

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
15 November 2007 (15.11.2007)

PCT

(10) International Publication Number
WO 2007/128405 A1

(51) International Patent Classification:
H04L 29/08 (2006.01)

(21) International Application Number:
PCT/EP2007/003587

(22) International Filing Date: 24 April 2007 (24.04.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
06008893.7 28 April 2006 (28.04.2006) EP

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH,

CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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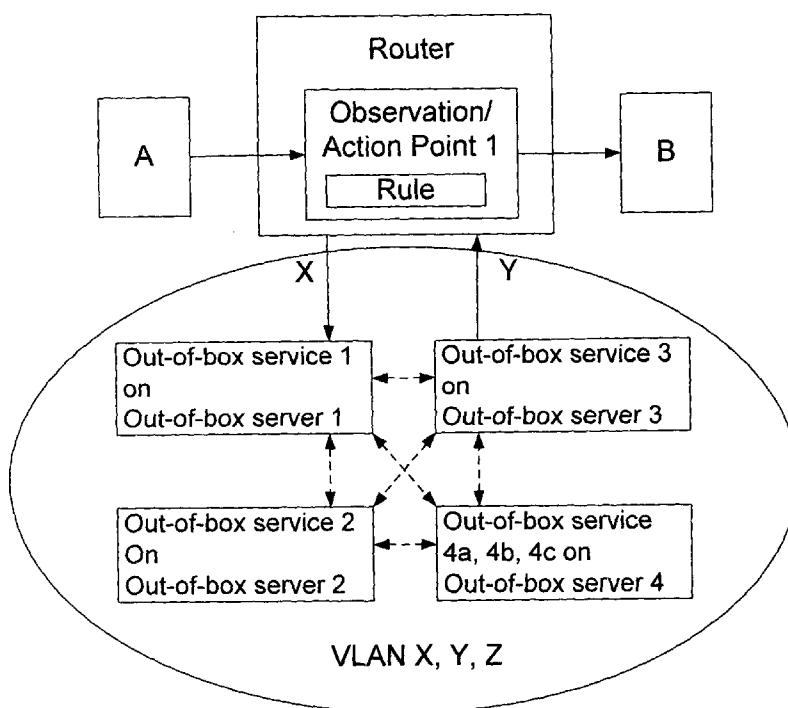
— of inventorship (Rule 4.17(iv))

Published:

— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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

(54) Title: OUT-OF-BOX SERVICES CASCADING



(57) Abstract: The invention discloses an efficient approach to the cascading of out-of-box services. System comprising a packet router with out-of-box interfaces and more than one out-of-box servers performing out-of-box services, characterized in that the packet flow comprises an identifier that defines the order of out-of-box services.

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Title**Out-of-box services cascading**Field of the invention

- 5 The invention relates to the cascading of out-of-box services.

Background of the invention

- 10 It is known that routers, commonly used for layer 3 routing, can offer the opportunity to intermediately route packets to an out-of-box service, in order for the out-of-box service to perform some higher layer or advanced service like e.g. data compression, before routing the packets to their intended destination. As illustrated in
- 15 figure 1, this type of out-of-box routing is provided in two directions, from A to B and back from B to A. For each direction, an opposite flow through out-of-box interfaces X and Y is configured. In this way an inverse service can be applied to each direction, such as compression in the
- 20 direction from A to B and decompression in the direction from B to A.

- From WO 2006/000629 it is known that packets can be subjected to more then one out-of-box services on more than one out-of-box servers by intermediately re-routing packets
- 25 through an observation point and a number of action points, thereby passing an out-of-box interface more then one time. Thus a number of intermediate re-routing actions are performed, out and into the router, which number is equal to the number of out-of-box services to be performed.
- 30

Problem definition

 The prior art is not able to process packets in an efficient manner, when the packets need to be subjected to

more than one out-of-box services via more then one out-of-box servers.

The system known from WO 2006/000629 is very resource consuming in terms of processor load, memory usage and
5 interface load.

Aim of the invention

The aim of the invention is to discloses a more efficient approach to intermediately re-route packets, when
10 the packets need to be subjected to more than one out-of-box services via more then one out-of-box servers.

Summary of the invention

The invention provides a system in which a packet
15 router is connected to more then one out-of-box servers through one or more out-of-box interfaces.

According to an aspect of the invention, the communication between the out-of-box servers is based on one or more VLANs.

20 According to another aspect of the invention each VLAN is assigned a specific VLAN ID and a specific by-directional packet flow through the out-of-box servers.

According to yet a further aspect of the invention, packets are subjected to a specific number and order of
25 out-of-box services by sending the packets to a specific VLAN ID via the out-of-box-interface.

According to another aspect of the invention, a single intermediate re-routing action by the router results in more then one out-of-box services performed on the packets
30 by more then one out-of-box servers. This is most beneficial compared to the prior art and alternative approach as disclosed in WO 2006/000629, because more than one out-of-box services can be applied to intermediately

routed packets, while resource consumption with respect to out-of-box interfaces, observation points and action points is largely decreased.

5 Brief description of the drawings

The invention will be explained in greater detail by reference to exemplary embodiments shown in the drawings, in which:

Fig. 1 shows a schematic view of a router supporting an
10 out-of-box service according to the prior art.

Fig. 2 shows a schematic view of a packet flow being subjected to multiple out-of-box services according to WO 2006/000629.

Fig. 3 shows a schematic view of an exemplary
15 embodiment according to the invention.

Detailed description of the invention

For the purpose of teaching of the invention, preferred embodiments of the method and system of the
20 invention are described in the sequel. It will be apparent to the person skilled in the art that other alternative and equivalent embodiments of the invention can be conceived and reduced to practice without departing from the true spirit of the invention, the scope of the invention being
25 only limited by the claims as finally granted.

The invention provides a system in which a packet router is connected to more than one out-of-box servers through one or more out-of-box interfaces. An exemplary
30 embodiment in figure 3 illustrates a Router, connected to out-of-box server 1 through out-of-box interface X and to out-of-box server 3 through out-of-box interface Y. The communication between the out-of-box servers is based on

one or more Virtual LANs (VLANs). In general, VLANs enable a group of servers on different physical LAN segments to communicate with each other as if they were all on the same physical LAN segment, by broadcasting information at layer 2. Different broadcast domains (VLANs) can be configured to define server groups and improve communication efficiency. Each broadcast domain can be given a specific VLAN ID.

According to the invention, a number of VLANs with a specific VLAN ID are configured. Each VLAN comprises a number of specific out-of-box servers, performing one or more specific out-of-box services on a packet flow. Each out-of-box server comprises a forwarding table, which specifies to which out-of box server or out-of-box interface the packets are to be forwarded after performing the one or more out-of-box services on the packet flow. In the exemplary embodiment shown in figure 3, VLAN X e.g. comprises out-of-box servers 1, 2 and 3, the out-of-box services being performed by said out-of-box servers being e.g. spam blocking, virus checking and data compression. The packets processed by out-of-box server 1 are forwarded to out-of-box server 2, as specified in the forwarding table of out-of-box server 1. The packets processed by out-of-box server 2 are forwarded to out-of-box server 3, as specified in the forwarding table of out-of-box server 2. The packets processed by out-of-box server 3 are forwarded to out-of-box interface Y, as specified in the forwarding table of out-of-box server 3. In this way a number of out-of-box services on a number of out-of-box servers can be performed in a very efficient way. In contrast to the prior art solution illustrated in figure 2, only one observation/action point needs to be invoked according to the present invention and in each direction (in and out of the router) only one out-of-box interface is passed.

It will be clear to a person skilled in the art that the same applies to the inverse communication path from B to A. In this case the packets are sent through out-of-box interface Y to out-of-box server 3. Out-of-box server 3
5 performs the inverse operation of data compression, i.e. data decompression and sends the processed packets to out-of-box server 2, as specified in the forwarding table. Out-of-box servers 2 and out-of-box server 1 perform the inverse operations of virus checking and spam blocking
10 respectively and send the processed packets to the destination specified in their respective forwarding tables. This results in the packets from B being send back to the router via out-of-box interface X and from the router to A.

15 According to the invention, a number of VLANs can be configured, each VLAN comprising a specific number of out-of-box servers. Each out-of-box server receives packets with a specific VLAN ID, performs its one or more out-of-box services and sends the packets to the destination
20 specified in the forwarding tables of the specific VLAN. In this way for each VLAN ID, a specific number and order of out-of-box services can be invoked by the router, by addressing the appropriate VLAN with its corresponding VLAN ID. In terms of services, the invention will be most
25 beneficial to implement different bundles of value-added services to different customer groups. A specific customer group can be recognized by the router on e.g. basic IP information, such as the 5-tuple in the IP packet header (Destination address, Source address, Protocol, Destination
30 port, Source port). According to the invention the router is able to send the packets of a recognized customer group to the appropriate VLAN, thereby triggering the out-of-box

services matching the services defined for a specific customer group.

It will be clear to a person skilled in the art that the application of the invention is most beneficial
5 compared to the prior art and alternative approach as disclosed in WO 2006/000629, because more than one out-of-box services can be applied to intermediately routed packets by a single re-routing action in the router and thus resource consumption with respect to out-of-box
10 interfaces, observation points and action points is largely decreased.

Furthermore, it will be clear that routing can mean routing at layer 3, but also switching at layer 2 or 4. A packet can be a packet such as an IP packet, but also a
15 frame such as a Frame Relay frame or a cell such as an ATM cell.

Claims

1. System comprising a packet router with out-of-box
interfaces connected to more than one out-of-box servers
5 performing out-of-box services on a packet flow,
characterized in that said packet flow comprises an
identifier that defines the order of out-of-box services.
2. System according to claim 1, in which the communication
10 between the out-of-box servers is based on one or more
VLANs and each VLAN is assigned a specific VLAN ID.
3. System according to claim 2 in which the identifier
defining the order of out-of-box servers is a VLAN ID.
15
4. Method comprising the intermediately re-routing of
packets by a router to out-of-box services on more than one
out-of-box servers via out-of-box interfaces, characterized
in that the order in which the out-of-box services are
20 performed is based on an identifier comprised in said
packets.
5. Method according to claim 4 comprising
- a communication method between the out-of-box servers,
25 said communication method being based on VLAN;
- one or more VLANs being used for the communication
between the out-of-box servers;
- each VLAN being assigned a specific VLAN ID.
- 30 6. Method according to claim 5 comprising the subjection to
a specific order of out-of-box services by means of the
sending of the packets to a specific VLAN ID via the out-
of-box interface.

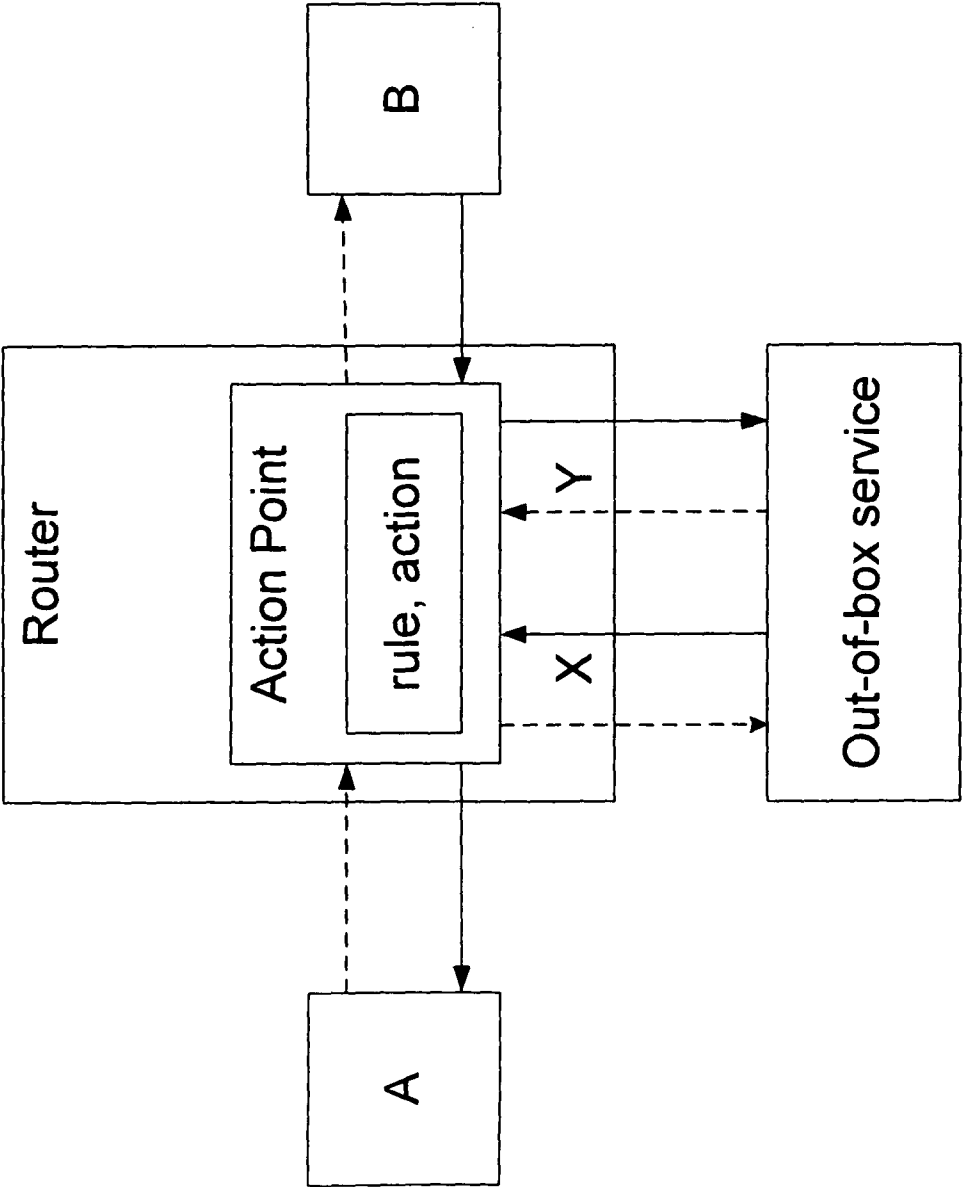


Figure 1

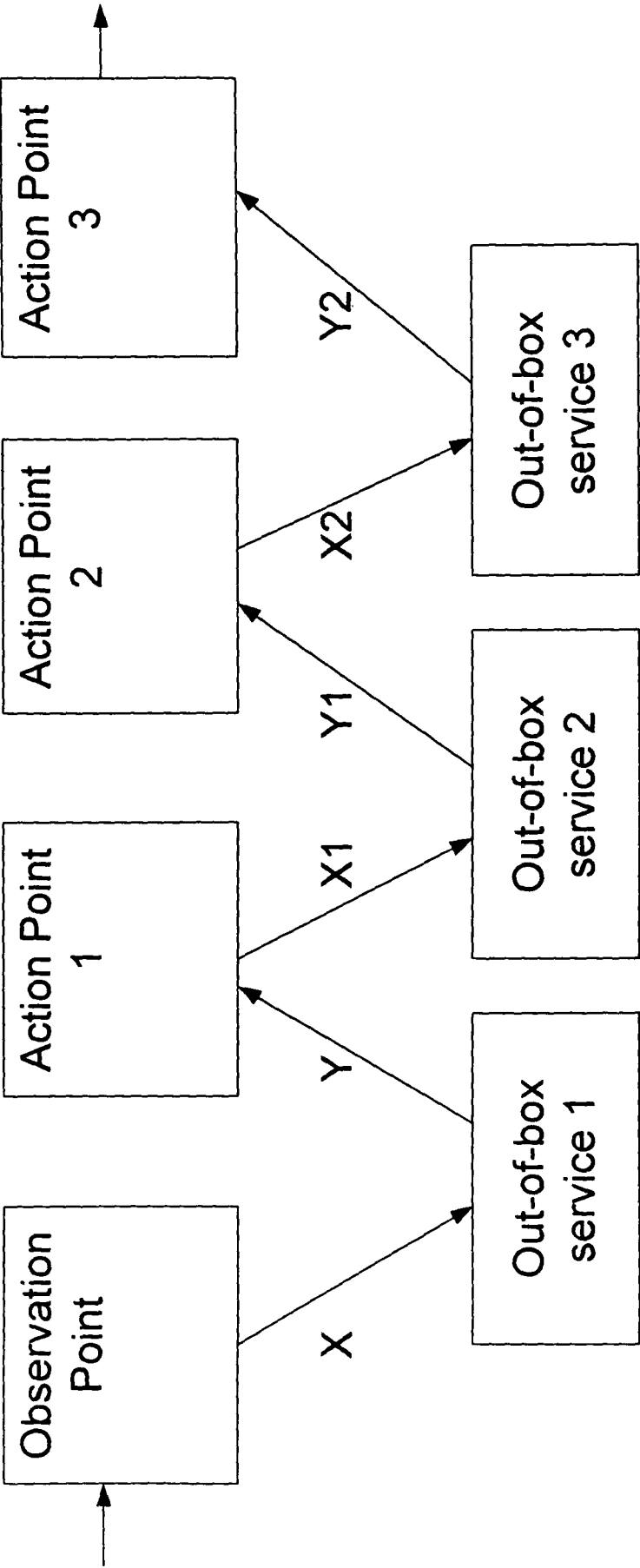


Figure 2

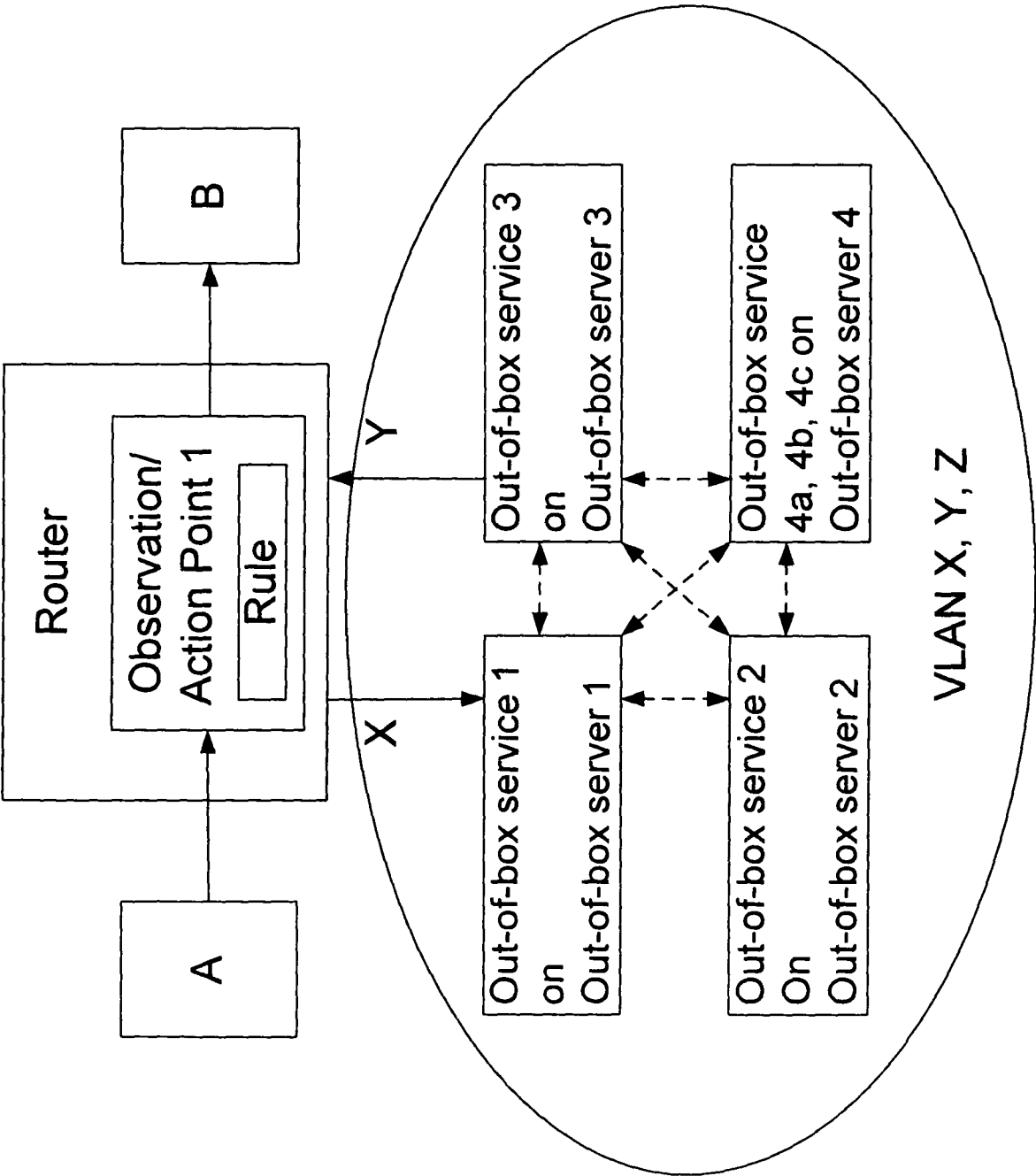


Figure 3

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2007/003587

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L29/08

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)

H04L

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)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005/286512 A1 (MAHAMUNI ATUL ET AL) 29 December 2005 (2005-12-29) figures 1-6	1-6
A	US 2004/093434 A1 (HOVELL PETER ET AL) 13 May 2004 (2004-05-13) figure 2	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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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.

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Date of the actual completion of the international search

11 September 2007

Date of mailing of the international search report

17/09/2007

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2007/003587

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
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