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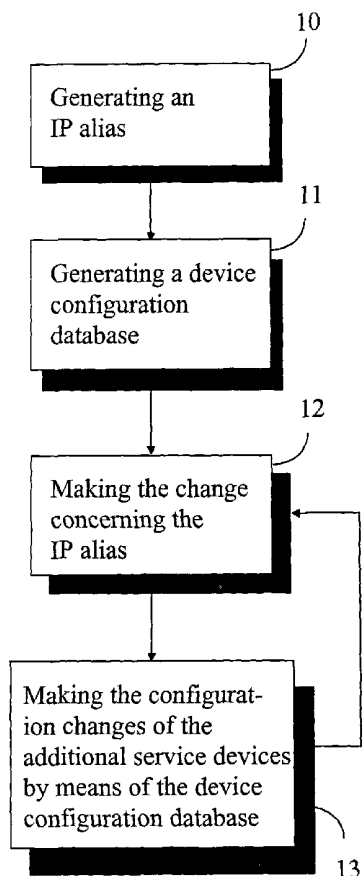
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(54) Title: CENTRALIZED CONFIGURATION OF A TELECOMMUNICATION NETWORK



(57) Abstract: The present invention relates to a method for centralized configura-
tion of a telecommunication network, which telecommunication network comprises
one or more IP networks with their addresses. From a set of IP addresses, an IP alias
is generated. In the method, a predetermined change is made at least in one service
parameter of the IP alias or of the devices belonging to the IP alias; those IP addi-
tional services are defined whose parameters are affected by the change in question,
and the necessary configuration changes are made in the devices generating the IP
additional services in question. According to the invention, a device configuration
database is created that comprises the configuration information of the additional
service devices; the aforementioned change is focused on the IP alias in question,
and the aforementioned configuration changes of the additional service devices are
made automatically and in parallel utilizing the aforementioned device configura-
tion database.

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CENTRALIZED CONFIGURATION OF A TELECOMMUNICATION NETWORK

FIELD OF THE INVENTION

The invention relates to telecommunication.
5 In particular, the invention relates to a new and advanced method for centralized configuration of a telecommunication network.

BACKGROUND OF THE INVENTION

10 The use of the Internet has become common in the past few years. For example companies utilize the Internet nowadays in a variety of ways, in which case also the services provided by the operators to the companies have increased.

15 Among other things, the Internet uses IP protocol for data transfer (Internet Protocol, IP). The IP protocol defines for each device of the network at least one IP address that unambiguously identifies the device in question. Data is transmitted in packets,
20 and besides the actual payload, each packet comprises the IP address of the sender and the recipient.

The IP address is 32-bits long, including four octets of eight bits. The IP address is divided into a network address and device address, with the
25 network address having 1-3 octets of eight bits reserved. The network address identifies the network in question. The network address is unambiguous throughout the whole Internet. The device address identifies a separate device within the area of a certain network
30 address. The device address is thus unambiguous within the area of a certain network address. The IP address consisting of both the network address and the device address identifies a separate device throughout the whole Internet. In addition to the above-mentioned,
35 part of the bits reserved for the device address may be used to identify separate sub-networks within a

certain IP network. In that case, a so-called network mask informs in the IP address of the sub-network part. Sub-network addresses are practical e.g. in such a case in which the IP network is divided into parts physically separate, such as several local area networks (Local Area Network, LAN). Thus in that case, an IP address comprises a network address, sub-network address, and a device address. The sub-network address is unambiguous in the area of a certain network address. The term IP network is hereinafter referred to the sequences of IP addresses comprising the same network and sub-network address, i.e. an IP network means a certain combination of network and network mask. Correspondingly, one IP address may be presented so that the IP address also comprises a network mask 255.255.255.255. The term IP address is hereinafter referred to the very combination of this kind. A typical example of the application in practice of the IP address is, for example, a medium-sized company which has several premises in the area of some town. Each premises have got one local area network. The devices have been so configured that all of them have the same network address. Correspondingly, the devices belonging to the same local area network have the same network address, in which case they form together the IP network. It is important to note that the above-mentioned is an example, naturally it is also possible to configure the networks in some other way, too.

There are currently two versions of the IP protocol. At present, the version most often used is version 4 (IPv4). A newer one, which is becoming common, is version 6 (IPv6). The versions in question differ from one another with respect to some specifications. For example, the IP address consists of 32 bits in version 4, whereas in version 6 it comprises 128 bits, which enables a considerably bigger number of addresses. IPv6 is also called the IPng (IP Next

Generation, IPng). More detailed information is available e.g. on the home page of the standardizing organization responsible for its specifications, IETF, at the address <http://www.ietf.org> (Internet Engineering Task Force, IETF).

Network operators provide to their clients different IP additional services. The term IP additional service is hereinafter used to mean such a value added service in which an IP address is used at least as some parameter. Examples of an IP additional service are a firewall service, quality class service, and a VPN service.

A firewall service is used to mean a service in which e.g. on a server there is installed a piece of software which enables one to protect the resources of a certain IP network from the users of other networks. Firewall software filters all packets and determines, based on the regulations set, for each packet separately, whether the packet will be forwarded to its destination. Typically, it is e.g. checked whether the IP address of the sender of the packet in question is on the list of accepted senders. There are also firewall solutions of another kind. The firewall software may also be installed e.g. on a router, and the filtering may be carried out e.g. specifically for each user by means of user identification.

The quality class service is used to mean a service in which hierarchic quality classes are determined for different needs of data transmission. For example, the real-time transfer of video or audio requires connection features better than the average, in which case, in the case of a quality class service, it is possible to determine for the packets in question such a service class that the network prioritizes the packets in question.

The virtual network, i.e. VPN service (Virtual Private Network, VPN) is used to mean a private data network which utilizes the public telecommunication infrastructure. The privacy is achieved by means of a specific tunneling protocol and different security methods. The idea is to provide to the clients the advantages of a private network, but due to the shared public infrastructure, at lower costs. In the virtual private network, the connection is determined as being a channel between the IP networks at the ends of the connection.

The problem with the IP additional services nowadays is their configuration e.g. in the changes of the IP network. In case there are changes made in the IP network, such as e.g. adding an IP address, the corresponding configuration changes have to be made also in the devices generating the additional services in question. At present, the changes in question have to be done in each device separately and manually. There may be dozens of devices in which the changes have to be done, and they may be located physically at a considerably long distance from one another. This naturally wastes the resources of the network operator to a considerable extent.

25

OBJECTIVE OF THE INVENTION

The objective of the present invention is to disclose a new kind of method that eliminates the drawbacks referred to above, or at least significantly alleviates them. One specific objective of the invention is to disclose a method which enables one to carry out the configuration of the service parameters of the devices generating IP additional services, the adding of new IP aliases and/or the deleting of the existing IP aliases centrally and automatically. An IP alias is used to mean a set of IP address and/or IP networks.

BRIEF DESCRIPTION OF THE INVENTION

In the present invention, a telecommunication network is configured centrally. The telecommunication network in question comprises one or more IP networks, which IP network comprises a set of IP addresses. In the telecommunication network in question, IP additional services are produced that have the IP address of the device using the additional service in question at least as one parameter. These devices using the same kind of service generate the IP alias, which thus comprises a set of IP addresses and/or IP networks.

In the present invention there is first made such a predetermined change in the IP alias that in some way influences the set of IP addresses belonging to the IP alias in question, such as e.g. the adding of a new IP network. This change may also be the deleting of an IP alias or the adding of a new IP alias. Alternatively, in the invention there is first a predetermined change made at least in one service parameter of the devices belonging to the IP alias. After this, those IP additional services are determined whose service parameters the change in the IP alias, or at least in one service parameter, influences, after which the necessary configuration changes are made in the additional service devices generating the IP additional services in question.

According to the present invention, prior to the change in question, an IP alias is generated from a predetermined set of IP addresses and/or IP networks. The entity of the IP addresses and/or IP networks forming the IP alias is logical, and is therefore in no way connected with the IP technology. The client, such as a company, may be assigned several IP aliases. It is also possible that the IP alias comprises IP addresses and/or IP networks of more than just one client. Further, prior to the change in

question, a device configuration database is created that comprises the configuration information of those additional service devices the IP additional services generated by which have the IP address of the device using the additional service in question at least as one service parameter. Further, after this, the aforementioned configuration changes in the additional service devices are made automatically and in parallel utilizing the aforementioned device configuration database.

In one embodiment of the invention, the same IP address is arranged in several different IP aliases.

In one embodiment of the invention, the same IP network is arranged in several different IP aliases.

In one embodiment of the invention, firewall service, quality class service, and/or VPN service is provided as an IP additional service.

In one embodiment of the invention, the adding of at least one new IP address is done as a change in the IP alias.

In one embodiment of the invention, the deleting of at least one IP address is done as a change in the IP alias.

As compared with prior art, the present invention provides the advantage that it enables the centralized and automatic configuration of devices generating additional services caused by the change in the IP alias, and/or at least in one of its service parameter, which considerably saves the resources of the network operator. Further, since the configuration is done considerably faster, the additional services in question are kept up to date considerably better than before, and in this way the quality of the services provided by the network operators gets clearly better from the point of view of the client.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following section, the invention will be described by the aid of the attached embodiments with reference to the accompanying drawing, in which

Fig. 1 schematically represents one method of the invention; and

Fig. 2 schematically represents one method of the invention.

10

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 schematically represents, by way of example, one method of the invention. At first, at step 10, from a predetermined set of IP addresses and/or IP networks, an IP alias is generated. For example, all the IP networks of a company's premises in Tampere are grouped as one single entity under the name "Tampere". After this, the Tampere IP alias may be used as a parameter in the IP additional services of the company, e.g. so that a hole is made in the firewall of the Helsinki premises of the company for users from Tampere and/or so that in the Espoo servers of the company, Tampere people are assigned a better service quality than the Helsinki people. Further, a virtual network connection may be established between the premises of Helsinki and Tampere.

At step 11, a centralized device configuration database is created that comprises the configuration information of those additional service devices the IP additional services created by which have the IP address of the device using the additional services in question at least as one parameter.

At step 12, the change in the IP alias is made. In the above-mentioned example 'Tampere', half a year later the Tampere premises get a new group, which is assigned a new IP network. In this situation, one

new IP network is added to the IP alias 'Tampere'. The
aforementioned change may also include the deleting of
an IP alias or the adding of a new one. In the above-
mentioned example concerning a company this could mean
5 that new premises are established for the company in
Oulu, in which case an IP alias of its own is created
for the Oulu premises.

Alternatively, at step 12, a change is made
at least in one service parameter of the devices be-
10 longing to the IP alias. In the above-mentioned exam-
ple 'Tampere', a better service class is wanted in be-
tween Tampere and Helsinki because of a video confer-
ence connection to be transmitted. In that case, the
service class of the IP alias Tampere is raised be-
15 tween Helsinki and Tampere.

At step 13, the configuration changes in the
additional service devices are made automatically and
in parallel utilizing the aforementioned device con-
figuration database. In the above-mentioned example
20 'Tampere', the management system checks in what serv-
ices the IP alias in question is used. The network op-
erator gets a list of those services in which the made
change causes a configuration change. The network op-
erator has also a possibility to do a copy of the
25 original IP alias, in which case the configuration
changes are not made. When the network operator ac-
cepts that the changes are made in all the listed
services, the management system automatically makes
all the firewall, quality class and VPN service con-
30 figurations in accordance with the new IP alias in all
the devices in parallel. Further, the made changes are
updated to the database, in which case a database cre-
ated thereafter may be utilized always when there are
changes made in the IP alias.

35 Fig. 2 schematically represents one method of
the invention by way of example. The method as de-
scribed in Fig. 2 is used to centrally configure the

devices of the IP alias generating IP additional services, when an IP network is added to the IP alias in question. If we proceed with the example "Tampere", when a new group is involved in the development unit
5 of Tampere to which a new IP network is assigned, at step 20, a user of the management system, i.e. e.g. a network operator, gives a command to the management system to add one network to the IP alias 'Tampere', which addition is then initialized at step 21 and
10 completed at step 22. The management system is implemented e.g. as a client-server system. At step 23, from the device configuration database, information is retrieved on those IP services whose parameters use the IP alias to which the addition is being done. The
15 configurations of the services are kept in the device configuration database, if that piece of information is got. At step 24, the network operator is displayed in the user interface those IP services which are affected by the change. Upon getting permission at step
20 25, the management system saves at step 26 the new configuration to the device configuration database and starts the configuration part of the devices. The configuration part starts a thread of configuration for each IP additional service in parallel, steps 27 and
25 28. After the configuration, the user of the management system, i.e. e.g. the network operator, is informed of the result of the configuration at step 29.

At its core, the management system functions as follows. At first, a change in some IP alias,
30 and/or at least in one of its service parameters, is input in the management system. The device configuration database is searched for the piece of information on what services the aforementioned change affects, and the changes are saved to the database. Next, the
35 management system configures each such device generating additional services that is affected by the aforementioned change. Since these devices generating addi-

tional services do not understand IP aliases, the configuration has to be done for each such IP address separately that is affected by the aforementioned change and/ or whose service parameters are affected
5 by the aforementioned change.

The invention is not restricted merely to the examples of its embodiments referred to above, instead many variations are possible within the scope of the inventive idea defined by the claims.

CLAIMS

1. A method for centralized configuration of a telecommunication network, which telecommunication network comprises one or more IP networks, which IP network comprises a set of IP addresses, in which telecommunication network in question, IP additional services are produced that have the IP address of the device using the additional service in question at least as one parameter, and which telecommunication network comprises a set of additional service devices generating the IP additional services in question, and which method comprises the steps of:

making a predetermined change at least in one service parameter of the IP alias and/or the devices belonging to the IP alias,

defining the IP additional services whose service parameters are affected by the change in question, and

making the necessary configuration changes in the additional service devices generating the IP additional services in question,

characterized in that the method further comprises the steps of:

generating, prior to the aforementioned change, an IP alias from a predetermined set of IP addresses and/or IP networks,

creating, prior to the aforementioned change, a configuration database which comprises the configuration information of the additional service devices the IP additional services generated by which have the IP address of the device using the additional service in question at least as one parameter,

focusing the aforementioned change in the IP network on the IP alias itself, and

making the aforementioned configuration changes in the additional service devices automati-

cally and in parallel utilizing the aforementioned device configuration database.

2. The method according to claim 1, characterized in that the method further comprises
5 the step of:

arranging the same IP address in several different IP aliases.

3. The method according to claim 1 or 2, characterized in that the method further
10 comprises the step of:

arranging the same IP network in several different IP aliases.

4. The method according to claim 1, 2 or 3, characterized in that the method further
15 comprises the step of:

generating firewall service as an IP additional service.

5. The method according to claim 1, 2, 3 or 4, characterized in that the method further
20 comprises the step of:

generating quality class service as an IP additional service.

6. The method according to claim 1, 2, 3, 4 or 5, characterized in that the method further
25 comprises the step of:

generating VPN service as an IP additional service.

7. The method according to claim 1, 2, 3, 4, 5 or 6, characterized in that the method
30 further comprises the step of:

doing the addition of at least one new IP address as a change in the IP alias.

8. The method according to claim 1, 2, 3, 4, 5, 6 or 7, characterized in that the method
35 further comprises the step of

doing the deletion of at least one IP address as a change in the IP alias.

9. The method according to claim 1, 2, 3, 4, 5, 6, 7 or 8, characterized in that the method further comprises the step of:

5 doing the addition of at least one new IP network as a change in the IP alias.

10. The method according to claim 1, 2, 3, 4, 5, 6, 7, 8 or 9, characterized in that the method further comprises the step of:

10 doing the deletion of at least one IP network as a change in the IP alias.

11. The method according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, characterized in that the method further comprises the step of:

15 doing the addition of at least one new IP alias as a change in the IP alias.

12. The method according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11, characterized in that the method further comprises the step of:

20 doing the deletion of at least one IP alias as a change in the IP alias.

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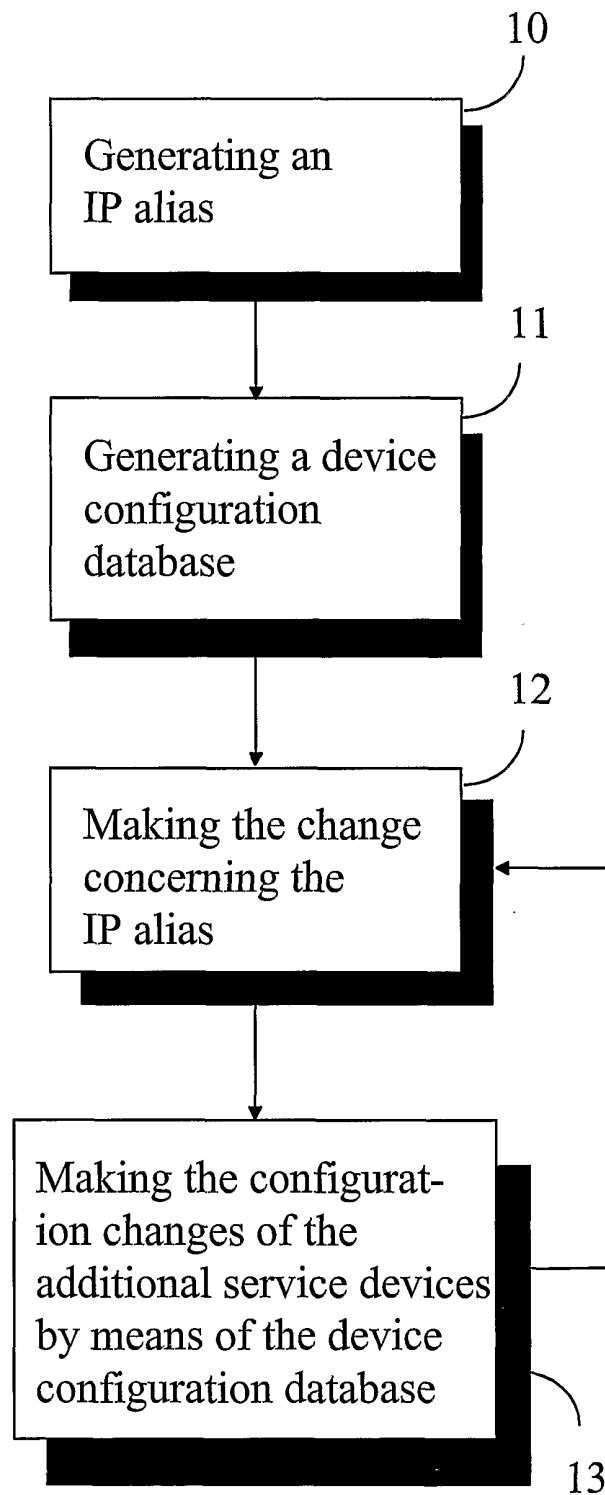


Fig. 1

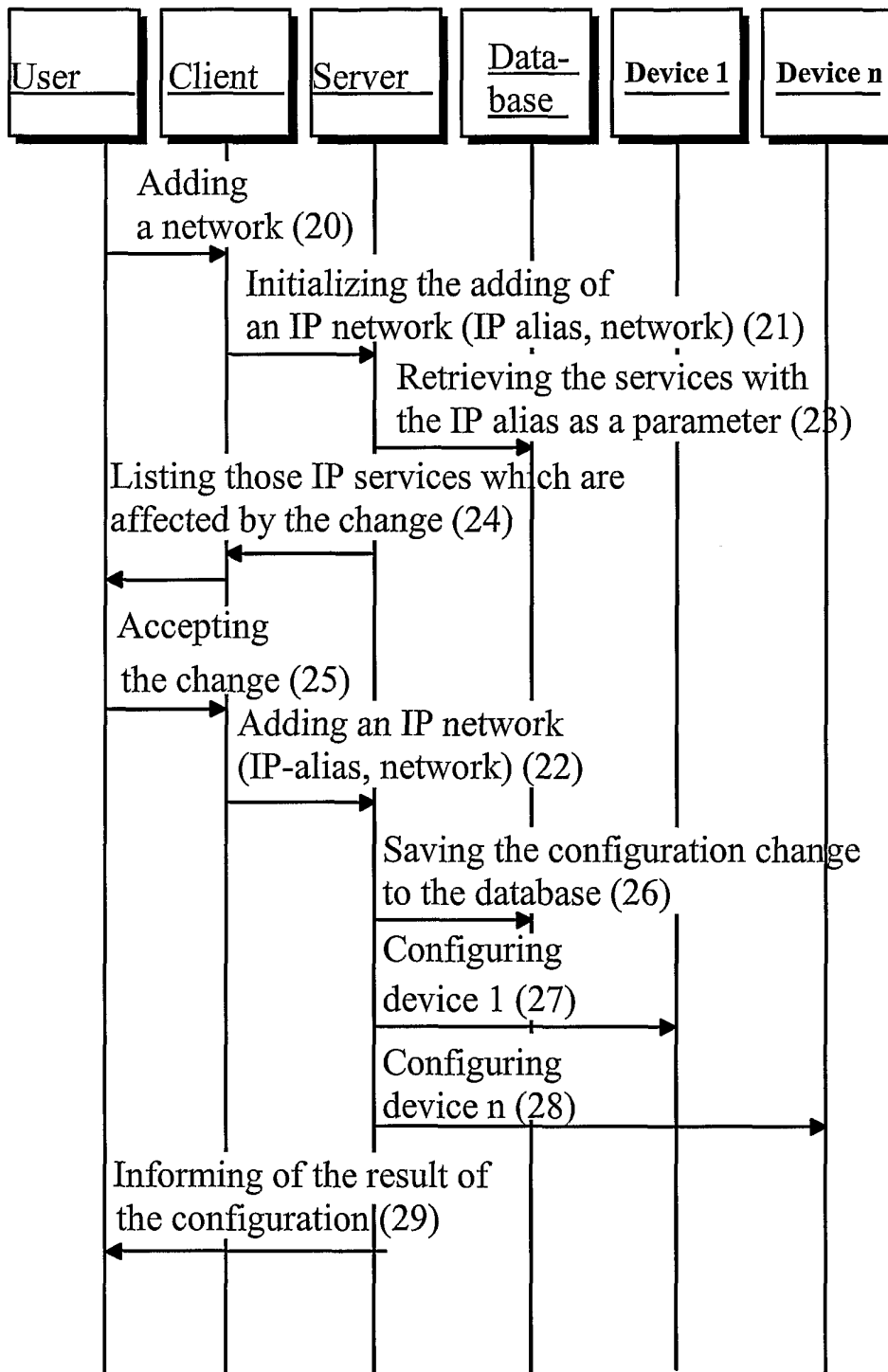


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 15/177, H04L 12/56

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)

IPC7: G06F, H04L

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

SE,DK,FI,NO classes as above

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

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6029196 A (LENZ), 22 February 2000 (22.02.00), column 1, line 1 - column 2, line 27; column 2, line 66 - column 6, line 16, figures 1-12 --	1-12
P,A	WO 0079738 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 28 December 2000 (28.12.00), page 5, line 20 - page 7, line 5 --	1-12
A	US 6061332 A (BRANTON JR ET AL), 9 May 2000 (09.05.00), column 3, line 45 - column 5, line 30 --	1-12

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

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

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"&" document member of the same patent family

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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.
A	Patent Abstracts of Japan, abstract of JP -209231 A (ricoh co ltd), 28 July 2000 (28.07.00), abstract -- -----	1-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

06/11/01

International application No.

PCT/FI 01/00697

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
US	6029196	A	22/02/00	NONE	
WO	0079738	A1	28/12/00	AU 4633900 A SE 9902336 D	09/01/01 00/00/00
US	6061332	A	09/05/00	AU 3502597 A WO 9750210 A US 5845062 A US 5870558 A	14/01/98 31/12/97 01/12/98 09/02/99