response, and said analyzer having a second output to which the Short Message Service message is forwarded if it does not represent said response.
4. The device of Claim 3, wherein said interface includes a joiner which is coupled to said first output of said analyzer to detect from said forwarded message a quantity of messages required to express said response.

-10-

5. The device of Claim 4, wherein said joiner, when said quantity exceeds one, obtains from each said message information indicative of a position of that message in a predetermined ordered relationship among said messages.

5 6. The device of Claim 1, wherein said interface includes a splitter that determines from said command a quantity of messages required to express said command.

7. The device of Claim 6, wherein said splitter adds to said at least one message information indicative of said quantity.

10 8. The device of Claim 6, wherein said splitter, when said quantity exceeds one, adds to each said message unique information indicative of a position of that message in a predetermined ordered relationship among said messages.

9. A server for use with a wireless telecommunications network, comprising:

15 an interface having an input to receive from the wireless telecommunications network a command invoking a procedure in said server and expressed as at least one Short Message Service message, and said interface having an output to provide said command, said command including first information indicative of the procedure and second information indicative of an operand associated with the procedure; and

20 an execution unit coupled to said interface output for executing the procedure invoked by said command.

10. The server of Claim 9, wherein said execution unit includes an output that provides a response produced by the procedure that said command invoked, said interface including a further input coupled to said execution unit output to receive said response, said interface including a further output to provide said response expressed as at least one Short Message Service message.

-11-

11. A method of accessing a procedure in a remote server via a wireless telecommunications network, comprising:

producing a command that, if applied to the server, will invoke the procedure, said command including first information indicative of the procedure and
5 second information indicative of an operand associated with the procedure;

expressing the command as at least one Short Message Service message;

sending said at least one message to the server via the wireless telecommunications network; and

10 at the server, reproducing the command from said at least one message.

12. The method of Claim 11, including receiving from the server via the wireless telecommunications network a response produced by the procedure that the command invoked and expressed as at least one Short Message Service message, and reproducing the response from said at least one message.

15 13. The method of Claim 12, including detecting whether a Short Message Service message represents said response; and

thereafter, forwarding the Short Message Service message to a first data path if it represents said response, and forwarding the Short Message Service message to a second data path if it does not represent said response.

20 14. The method of Claim 13, including detecting from a Short Message Service message on the first data path a quantity of Short Message Service messages required to express said response.

25 15. The method of Claim 14, including, when said quantity exceeds one, obtaining from each message information indicative of a position of that message in a predetermined ordered relationship among said messages.

16. The method of Claim 11, including determining from said command a quantity of said messages required to express said command.

-12-

17. The method of Claim 16, including adding to said at least one message information indicative of said quantity.

18. The method of Claim 16, including, when said quantity exceeds one, implementing an ordering scheme that identifies a predetermined ordered relationship among said messages.

19. The method of Claim 18, including adding to each said message unique information indicative of a position of that message in said ordered relationship.

20. A method of using a wireless telecommunications network and a mobile communication device operable therein to effect performance of a data processing operation needed by a user of the mobile communication device, comprising:

the mobile communication device determining from a user input that the data processing operation is needed by the user;

the mobile communication device automatically determining whether the mobile communication device has adequate resources available for performing the data processing operation within the mobile communication device;

if the mobile communication device determines that adequate resources are not available for performing the data processing operation within the mobile communication device, the mobile communication device sending to an external data processing resource a command for the data processing operation, including using Short Message Service to transmit the command from the mobile communication device through the wireless telecommunications network to the external data processing resource;

the external data processing resource receiving the command and performing the data processing operation in response to the received command; and

the external data processing resource sending a result of the data processing operation to the mobile communication device, including using Short Message Service to transmit the result from the external data processing resource through the wireless telecommunications network to the mobile communication device.

-13-

21. The method of Claim 20, wherein said step of sending a result includes downloading data from the external data processing resource to the mobile communication device.

5 22. The method of Claim 20, wherein said step of sending a result includes downloading a computer program from the external data processing resource to the mobile communication device.

10 23. The method of Claim 20, wherein said step of sending a command includes sending from the mobile communication device to the external data processing resource a remote procedure call for execution of a procedure by the external data processing resource.

24. The method of Claim 20, wherein said performing step includes performing a digital signing algorithm.

15 25. The method of Claim 20, wherein said performing step includes performing a language translation operation.

20 26. The method of Claim 20, wherein said step of sending a command includes sending to the external data processing resource first information indicative of the data processing operation and second information indicative of an operand associated with the data processing operation, and wherein said step of using Short Message Service to transmit the command includes expressing said first information and said second information as at least one Short Message Service message, and transmitting the at least one Short Message Service message from the mobile communication device through the wireless telecommunications network to the external data processing resource.

25 27. A method of instructing a data processing resource to perform a data processing operation, comprising:

-14-

producing first information indicative of the data processing operation and second information indicative of an operand associated with the data processing operation;

5 expressing the first and second information as at least one Short Message Service message; and

transmitting the at least one Short Message Service message from a mobile communication device through a wireless telecommunications network to the data processing resource.

10 28. A wireless mobile communication device, comprising:

a controller having an input for receiving information from a user of the wireless mobile communication device, said controller for determining from the user input information that a data processing operation is needed by the user, and said controller further for automatically determining whether the mobile communication
15 device has adequate resources available for performing the data processing operation within the mobile communication device, said controller having an output for producing, in response to a determination that adequate resources are not available for performing the data processing operation within the mobile communication device, a command for execution of the data processing operation by a data processing
20 resource that is accessible to said wireless mobile communication device via a wireless telecommunications network; and

an interface having an input coupled to said controller output to receive said command, and said interface having an output that outputs said command to the wireless tele- communications network using Short Message Service.

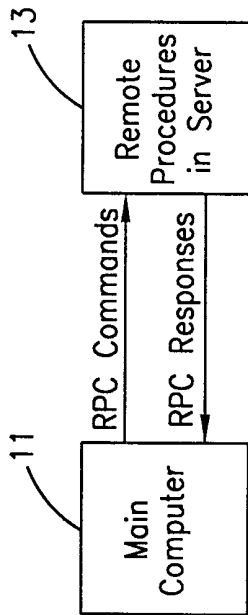


FIG. 1
(PRIOR ART)

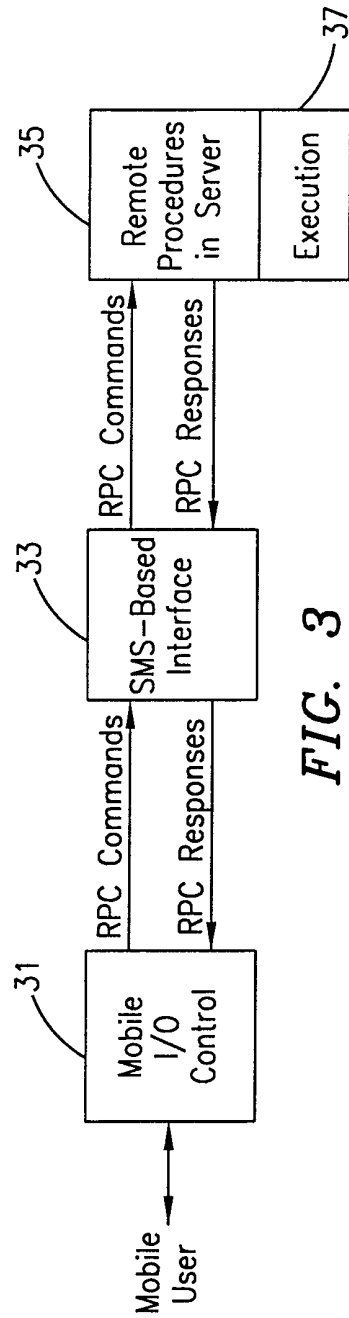


FIG. 3

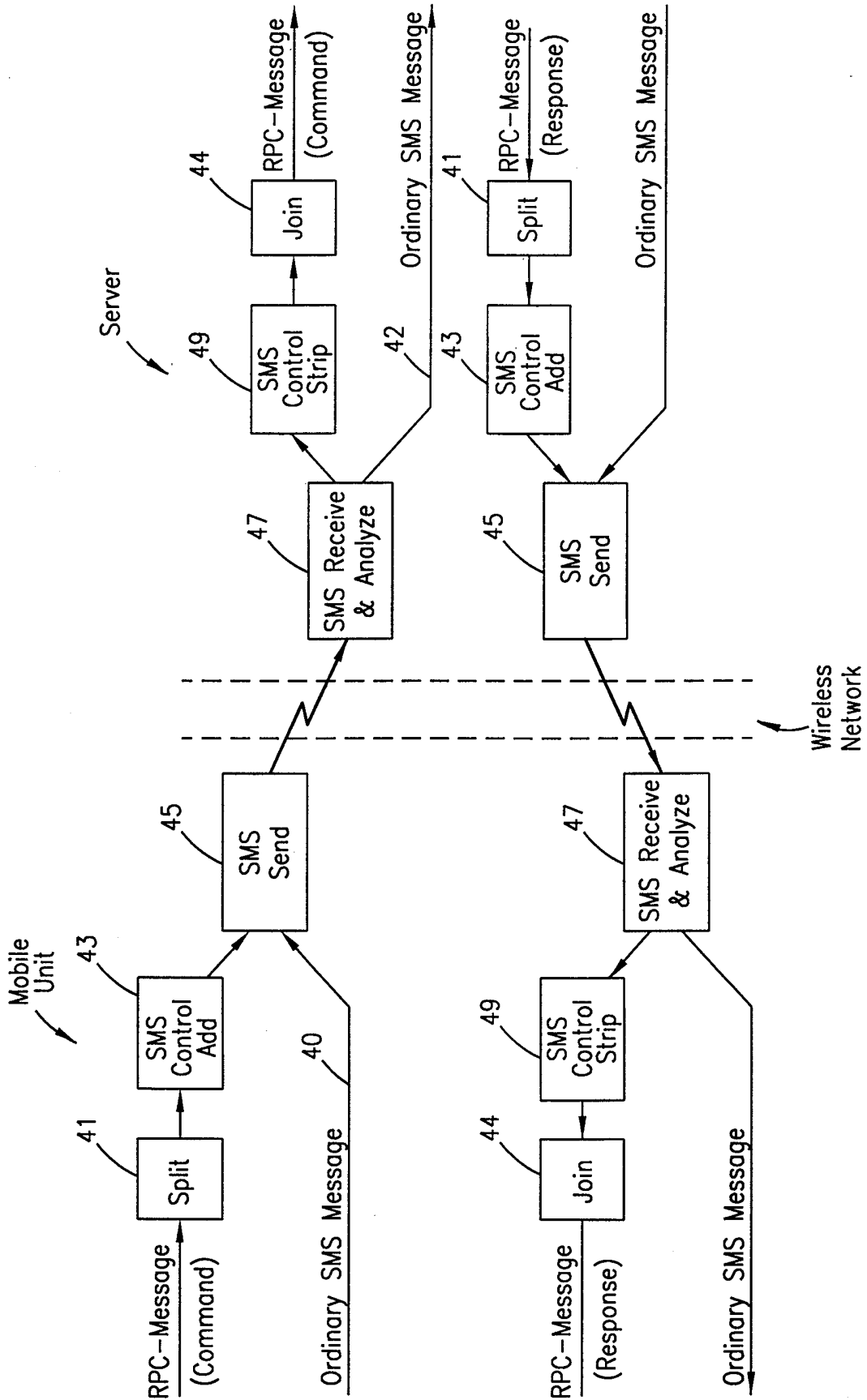


FIG. 4

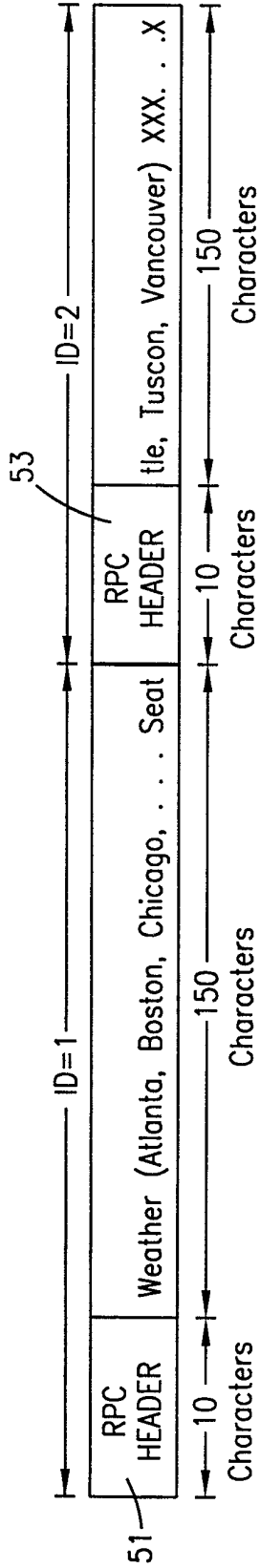


FIG. 5

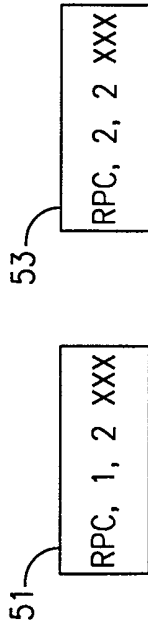


FIG. 6

Weather (Atlanta, Boston, Chicago, . . . Seattle, Tuscon, Vancouver)

FIG. 2
(Prior Art)

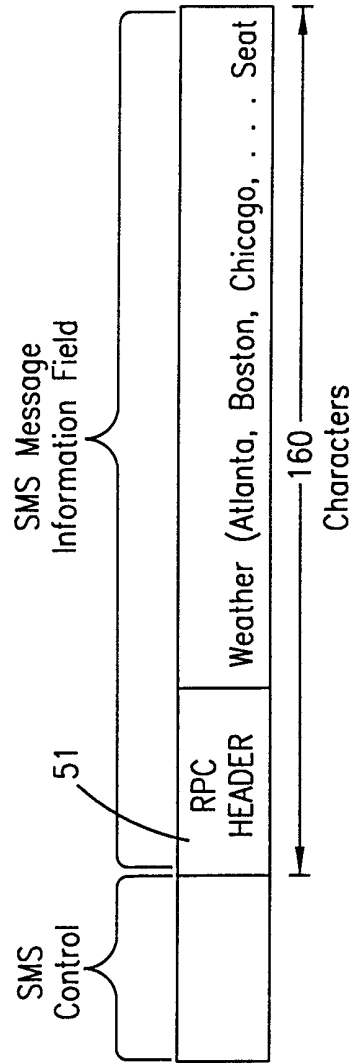


FIG. 8

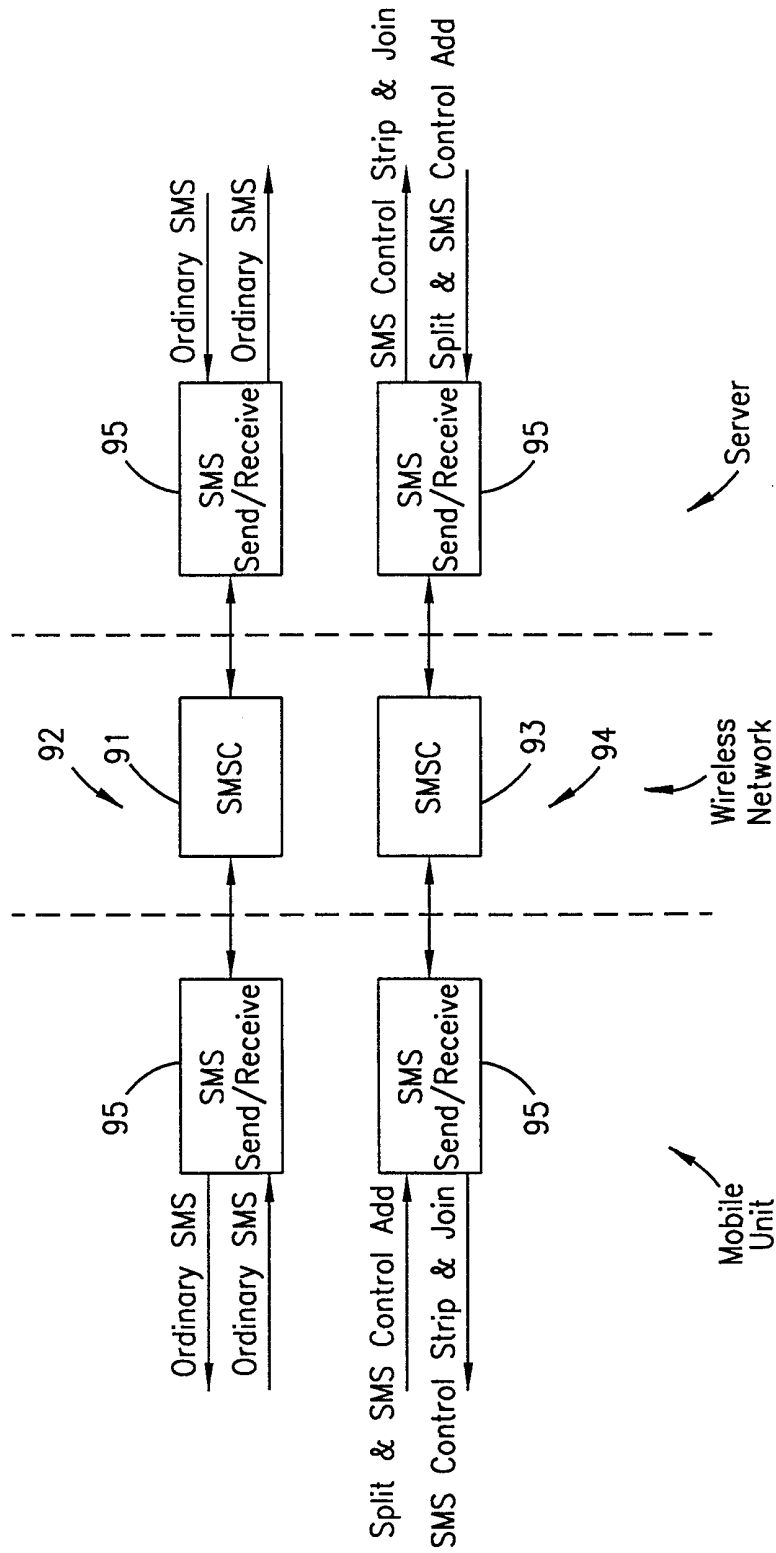


FIG. 9

INTERNATIONAL SEARCH REPORT

Int'l. Application No

PCT/SE 98/02077

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04Q/22

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 6 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. |
|------------|--|-----------------------|
| X | WO 97 32439 A (DECKER PETER ;KAARTINEN KALEVI (DE); GUSTAFSSON PATRIK (FI); NOKIA) 4 September 1997 see page 3, line 20 - line 33 see page 4, line 13 - line 26 see page 7, line 19 - page 9, line 13 see page 20, line 30 - page 22, line 22 see page 26, line 20 - page 28, line 26 see page 30, line 34 - page 32, line 29 --- -/-- | 1-19,27 |

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

8 March 1999

Date of mailing of the international search report

07.05.1999

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

Authorized officer

GERLING J.C.J.

INTERNATIONAL SEARCH REPORT

Int. l. Application No

PCT/SE 98/02077

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|---|-----------------------|
| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | <p>WO 97 08906 A (SENDIT AB ;WINBLADH HJALMAR (SE)) 6 March 1997 see page 2, line 25 - page 3, line 25 see page 6, line 1 - line 20 see page 7, line 21 - line 32 see page 8, line 8 - line 13 see page 9, line 4 - line 10 see page 12, line 17 - page 14, line 5 see page 17, line 4 - line 20</p> <p style="text-align: center;">---</p> | 1,9,11, 27 |
| A | <p>EP 0 777 394 A (ALCATEL BELL NV) 4 June 1997 see column 1, line 51 - column 2, line 8 see column 2, line 35 - column 3, line 3 see column 3, line 55 - column 4, line 13 see column 4, line 55 - column 5, line 1 see column 6, line 1 - column 7, line 19 see column 7, line 33 - line 54; claims 1-6,13-16</p> <p style="text-align: center;">---</p> | 1-19,27 |
| A | <p>EP 0 689 368 A (PTT GENERALDIREKTION) 27 December 1995 see column 1, line 30 - column 2, line 24 see column 3, line 6 - column 4, line 42 see column 5, line 7 - line 44 see column 6, line 41 - column 7, line 13 see column 8, line 19 - column 10, line 2 see column 10, line 26 - column 11, line 25 see column 12, line 48 - column 13, line 46</p> <p style="text-align: center;">-----</p> | 1-19,27 |

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/ 02077

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

- 2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

- 3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

- 1. CLAIMS: 1-19,27 RELATES TO-DEVICES AND METHOD FOR INVOKING AND EXECUTING A PROCEDURE IN A SERVER USING SHORT MESSAGE SERVICE MESSAGES
- 2. CLAIMS: 20-26,28 RELATES TO-A DEVICE AN METHOD FOR DETERMINING IF DATA PROCESSING CAN BE PERFORMED BY SAID DEVICE OR EXTERNAL PROCESSING IS NEEDED FOR FURTHER INFORMATION PLEASE SEE FORM PCT/ISA/206 MAILED 18.03.99

- 1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

- 2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

- 3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

- 4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-19,27

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/SE 98/02077

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|-------------------------|------------------|
| WO 9732439 A | 04-09-97 | FI 960895 A | 27-08-97 |
| | | AU 1881497 A | 16-09-97 |
| | | CA 2247449 A | 04-09-97 |
| | | EP 0882375 A | 09-12-98 |
| ----- | | | |
| WO 9708906 A | 06-03-97 | SE 503752 C | 26-08-96 |
| | | AU 6894196 A | 19-03-97 |
| | | BR 9610197 A | 11-08-98 |
| | | CA 2230544 A | 06-03-97 |
| | | CN 1199534 A | 18-11-98 |
| | | EP 0872128 A | 21-10-98 |
| | | NO 980836 A | 29-04-98 |
| | | NZ 316656 A | 28-07-98 |
| | | PL 325196 A | 06-07-98 |
| | | SE 9502995 A | 26-08-96 |
| ----- | | | |
| EP 0777394 A | 04-06-97 | JP 10004432 A | 06-01-98 |
| ----- | | | |
| EP 0689368 A | 27-12-95 | AT 153206 T | 15-05-97 |
| | | AU 691271 B | 14-05-98 |
| | | AU 2174595 A | 04-01-96 |
| | | BR 9508091 A | 12-08-97 |
| | | CA 2152215 A | 21-12-95 |
| | | WO 9535635 A | 28-12-95 |
| | | CN 1128476 A | 07-08-96 |
| | | CZ 9603513 A | 14-05-97 |
| | | DE 59402759 D | 19-06-97 |
| | | DK 689368 T | 08-12-97 |
| | | ES 2103557 T | 16-09-97 |
| | | FI 965078 A | 17-12-96 |
| | | GR 3023908 T | 30-09-97 |
| | | HK 1003587 A | 30-10-98 |
| | | HU 76397 A | 28-08-97 |
| | | JP 8265843 A | 11-10-96 |
| | | NO 965315 A | 18-02-97 |
| | | NZ 287390 A | 19-12-97 |
| | | PL 317643 A | 14-04-97 |
| | | SG 34235 A | 06-12-96 |
| SI 9520064 A | 30-04-97 | | |
| SK 161396 A | 05-11-97 | | |

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. .tional Application No

PCT/SE 98/02077

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|---------------------|
| EP 0689368 A | | ZA 9505091 A | 10-04-96 |
| ----- | | | |