

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court _____ for the Eastern District of Texas _____ on the following

☐ Trademarks or ☒ Patents. (☐ the patent action involves 35 U.S.C. § 292.);

DOCKET NO. 2:22-cv-00172	DATE FILED 5/24/2022	U.S. DISTRICT COURT for the Eastern District of Texas
PLAINTIFF NetSocket, Inc.		DEFENDANT Cisco Systems, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,616,601	11/10/2009	NetSocket, Inc.
2 7,190,698	3/13/2007	NetSocket, Inc.
3		
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT		
CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/257,248	10/10/2002	Emil Svanberg	200126.01101

CONFIRMATION NO. 2567

POA ACCEPTANCE LETTER

110123
Ross Barnes LLP
275 W. Campbell Rd., Ste. 210
Richardson, TX 75080



Date Mailed: 07/26/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/23/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/nrhayden/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/257,248	10/10/2002	Emil Svanberg	NET-5101

25962
SLATER MATSIL, LLP
17950 PRESTON RD, SUITE 1000
DALLAS, TX 75252-5793

CONFIRMATION NO. 2567
POWER OF ATTORNEY NOTICE



Date Mailed: 07/26/2019

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/23/2019.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/nrhayden/

Electronic Acknowledgement Receipt	
EFS ID:	36666211
Application Number:	10257248
International Application Number:	
Confirmation Number:	2567
Title of Invention:	NETWORK OPTIMISATION METHOD
First Named Inventor/Applicant Name:	Emil Svanberg
Customer Number:	25962
Filer:	Robin L. Barnes/Nicole Isenhardt
Filer Authorized By:	Robin L. Barnes
Attorney Docket Number:	NET-5101
Receipt Date:	23-JUL-2019
Filing Date:	10-OCT-2002
Time Stamp:	15:39:18
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no				
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA373b20012601101v698v4.pdf	151105 f5ba94f977be568641292adfea625b7342395ff	no	3
Warnings:					

Information:	
Total Files Size (in bytes):	151105
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	

PETITION TO ACCEPT UNINTENTIONALLY DELAYED PAYMENT OF MAINTENANCE FEE IN AN EXPIRED PATENT (37 CFR 1.378(b))				
Patent Number	Issue Date	Application Number	Filing Date	Docket Number (if applicable)
7190698	13-Mar-2007	10257248	10-Oct-2002	
CAUTION: Maintenance fee (and surcharge, if any) payment must correctly identify: (1) the patent number and (2) the application number of the actual U.S. application leading to issuance of that patent to ensure the fee(s) is/are associated with the correct patent. 37 CFR 1.366(c) and (d).				
Applicants claims the following fee status:				
☒ Small Entity				
☐ Micro Entity				
☐ Regular Undiscounted				
Applicants selects the following :				
☐ 3 1/2		☐ 7 1/2		☒ 11 1/2
PETITION FEE The petition fee required by 37 CFR 1.17(m) (Fee Code 1558/2558) must be paid as a condition of accepting unintentionally delayed payment of the maintenance fee.				
MAINTENANCE FEE (37 CFR 1.20(e)-(g)) The appropriate maintenance fee must be submitted with this petition.				
STATEMENT THE UNDERSIGNED CERTIFIES THAT THE DELAY IN PAYMENT OF THE MAINTENANCE FEE TO THIS PATENT WAS UNINTENTIONAL				
PETITIONER(S) REQUEST THAT THE DELAYED PAYMENT OF THE MAINTENANCE FEE BE ACCEPTED AND THE PATENT REINSTATED				
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES 37 CFR 1.378(c) states: "Any petition under this section must be signed in compliance with 37 CFR 1.33(b) ."				
I certify, in accordance with 37 CFR 1.4(d)(4) that I am				
☒ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application. ☐ An attorney or agent registered to practice before the Patent and Trademark Office ☐ A sole patentee ☐ A joint patentee; I certify that I am authorized to sign this submission on behalf of all the other patentees as evidenced by the power of attorney in the application ☐ A joint patentee; all of whom are signing this e-petition ☐ The assignee of record of the entire interest that qualifies as an authorized party under 37 CFR 1.33(b)				

Attorney			
A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature			
Signature	/Robin L. Barnes/		
Name	Robin L. Barnes	Registration Number	45936

Electronic Patent Application Fee Transmittal				
Application Number:		10257248		
Filing Date:		10-Oct-2002		
Title of Invention:		NETWORK OPTIMISATION METHOD		
First Named Inventor/Applicant Name:		Emil Svanberg		
Filer:		Robin L. Barnes/Nicole Isenhardt		
Attorney Docket Number:		NET-5101		
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
MAINTENANCE FEE DUE AT 11.5 YEARS	2553	1	3700	3700
PET. DELAY PYMT MAINTAIN PATENT IN FORCE	2558	1	1000	1000
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				4700



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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In re Patent No. 7190698 :
Issue Date: March 13, 2007 :
Application No. 10257248 :DECISION GRANTING PETITION
Filed: October 10, 2002 :UNDER 37 CFR 1.378(b)
Attorney Docket No. NET-5101 :

This is a decision on the electronic petition, filed July 23, 2019, under 37 CFR 1.378(b) to accept the unintentionally delayed payment of the 11.5 year maintenance fee for the above-identified patent.

The petition is **GRANTED**.

The maintenance fee is accepted, and the above-identified patent reinstated as of July 23, 2019. This decision also constitutes notice that the fee has been accepted. An electronic copy of the petition and this decision has been created as an entry in the Image File Wrapper. Nevertheless, petitioner should print and retain an independent copy.

Telephone inquiries related to this electronic decision should be directed to the Electronic Business Center at 1-866-217-9197.

Electronic Acknowledgement Receipt	
EFS ID:	36667527
Application Number:	10257248
Patent Number:	7190698
Confirmation Number:	2567
Petition Issued Date:	July 23,2019
Title of Invention:	NETWORK OPTIMISATION METHOD
First Named Inventor/Applicant Name:	Emil Svanberg
Customer Number:	25962
Filer:	Robin L. Barnes/Nicole Isenhardt
Filer Authorized By:	Robin L. Barnes
Attorney Docket Number:	NET-5101
Receipt Date:	23-JUL-2019
Filing Date:	10-OCT-2002
Time Stamp:	16:31:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$4700
RAM confirmation Number	072419INTEFSW16325300
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition automatically granted by EFS	petition-request.pdf	32569	no	2
			8e547a5a5c3f6af530dc8c0621596d63c4c1f1db		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	31896	no	2
			cb20e4461d7ff38ba187e9c4b4359001690c228		
Warnings:					
Information:					
Total Files Size (in bytes):			64465		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

(Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number.)

PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS	Patent Number	7,190,698
	Issue Date	03/13/2007
	First Named Inventor	Emil Svanberg, Lulea, (SE)
	Title	Network Optimisation Method
	Attorney Docket No.	200126.01101

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.OR ☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

110123

OR ☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

☒ The address associated with the above-identified Customer Number.

OR

☐ The address associated with the Customer Number identified in the box at right:

OR

☐ Firm or Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the:

☐ Inventor, having ownership of the patent.

OR

☒ Patent owner.

Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on

SIGNATURE of Inventor or Patent Owner		Date	21 JUL 2019
Signature	Ken Lewis	Telephone	214-763-7650
Name	Ken Lewis		
Title and Company	President and CEO, Netsocket, Inc.		

NOTE: Signatures of all the inventors or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.☐ A total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Netsocket, Inc.

Application No./Patent No.: 7,190,698

Filed/Issue Date: 03/13/2007

Titled: **Network Optimisation Method**

Netsocket, Inc., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;
2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)
- the patent application/patent identified above, by virtue of either:

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or a copy* is attached.

OR

B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Svanberg, Emil, et al.

To: Operax AB

The document was recorded in the United States Patent and Trademark Office at
Reel 018550 Frame 0267 or a copy* is attached.

2. From: Operax AB

To: NYA Operax AB

The document was recorded in the United States Patent and Trademark Office at
Reel 021978 Frame 0022 or a copy* is attached.

3. From: NYA Operax AB

To: Operax AB

The document was recorded in the United States Patent and Trademark Office at
Reel 021991 Frame 0371 or a copy* is attached.

☒ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ *As required by 37 CFR 3.73(b)(1)(i), if a copy/copies is/are attached, the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.


Signature

2019-07-23

Date

Robin L. Barnes

Printed or Typed Name

45936

Title or Registration Number

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Supplemental Sheet

4. From: Operax AB To: NETSOCKET, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 022007 Frame 0627

5. From: NETSOCKET, INC., a Delaware Corporation To: Comerica Bank, a Texas Banking Association

The document was recorded in the United States Patent and Trademark Office at
Reel 026829 Frame 0444

6. From: NETSOCKET, INC. To: Alliacense Limited LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 036740 Frame 0668

7. From: Comerica Bank To: NETSOCKET, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 036612 Frame 0637

8. From: NETSOCKET, INC. To: Alliacense Limited LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 038109 Frame 0515

9. From: Alliacense Limited, LLC To: NETSOCKET, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 049803 Frame 0043

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT3558759

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
NETSOCKET, INC.	09/02/2015
RECEIVING PARTY DATA	
Name:	ALLIACENSE LIMITED LLC
Street Address:	4880 STEVENS CREEK BLVD.
Internal Address:	SUITE 103
City:	SAN JOSE
State/Country:	CALIFORNIA
Postal Code:	95129
PROPERTY NUMBERS Total: 4	
Property Type	Number
Patent Number:	7616601
Patent Number:	7734796
Patent Number:	7190698
Patent Number:	7720966
CORRESPONDENCE DATA	
Fax Number:	(408)446-5444
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	408-886-5441
Email:	emi@alliacense.com
Correspondent Name:	EMI RHODES
Address Line 1:	4880 STEVENS CREEK BLVD.
Address Line 2:	SUITE 103
Address Line 4:	SAN JOSE, CALIFORNIA 95129
NAME OF SUBMITTER:	EMI RHODES
SIGNATURE:	/EMI RHODES/
DATE SIGNED:	10/06/2015
This document serves as an Oath/Declaration (37 CFR 1.63).	
Total Attachments: 5	

source=150902 Netsocket Executed Assignment Sept 2, 2015#page1.tif
source=150902 Netsocket Executed Assignment Sept 2, 2015#page2.tif
source=150902 Netsocket Executed Assignment Sept 2, 2015#page3.tif
source=150902 Netsocket Executed Assignment Sept 2, 2015#page4.tif
source=150902 Netsocket Executed Assignment Sept 2, 2015#page5.tif

ADDENDUM E
FORM OF ASSIGNMENT

This assignment ("Assignment") is entered into between ALLIACENSE LIMITED, LLC, a Delaware limited liability corporation, having its principal place of business at 4880 Stevens Creek Boulevard, Suite 103, San Jose, California 95129 ("Assignee"), and Netsocket, Inc., a Delaware corporation with its principal place of business at P.O. Box 867627, Plano, Texas 75086-7627, of behalf of itself and its Affiliates, (collectively, "Assignor"). Assignee and Assignor may be referred to individually as "Party" and collectively as the "Parties."

NOW THEREFORE, for and in consideration of the mutual covenants herein contained as well as of other good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, and pursuant to that certain Commercialization Agreement between Assignee and Assignor dated June ____, 2015 (the "Agreement"), it is covenanted and agreed by and between the parties hereto that:

1. Subject Matter.

"Project IP" means the patents and applications scheduled at Schedule I, entitled "Schedule of Project IP," including all foreign counterparts, extensions, reissues, and/or renewals of such patents and patent applications.

2. Assignment.

2.1. Assignor hereby grants, sets-over, assigns, transfers, conveys, and acquits unto Assignee all of Assignor's right, title, and interest of whatsoever kind or nature, now existing or hereafter arising, in and to the Project IP, including but not limited to, with respect to the Project IP, the exclusive, worldwide right to:

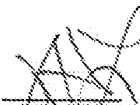
2.1.1. Regulate and control by license, sublicense, affiliation, or other agreement the practice and/or use of any and all of the Project IP;

2.1.2. Otherwise pursue the commercialization and enforcement of any and all claims of the Project IP, including the manufacture, sale, and use of any and all products and/or services and the practice of any and all methods and processes covered by any and all claims of any or all of the Project IP;

2.1.3. Sue on and collect for its own use and benefit all claims and/or entitlements with respect to damages by reason of past, present and future infringement or use of any and all of the Project IP; and,

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NETSOCKET
9/2/15


Alliacense

2.1.4. Pursue in its own name and for its own use and benefit all remedies of whatsoever kind or nature (including injunctive relief) relating to the past, present, or future infringement or use of any and all of the Project IP.

2.2. All costs for the registration of the assignment of the Project IP will be borne by Assignee.

2.3. By virtue of the grants of contained herein, Assignor acknowledges that it does not retain any rights, licenses or other benefits with respect to any or all of the Project IP.

3. Attachments.

- Schedule I: Schedule of Project IP

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals as of June __, 2015.

NETSOCKET, INC. (ASSIGNOR)	ALLIACENSE LIMITED LLC (ASSIGNEE)
By: <u>[Signature]</u> Ken Lewis Title: CEO Date: <u>June 2015</u>	By: <u>[Signature]</u> NAC LACKONE Title: <u>President</u> Date: <u>6 June 2015</u>

2 SEPTEMBER 2015

[Signature]

July

[Signature]

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[Signature]
NETSOCKET
9/2/15

[Signature]
Alliacense

Schedule I
Schedule of Project IP

Family	Status	Country	Patent No.
1		Provisional	60/261,166
1		PCT	WO/2002/056564
1	Issued	US	7616601
1	Issued	CN	CN100380903
1	Issued	EP	EP1354456
1		JP	JP2004527934
1		KR	KR20040007434
1		AT	AT504133
2		Provisional	60/316,298
2	Issued	SE	SE519215
2		PCT	WO/2003/021888
2	Issued	US	7734796
2	Issued	EP	EP1423945
2	Issued	JP	JP3977331
2		CA	CA2459571
2	Rejected	CN	CN1552143
2		KR	KR20040040448
2		TW	TW245524
2		PT	PT1423945
2		AT	AT367696
2		DE	DE60221261
2		DK	DK1423945
2		ES	ES2290327
4		Provisional	60/197,006
4		PCT	WO/2001/080485
4	Issued	US	7190698
4	Issued	EP	EP1275226
4	Issued?	CN	CN1183724
4	Lapsed?	KR	KR100696003
4		JP	JP2003531519

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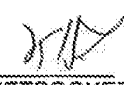

NETSOCKET


Alliacense

Family	Status	Country	Patent No.
4		DE	DE60102367
4		AT	AT262244
4		AU	AU6019001
4		ES	ES2217150
7		Provisional	60/430,088
7		PCT	WO/2004/051944
7	Issued	US	7720968
7		EP	EP1579638
7		JP	JP2006508605
7		KR	KR20050085155
7		AU	AU2003279659
8	Issued	SE	SE526535
8		US	60/530800
8		PCT	WO/2005/062555
8	Issued	EP	EP1898119
8	ABN	US	US20070115918
9		Provisional	60/671,083
9		PCT	WO/2006/041373
9	Issued	EP	EP1800442
9		CA	CA2583293
9		JP	JP2008516521
9		KR	KR20070085339
9	ABN	US	US20090003194
10		PCT	WO/2003/064157
10	Issued	EP	EP1488678
10	Issued	JP	JP4018640
10	ABN	US	US20050157644
10		KR	KR20040105804
10		AT	AT424073
10		AU	AU2002248116
12		Provisional	60/369,564

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NETSOCKET

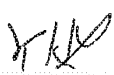

Alliacense

Family	Status	Country	Patent No.
12		PCT	WO/2003/085514
12	Issued	EP	EP1490765
12	ABN	US	US2005125517
12	Issued	JP	JP4064353
12		KR	KR20050004631
12		AT	AT418214
12		AU	AU2002343306
13		Provisional	60/530,902
13	Issued	SE	SE526257
13		PCT	WO/2005/062557
13	Issued	EP	EP1698123
13	ABN	US	US20070115856
13		AT	AT522049
14		Provisional	60/676,944
14		PCT	WO/2006/118500
14	Issued	EP	EP1878170
14	ABN	US	US20090304020
14		CA	CA2605126
14		CN	CN101171803
14		JP	JP2008541553
14		PCT	WO/2006/118502
14	Issued	EP	EP1878270
14	ABN	US	US20090323712
14		CA	CA2605129
14		CN	CN101185346
14		JP	JP2008541555

Together with all progenitors and progeny thereof and all additions, changes, amendments, modifications, actions, counterparts, continuations, continuations-in-part, extensions, reissues, divisionals and/or renewals of such progenitors and progeny," together with any counterparts thereof anywhere in the world, as well as all inventions disclosed in any such patents, progenitors, progeny, or counterparts.

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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/257,248	10/10/2002	Emil Svanberg	NET-5101

25962
SLATER & MATSIL, L.L.P.
17950 PRESTON RD, SUITE 1000
DALLAS, TX 75252-5793

CONFIRMATION NO. 2567
POA ACCEPTANCE LETTER



Date Mailed: 02/12/2009

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/30/2009.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/sabuna/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/257,248	10/10/2002	Emil Svanberg	1505-1015

466
YOUNG & THOMPSON
209 Madison Street
Suite 500
ALEXANDRIA, VA 22314

CONFIRMATION NO. 2567
POWER OF ATTORNEY NOTICE



Date Mailed: 02/12/2009

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/30/2009.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/sabuna/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☒ Practitioners associated with the Customer Number:

25962

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☒ The address associated with Customer Number:

25962

OR

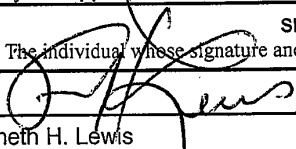
☐ Firm or Individual Name	Slater & Matsil, L.L.P.		
Address	17950 Preston Rd., Suite 1000		
City	Dallas	State	TX Zip 75252
Country	United States		
Telephone	972-732-1001	Email	knapp@slater-matsil.com

Assignee Name and Address:
NetSocket, Inc.
3701 W. Plano Pkwy., Suite 140
Plano, TX 75075

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	8 DEC 08
Name	Kenneth H. Lewis	Telephone	214 427 7301
Title	President & C.E.O.		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(b)Applicant/Patent Owner: NetSocket, Inc.Application No./Patent No.: 7,190,698 B2 Filed/Issue Date: March 13, 2007Entitled: Network Optimisation MethodNetSocket, Inc., a corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest; or
2. ☐ an assignee of less than the entire right, title and interest.
(The extent (by percentage) of its ownership interest is _____ %)

In the patent application/patent identified above by virtue of either:

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

OR

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Emil Svanberg, Joachim Johansson, Anders Torger, Joakim Norrgard, and Anders Larsson
To: Operax AB

The document was recorded in the United States Patent and Trademark Office at
Reel 018550, Frame 0267, or for which a copy thereof is attached.

2. From: Operax AB To: Nya Operax AB

The document was recorded in the United States Patent and Trademark Office at
Reel 021978, Frame 0022, or for which a copy thereof is attached.

3. From: Nya Operax AB To: Operax AB

The document was recorded in the United States Patent and Trademark Office at
Reel 021991, Frame 0371, or for which a copy thereof is attached.

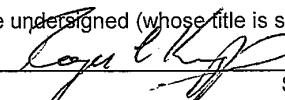
4. From: Operax AB To: NetSocket, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 022007, Frame 0627, or for which a copy thereof is attached.☐ Additional documents in the chain of title are listed on a supplemental sheet.

- ☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.


Signature1-30-09
DateRoger C. Knapp, Reg. No. 46,836
Printed or Typed Name972-732-1001
Telephone NumberAttorney for Applicants
Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt	
EFS ID:	4707622
Application Number:	10257248
International Application Number:	
Confirmation Number:	2567
Title of Invention:	NETWORK OPTIMISATION METHOD
First Named Inventor/Applicant Name:	Emil Svanberg
Customer Number:	00466
Filer:	Roger Clark Knapp/Natalie Swider
Filer Authorized By:	Roger Clark Knapp
Attorney Docket Number:	1505-1015
Receipt Date:	30-JAN-2009
Filing Date:	10-OCT-2002
Time Stamp:	14:47:01
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		NET-5101_POA.pdf	141203	yes	2
			330d7951c2fa5e61c2f260577027a34cd18e cb6b		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Power of Attorney	1	1
	Assignee showing of ownership per 37 CFR 3.73(b).	2	2
Warnings:			
Information:			
Total Files Size (in bytes):		141203	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/257,248	03/13/2007	7190698	1505-1015	2567

466 7590 02/21/2007
YOUNG & THOMPSON
745 SOUTH 23RD STREET
2ND FLOOR
ARLINGTON, VA 22202

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 1064 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Emil Svanberg, Lulea, SWEDEN;
Joachim Johansson, Lulea, SWEDEN;
Anders Torger, Lulea, SWEDEN;
Joakim Norrgard, Lulea, SWEDEN;
Anders Larsson, Lulea, SWEDEN;



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BIBDATASHEET

CONFIRMATION NO. 2567

Bib Data Sheet

SERIAL NUMBER 10/257,248	FILING OR 371(c) DATE 10/10/2002 RULE	CLASS 370	GROUP ART UNIT 2616	ATTORNEY DOCKET NO. 1505-1015
APPLICANTS Emil Svanberg, Lulea, SWEDEN; Joachim Johansson, Lulea, SWEDEN; Anders Torger, Lulea, SWEDEN; Joakim Norrgard, Lulea, SWEDEN; Anders Larsson, Lulea, SWEDEN;				
** CONTINUING DATA ***** This application is a 371 of PCT/EP01/04062 04/06/2001 which claims benefit of 60/197,006 04/13/2000				
** FOREIGN APPLICATIONS *****				
** SMALL ENTITY **				
Foreign Priority claimed ☐ yes ☐ no 35 USC 119 (a-d) conditions ☐ yes ☐ no ☐ Met after met Allowance Verified and Acknowledged		STATE OR COUNTRY SWEDEN	SHEETS DRAWING 3	TOTAL CLAIMS 8
Examiner's Signature _____ Initials _____				INDEPENDENT CLAIMS 1
ADDRESS 466				
TITLE NETWORK OPTIMISATION METHOD				
FILING FEE RECEIVED 810	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	

PART B - FEE(S) TRANSMITTAL

Complete and send this form together with applicable fee(s), to: **Mail** **Mail Stop ISSUE** **E**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

00466 7590 11/08/2006

YOUNG & THOMPSON
 745 SOUTH 23RD STREET
 2ND FLOOR
 ARLINGTON, VA 22202

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/257,248	10/10/2002	Emil Svanberg	1505-1015	2567

TITLE OF INVENTION: NETWORK OPTIMISATION METHOD

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	~~\$1700~~ 700	\$300	\$0	~~\$1700~~ 1000	02/08/2007
EXAMINER	ART UNIT	CLASS-SUBCLASS				
FAROUL, FARAH	2616	370-395200	02/07/2007 MAHME2 00000156 1025/248			

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent from page 154

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 **YOUNG & THOMPSON**

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE
 OPERAX AB

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)
 Lulea, Sweden

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
☒ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☒ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number **25-0120** (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☒ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature Benoit Castel
 Typed or printed name **Benoit CASTEL #35,041**

Date **February 6, 2007**
 Registration No. **#35,041**

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Bib Data Sheet

CONFIRMATION NO. 2567

SERIAL NUMBER 10/257,248	FILING OR 371(c) DATE 10/10/2002 RULE	CLASS 370	GROUP ART UNIT 2616	ATTORNEY DOCKET NO. 1505-1015
APPLICANTS Emil Svanberg, Lulea, SWEDEN; Joachim Johansson, Lulea, SWEDEN; Anders Torger, Lulea, SWEDEN; Joakim Norrgard, Lulea, SWEDEN; Anders Larsson, Lulea, SWEDEN;				
** CONTINUING DATA ***** This application is a 371 of PCT/EP01/04062 04/06/2001 which claims benefit of 60/197,006 04/13/2000				
** FOREIGN APPLICATIONS *****				
Foreign Priority claimed ☐ yes ☐ no 35 USC 119 (a-d) conditions ☐ yes ☐ no ☐ Met after met Allowance Verified and Acknowledged <u>Examiner's Signature</u> <u>Initials</u>		STATE OR COUNTRY SWEDEN	SHEETS DRAWING 3	TOTAL CLAIMS 8
				INDEPENDENT CLAIMS 1
ADDRESS 00466				
TITLE NETWORK OPTIMISATION METHOD				
FILING FEE RECEIVED 510	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	



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NOTICE OF ALLOWANCE AND FEE(S) DUE

00466 7590 11/08/2006

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2ND FLOOR
ARLINGTON, VA 22202

EXAMINER

FAROUL, FARAH

ART UNIT

PAPER NUMBER

2616

DATE MAILED: 11/08/2006

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/257,248	10/10/2002	Emil Svanberg	1505-1015	2567
TITLE OF INVENTION: NETWORK OPTIMISATION METHOD				

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300	\$0	\$1700	02/08/2007

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

00466 7590 11/08/2006

YOUNG & THOMPSON
745 SOUTH 23RD STREET
2ND FLOOR
ARLINGTON, VA 22202

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/257,248	10/10/2002	Emil Svanberg	1505-1015	2567

TITLE OF INVENTION: NETWORK OPTIMISATION METHOD

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300	\$0	\$1700	02/08/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
FAROUL, FARAH	2616	370-395200

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
 (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/257,248	10/10/2002	Emil Svanberg	1505-1015	2567

00466	7590	11/08/2006
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YOUNG & THOMPSON
745 SOUTH 23RD STREET
2ND FLOOR
ARLINGTON, VA 22202

EXAMINER	
FAROUL, FARAH	

ART UNIT	PAPER NUMBER
2616	

DATE MAILED: 11/08/2006

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 1064 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 1064 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability	Application No.	Applicant(s)	
	10/257,248	SVANBERG ET AL.	
	Examiner	Art Unit	
	Farah Faroul	2616	

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address–

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Application filed on October 10, 2002.
2. ☒ The allowed claim(s) is/are 1-8.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. ☒ Notice of References Cited (PTO-892) 2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>October 10, 2002</u> 4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | <ol style="list-style-type: none"> 5. ☐ Notice of Informal Patent Application 6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date <u>20061031</u> 7. ☒ Examiner's Amendment/Comment 8. ☐ Examiner's Statement of Reasons for Allowance 9. ☐ Other _____ |
|---|---|

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Benoit Castel on October 30, 2006.

In the claims:

The listing of the claims will replace all prior version, and listing, of the claims in the application:

Listing of claims:

1. (Currently amended) Method in a packet based communication network including network domains, wherein at least one domain is a Multiprotocol Label Switching MPLS domain, to establish a virtual leased line, VLL, between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source (SRC) and the destination (DST), wherein the bandwidth broker (BB) is associated to each network domain and the bandwidth broker (BB) is [adapted to] configured to control a hierarchical routing domain, the method comprises the following steps:

i) generate a request from an entity for a Virtual Leased Line, VLL, having a predefined Quality of Service, QoS, from a source network (SRC) to a destination network (DST)

and apply the request to a Bandwidth Broker (BB) of a domain A, BB_A , associated to the source network;

ii) BB_A establishes the different domains involved to reach the destination network (DST);

iii) BB_A directly or indirectly passes requests to all Bandwidth Brokers (BB) of the involved domains regarding a VLL of the predefined QoS from ingress to egress of each domain;

iv) each involved bandwidth broker (BB) performs admission control in its domain;

v) each involved bandwidth broker (BB) returns a result of the admission control to BB_A that passes it back to the requesting entity and if the request was admitted along all domains between the source (SRC) and the destination (DST) a VLL of the predefined QoS is granted,

characterized in that step iv) comprises the following step: performing [LSP] Label Switched Path, LSP, setup and passing resource requests from the Bandwidth Broker (BB) to at least one intra-domain (IDB), wherein each intra-domain broker (IDB) is responsible for admission control and the Label Switched Path, LSP, setup.

2. (Original) Method according to claim 1, characterized in that if said domains comprise at least one Differentiated Services, DiffServ, domain, the method comprises the following step to be performed after step v):

vi) BB_A engages in Traffic Conditioners configuration in the ingress router for SRC in order to establish a VLL of the predefined QoS.

3. (Original) Method according to claim 1, characterized in that said domains comprise at least one Differentiated Services, DiffServ, domain and one Multiprotocol Label Switching, MPLS, domain.

4. (Original) Method according to claim 1, characterized in that said predefined QoS is a rate, R.

5. (Original) Method according to claim 1, characterized in that the bandwidth broker (BB) comprises a topology map and routing information to be able to perform path sensitive admission control of incoming requests, wherein the information is retrieved by peering as a link-state router.

6. (Original) Method according to claim 4, characterized in that the bandwidth broker (BB) comprises a data structure which keeps resource usage information over time for each link in the topology which enables ability to plan ahead of time.

7. (Original) Method according to claim 1, characterized in that a bandwidth broker (BB) in a specific domain performs admission control for all links in the path that belong to that domain.

8. (Original) Method according to claim 1, characterized in that a bandwidth broker (BB) comprises a storage, where it stores records of all its granted requests and also user-related data such as policies or accounting information.

Allowable Subject Matter

2. Claims 1-8 are allowed.

For Claims 1-8, the prior art fails to teach a combination of:

i) generate a request from an entity for a Virtual Leased Line, VLL, having a predefined Quality of Service, QoS, from a source network to a destination network and apply the request to a Bandwidth Broker of a domain A, BB_A , associated to the source network;

ii) BB_A establishes the different domains involved to reach the destination network;

v) each involved bandwidth broker returns a result of the admission control to BB_A that passes it back to the requesting entity and if the request was admitted along all domains between the source and the destination a VLL of the predefined QoS is granted,

characterized in that step iv) comprises the following step: performing Label Switched Path, LSP, setup and passing resource requests from the Bandwidth Broker to at least one intra-domain, wherein each intra-domain broker is responsible for admission control and the Label Switched Path, LSP, setup.

Information Disclosure Statement

3. The information disclosure statement filed on October 10, 2002 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

The non-patent literature publication titled "Performance of QoS agents for provisioning network resources" by O Schelen et al. has not been considered because applicant failed to provide a legible copy of the document.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chen et al. (US 6,487,170 B1), Hahne et al. (US 6,538,416 B1), and Sundqvist et al. (US 7,054,938 B2) are cited to show systems pertinent to applicant's invention.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farah Faroul whose telephone number is 571-270-1421. The examiner can normally be reached on Monday - Friday 8 AM - 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dang Ton can be reached on 571-272-3171. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

F. Faroul



DANG T. TON
SUPERVISORY PATENT EXAMINER

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	10/257,248	SVANBERG ET AL.	
	Examiner	Art Unit	
	Farah Faroul	2616	

All Participants:

(1) Farah Faroul.

(2) Benoit Castel.

Date of Interview: 30 October 2006

Type of Interview:
☒ Telephonic
☐ Video Conference
☐ Personal (Copy given to: ☐ Applicant ☐ Applicant's representative)

Exhibit Shown or Demonstrated: ☐ Yes ☒ No
 If Yes, provide a brief description:

Part I.
 Rejection(s) discussed:

Claims discussed:
 1

Prior art documents discussed:

Part II.
 SUBSTANCE OF INTERVIEW DESCRIBING THE GENERAL NATURE OF WHAT WAS DISCUSSED:
Examiner's amendment to Claim 1: change the term "adapted to" to "configured to" and the term "LSP" to "Label Switched Path, LSP"

Part III.
☒ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview directly resulted in the allowance of the application. The examiner will provide a written summary of the substance of the interview in the Notice of Allowability.
☐ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview did not result in resolution of all issues. A brief summary by the examiner appears in Part II above.

DANG T. TON
SUPERVISORY PATENT EXAMINER

Status of Application: _____

(3) _____

(4) _____

Time: 2:30 PM


 (Examiner/SPE Signature)

 (Applicant/Applicant's Representative Signature – if appropriate)

* Abstract provided for the Examiner's convenience

Notice of References Cited	Application/Control No. 10/257,248	Applicant(s)/Patent Under Reexamination SVANBERG ET AL.	
	Examiner Farah Faroul	Art Unit 2616	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,487,170 B1	11-2002	Chen et al.	370/231
*	B	US-7,054,938 B2	05-2006	Sundqvist et al.	709/227
*	C	US-6,538,416 B1	03-2003	Hahne et al.	370/431
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Issue Classification 		Application/Control No. 10257248	Applicant(s)/Patent under Reexamination SVANBERG ET AL.
Examiner Farouk, Farah		Art Unit 2616	

ORIGINAL		INTERNATIONAL CLASSIFICATION			
CLASS	SUBCLASS	CLAIMED		NON-CLAIMED	
370	395.2	H 0	L 4	12 / 28	
		H 0	L 4	12 / 56	

CROSS REFERENCE(S)	
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)
370	351 401

Farah Farouk (Assistant Examiner)	10/30/06 (Date)	DANG T. TON SUPERVISORY PATENT EXAMINER	Total Claims Allowed: 8
 (Legal/Instruments Examiner)	11/6/06 (Date)	Term DANG T. TON (Primary Examiner)	O.G. Print Figure 1 4

U.S. Patent and Trademark Office

Part of Paper No. 20061030

Index of Claims

Application/Control No.

10257248

Applicant(s)/Patent under Reexamination

SVANBERG ET AL.

Examiner

Faroul, Farah

Art Unit

2616

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

☒ Claims renumbered in the same order as presented by applicant☐ CPA☐ T.D.☐ R.1.47

CLAIM

DATE

Final	Original	10/30/2006								
1	1	=								
2	2	=								
3	3	=								
4	4	=								
5	5	=								
6	6	=								
7	7	=								
8	8	=								

Searched 	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10257248	SVANBERG ET AL.
	Examiner Faroul, Farah	Art Unit 2616

Class	SubClass	Date	Examiner
370	395.2	10/30/2006	F.F.
370	395.21	10/30/2006	F.F.
370	395.31	10/30/2006	F.F.
370	395.4	10/30/2006	F.F.
370	351	10/30/2006	F.F.
370	401	10/30/2006	F.F.
370	461	10/30/2006	F.F.
370	462	10/30/2006	F.F.
370	329	10/30/2006	F.F.
370	465	10/30/2006	F.F.
370	466	10/30/2006	F.F.

U.S. Patent and Trademark Office	Part of Paper No.: 20061030
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Search Notes 	Application/Control No. 10257248	Applicant(s)/Patent Under Reexamination SVANBERG ET AL.
	Examiner Faroul, Farah	Art Unit 2616

Notes	Date	Examiner
Consulted with SPE Dang Ton -	10/30/2006	F.F.
Inventor name search	10/30/2006	F.F.
IDS	10/31/2006	F.F.
EAST search	10/30/2006	F.F.
U.S. Patent and Trademark Office		Part of Paper No.: 20061030

Interference Searched 	Application/Control No. 10257248	Applicant(s)/Patent Under Reexamination SVANBERG ET AL.
	Examiner Faroul, Farah	Art Unit 2616

Class	SubClass	Date	Examiner
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Interference search history printout	10/30/2006	F.F.
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U.S. Patent and Trademark Office	Part of Paper No.: 20061030
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Bib Data Sheet

CONFIRMATION NO. 2567

SERIAL NUMBER 10/257,248	FILING OR 371(c) DATE 10/10/2002 RULE	CLASS 370	GROUP ART UNIT 2616	ATTORNEY DOCKET NO. 1505-1015
APPLICANTS Emil Svanberg, Lulea, SWEDEN; Joachim Johansson, Lulea, SWEDEN; Anders Torger, Lulea, SWEDEN; Joakim Norrgard, Lulea, SWEDEN; Anders Larsson, Lulea, SWEDEN;				
** CONTINUING DATA ** <i>yes F.F. 10/30/06</i> This application is a 371 of PCT/EP01/04062 04/06/2001				
** FOREIGN APPLICATIONS ** <i>yes F.F. 10/30/06</i> UNITED STATES OF AMERICA 60197006 04/13/2000				
Foreign Priority claimed ☒ yes ☐ no 35 USC 119 (a-d) conditions ☒ yes ☐ no ☐ Met after met: Allowance Verified and Acknowledged <i>[Signature]</i> F.F.		STATE OR COUNTRY SWEDEN	SHEETS DRAWING 3	TOTAL CLAIMS 8
			INDEPENDENT CLAIMS 1	
ADDRESS 00466				
TITLE Network optimisation method				
FILING FEE RECEIVED 510	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	((virtual adj leased adj line) VLL) AND (admission adj control)).CLM.	US-PGPUB	OR	OFF	2006/10/31 14:58
		((MPLS (multiprotocol adj label adj switching)).CLM.	US-PGPUB	OR	OFF	2006/10/31 14:52
		((MPLS (multiprotocol adj label adj switching)) AND ((virtual adj leased adj line) VLL) AND ((quality adj of adj service) QoS) AND packet AND routing AND ingress AND egress).CLM.	USPAT	OR	OFF	2006/10/31 14:50
L2	1	((MPLS (multiprotocol adj label adj switching)) AND ((virtual adj leased adj line) VLL) AND ((quality adj of adj service) QoS) AND packet AND routing AND ingress AND egress).CLM.	US-PGPUB	OR	OFF	2006/10/31 14:51
L3	1	((MPLS (multiprotocol adj label adj switching)) AND ((virtual adj leased adj line) VLL) AND ((quality adj of adj service) QoS)).CLM.	US-PGPUB	OR	OFF	2006/10/31 14:51
L4	1	((MPLS (multiprotocol adj label adj switching)) AND ((virtual adj leased adj line) VLL)).CLM.	US-PGPUB	OR	OFF	2006/10/31 14:51
L5	480	((MPLS (multiprotocol adj label adj switching))).CLM.	US-PGPUB	OR	OFF	2006/10/31 14:52
L6	5	L5 and (bandwidth adj broker)\	US-PGPUB	OR	OFF	2006/10/31 14:52
L7	5	L5 and (bandwidth adj broker)	US-PGPUB	OR	OFF	2006/10/31 14:57
L8	1	((((virtual adj leased adj line) VLL) AND (admission adj control)).CLM.	US-PGPUB	OR	OFF	2006/10/31 14:58
L9	1	((((virtual adj leased adj line) VLL) AND (admission same control)).CLM.	US-PGPUB	OR	OFF	2006/10/31 14:58
L10	2	((((LSP same setup)(label adj switched adj path same setup)) AND bandwidth). CLM.	US-PGPUB	OR	OFF	2006/10/31 14:59

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	65270	network and (optimis\$5 or optimiz\$5)	USPAT	OR	OFF	2006/10/30 11:40
S2	15	S1 and (bandwidth adj broker)	USPAT	OR	OFF	2006/10/30 11:39
S3	10	S2 and (MPLS pr Diffserv)	USPAT	OR	OFF	2006/10/30 11:55
S4	0	S3 and VLL	US-PGPUB; USPAT	OR	OFF	2006/10/30 11:40
S5	274	(virtual adj leased adj line) or VLL	USPAT	OR	OFF	2006/10/30 11:56
S6	24	S5 and (QoS or (quality adj of adj service))	USPAT	OR	OFF	2006/10/30 11:56
S7	14	S6 and (source same destination)	USPAT	OR	OFF	2006/10/30 11:57
S8	3	S7 and (bandwidth adj broker)	USPAT	OR	OFF	2006/10/30 12:07
S9	1	MPLS and VLL and DiffServ	USPAT	OR	OFF	2006/10/30 12:08
S10	30730	(network same domain\$)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:09
S11	1	S10 and (request same VLL)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:09
S12	78	S10 and (bandwidth adj broker)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:10
S13	268620	S12 ans (source same destination)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:10
S14	37	S12 and (source same destination)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:10

EAST Search History

S15	30	S14 and QoS	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:10
S16	4	S15 and (virtual same leased same line)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 14:19
S17	46	(admission adj control) same (bandwidth adj broker)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:21
S18	1	S17 and (VLL or VPWS)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:20
S19	16	S17 and (egress same ingress)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:21
S20	7	S19 and (result same request)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:50
S21	1	"10506164"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:50

EAST Search History

S22	1	"10/506164"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:52
S23	1	"10/535208"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:53
S24	1	"10/509093"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 12:53
S25	0	"10510108"	USPAT	OR	OFF	2006/10/30 13:13
S26	0	"10/510108"	USPAT	OR	OFF	2006/10/30 13:13
S27	1	"10/510108"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 13:13
S28	8319	(virtual adj leased adj line)or VLL	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 14:20
S29	56	S28 and Qos	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 14:20
S30	48	S28 and MPLS	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 14:20

EAST Search History

S31	33	S29 and S30	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 14:20
S32	16	S31 and DiffServ	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 14:20
S33	5	S32 and (bandwidth adj broker)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/10/30 14:21

Day : Monday
Date: 10/30/2006

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Time: 12:26:10

Inventor Name Search Result

Your Search was:

Last Name = SVANBERG

First Name = EMIL

Application#	Patent#	Status	Date Filed	Title	Inventor Name
09581809	Not Issued	161	09/07/2000	External routing manager	SVANBERG, EMIL
10257248	Not Issued	30	10/10/2002	Network optimisation method	SVANBERG, EMIL
10506164	Not Issued	30	08/31/2004	Method for providing topology awareness information within an ip network	SVANBERG, EMIL
10535208	Not Issued	30	05/17/2005	Arrangements and method for hierarchical resource management in a layered network architecture	SVANBERG, EMIL
60197006	Not Issued	159	04/13/2000	Network resource optimization Method and apparatus	SVANBERG, EMIL
60361306	Not Issued	159	03/04/2002	Communication system	SVANBERG, EMIL
60430098	Not Issued	159	12/02/2002	I-P network	SVANBERG, EMIL

Inventor Search Completed: No Records to Display.

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Day : Monday
Date: 10/30/2006



Time: 12:31:10

Inventor Name Search Result

Your Search was:

Last Name = JOHANSSON

First Name = JOACHIM

Application#	Patent#	Status	Date Filed	Title	Inventor Name
09446120	6731707	150	08/24/2000	ARRANGEMENT FOR SYNCHRONIZATION OF NODES IN VDSL-SYSTEMS	JOHANSSON, JOACHIM
09446357	7023907	150	03/09/2000	VDSL MODEM DIVIDED INTO A DIGITAL AND AN ANALOG PART	JOHANSSON, JOACHIM
09530947	6738440	150	12/27/2000	SUBSCRIBER LINE TRANSMISSION SYSTEMS	JOHANSSON, JOACHIM
09582637	Not Issued	120	10/20/2000	TELECOMMUNICATIONS	JOHANSSON, JOACHIM
09926451	7003579	150	02/01/2002	PROCEDURE AND DEVICE FOR CONTROL OF DATA FILE TRANSMISSION	JOHANSSON, JOACHIM
10257248	Not Issued	30	10/10/2002	Network optimisation method	JOHANSSON, JOACHIM
10509093	Not Issued	30	09/28/2004	Method and system for reserving resources within an ip-network	JOHANSSON, JOACHIM
10510108	Not Issued	30	10/04/2004	Method for creating a map of available resources within an ip network	JOHANSSON, JOACHIM
10533451	Not Issued	30	05/02/2005	Method and arrangement to reserve resources in an ip network	JOHANSSON, JOACHIM
10535208	Not Issued	30	05/17/2005	Arrangements and method for hierarchical resource management in a layered network architecture	JOHANSSON, JOACHIM
60197006	Not Issued	159	04/13/2000	Network resource optimization Method and apparatus	JOHANSSON, JOACHIM
60369564	Not Issued	159	04/04/2002	Method and arrangement in a communication system	JOHANSSON, JOACHIM
60422104	Not Issued	159	10/30/2002	Method and arrangement in an IP network	JOHANSSON, JOACHIM
60430098	Not	159	12/02/2002	I-P network	JOHANSSON,

	Issued				JOACHIM
<u>60434678</u>	Not Issued	159	12/20/2002	IP network	JOHANSSON, JOACHIM
<u>60617083</u>	Not Issued	159	10/12/2004	Resilience solution for access bandwidth managers	JOHANSSON, JOACHIM

Inventor Search Completed: No Records to Display.

	Last Name	First Name	
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Inventor Name Search Result

Your Search was:

Last Name = TORGER

First Name = ANDERS

Application#	Patent#	Status	Date Filed	Title	Inventor Name
10257248	Not Issued	30	10/10/2002	Network optimisation method	TORGER, ANDERS
60197006	Not Issued	159	04/13/2000	Network resource optimization Method and apparatus	TORGER, ANDERS
60677347	Not Issued	159	05/04/2005	Resource offsets for synchronization of reservations	TORGER, ANDERS

Inventor Search Completed: No Records to Display.

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	TORGER	ANDERS	

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Time: 12:31:26

Inventor Name Search Result

Your Search was:

Last Name = NORRGARD

First Name = JOAKIM

Application#	Patent#	Status	Date Filed	Title	Inventor Name
09778004	7054938	150	02/07/2001	METHOD AND APPARATUS FOR NETWORK SERVICE RESERVATIONS OVER WIRELESS ACCESS NETWORKS	NORRGARD, JOAKIM
10250702	Not Issued	30	12/19/2003	Network resource manager in a mobile telecommunication system	NORRGARD, JOAKIM
10257248	Not Issued	30	10/10/2002	Network optimisation method	NORRGARD, JOAKIM
10488613	Not Issued	30	03/04/2004	Method and arrangement in an ip network	NORRGARD, JOAKIM
10506164	Not Issued	30	08/31/2004	Method for providing topology awareness information within an ip network	NORRGARD, JOAKIM
10509093	Not Issued	30	09/28/2004	Method and system for reserving resources within an ip-network	NORRGARD, JOAKIM
10510108	Not Issued	30	10/04/2004	Method for creating a map of available resources within an ip network	NORRGARD, JOAKIM
10533451	Not Issued	30	05/02/2005	Method and arrangement to reserve resources in an ip network	NORRGARD, JOAKIM
10535208	Not Issued	30	05/17/2005	Arrangements and method for hierarchical resource management in a layered network architecture	NORRGARD, JOAKIM
11266352	Not Issued	20	11/04/2005	Method for, and a topology aware resource manager in an IP-telephony system	NORRGARD, JOAKIM
60181547	Not Issued	159	02/10/2000	In advance internet service reservations over wireless access networks	NORRGARD, JOAKIM

60197006	Not Issued	159	04/13/2000	Network resource optimization Method and apparatus	NORRGARD, JOAKIM
60229544	Not Issued	159	09/05/2000	IP telephony resource management method and apparatus	NORRGARD, JOAKIM
60261166	Not Issued	159	01/16/2001	Resource management in IP-based wireless systems	NORRGARD, JOAKIM
60316298	Not Issued	159	09/04/2001	Method and arrangement in an IP network	NORRGARD, JOAKIM
60361306	Not Issued	159	03/04/2002	Communication system	NORRGARD, JOAKIM
60369564	Not Issued	159	04/04/2002	Method and arrangement in a communication system	NORRGARD, JOAKIM
60422104	Not Issued	159	10/30/2002	Method and arrangement in an IP network	NORRGARD, JOAKIM
60430098	Not Issued	159	12/02/2002	I-P network	NORRGARD, JOAKIM
60434678	Not Issued	159	12/20/2002	IP network	NORRGARD, JOAKIM
60617083	Not Issued	159	10/12/2004	Resilience solution for access bandwidth managers	NORRGARD, JOAKIM
60677347	Not Issued	159	05/04/2005	Resource offsets for synchronization of reservations	NORRGARD, JOAKIM

Inventor Search Completed: No Records to Display.

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Inventor Name Search Result

Your Search was:

Last Name = LARSSON

First Name = ANDERS

Application#	Patent#	Status	Date Filed	Title	Inventor Name
<u>06512132</u>	Not Issued	161	06/06/1983	STRANDING MACHINE	LARSSON, ANDERS
<u>07109829</u>	Not Issued	161	10/16/1987	METHOD FOR BINDING IMMUNE COMPLEXES	LARSSON, ANDERS
<u>08066182</u>	<u>5471977</u>	150	05/21/1993	METHOD AND APPARATUS FOR THE CONTROL AND INDEPENDENT MONITORING OF AN EXTREMELY SMALL GAS FLOW	LARSSON, ANDERS
<u>08167877</u>	<u>5776697</u>	250	02/07/1994	CHARACTERIZATION OR DETERMINATION OF THE AMOUNT OF BLOOD CELLS BY MEANS OF POULTRY ANTIBODIES	LARSSON, ANDERS
<u>08279108</u>	Not Issued	166	07/22/1994	GAS MIXTURE AND DEVICE FOR DELIVERING THE GAS MIXTURE TO THE LUNGS OF A RESPIRATORY SUBJECT	LARSSON, ANDERS
<u>08279109</u>	<u>5522381</u>	150	07/22/1994	DEVICE FOR SUPPLYING BREATHING GAS TO THE LUNGS OF A RESPIRATORY SUBJECT	LARSSON, ANDERS
<u>08327990</u>	<u>5540233</u>	150	10/24/1994	METHOD FOR DETERMINING THE FUNCTIONAL RESIDUAL CAPACITY OF LUNGS AND A VENTILATOR FOR PRACTICING SAID METHOD	LARSSON, ANDERS
<u>08570525</u>	<u>5615669</u>	150	12/11/1995	GAS MIXTURE AND DEVICE FOR DELIVERING THE GAS MIXTURE TO THE LUNGS OF A RESPIRATORY SUBJECT	LARSSON, ANDERS
<u>08592953</u>	Not Issued	161	01/29/1996	COLORIMETRIC DEVICE FOR INDICATING CARBON DIOXIDE	LARSSON, ANDERS

<u>08594059</u>	<u>5965061</u>	150	01/30/1996	METHOD OF INCREASING THE SHELF LIFE OF A COLORIMETRIC DEVICE FOR INDICATING CARBON DIOXIDE AND PACKAGE CONTAINING SUCH DEVICE	LARSSON, ANDERS
<u>08771226</u>	<u>5918595</u>	150	12/20/1996	METHOD FOR VAPORIZING AN ANESTHETIC LIQUID AND VAPORIZER OPERATING ACCORDING TO THE METHOD	LARSSON, ANDERS
<u>08954606</u>	<u>6192577</u>	150	10/20/1997	METHOD FOR SHIELDING OF ELECTRONICS	LARSSON, ANDERS
<u>08968881</u>	Not Issued	163	11/05/1997	GAS MIXTURE AND DEVICE FOR DELIVERING THE GAS MIXTURE TO THE LUNGS OF A RESPIRATORY SUBJECT	LARSSON, ANDERS
<u>09068754</u>	<u>6290853</u>	150	02/22/1999	CHROMOTOGRAPHIC METHOD AND DEVICE IN WHICH A CONTINUOUS MACROPOROUS ORGANIC MATRIX IS USED	LARSSON, ANDERS
<u>09125936</u>	<u>6144480</u>	150	03/22/1999	OPTICAL ARRANGEMENT FOR PROCESSING AN OPTICAL WAVE	LARSSON, ANDERS
<u>09319150</u>	<u>6368481</u>	250	08/23/1999	CASSETTE FOR ELECTROPHORESIS SYSTEM	LARSSON, ANDERS
<u>09375848</u>	<u>6667800</u>	150	08/17/1999	METHOD AND DEVICE FOR MEASURING AND QUANTIFYING SURFACE DEFECTS ON A TEST SURFACE	LARSSON, ANDERS
<u>09381361</u>	<u>6537550</u>	150	09/20/1999	USE OF AVIAN ANTIBODIES	LARSSON, ANDERS
<u>09423632</u>	<u>6230877</u>	250	01/19/2000	SAFETY PACKAGING	LARSSON, ANDERS
<u>09581809</u>	Not Issued	161	09/07/2000	External routing manager	LARSSON, ANDERS
<u>09630821</u>	Not Issued	161	08/02/2000	Electronic system with shielded components	LARSSON, ANDERS
<u>09666158</u>	<u>6398572</u>	150	09/19/2000	SIM (SUBSCRIBER IDENTITY MODULE) CARD HOLDER WITH SEPARATE END STOP	LARSSON, ANDERS
<u>09674457</u>	Not Issued	121	01/05/2001	Microfluidic device	LARSSON, ANDERS

09758041	6614816	150	01/11/2001	OPTICAL ELECTROMAGNETIC WAVE GENERATOR	LARSSON, ANDERS
09890382	Not Issued	161	07/30/2001	Method and device for exchange of information	LARSSON, ANDERS
09937533	6967101	150	11/27/2001	SURFACE AND ITS MANUFACTURE AND USES	LARSSON, ANDERS
10030297	7104517	150	12/21/2001	POLYMER VALVES	LARSSON, ANDERS
10069827	Not Issued	120	02/26/2002	Microfluidic surfaces	LARSSON, ANDERS
10182792	Not Issued	41	07/30/2002	Method for covering a microfluidic assembly	LARSSON, ANDERS
10250261	Not Issued	61	06/18/2003	FUEL INJECTION SYSTEM FOR AN INTERNAL COMBUSTION ENGINE	LARSSON, ANDERS
10250702	Not Issued	30	12/19/2003	Network resource manager in a mobile telecommunication system	LARSSON, ANDERS
10257248	Not Issued	30	10/10/2002	Network optimisation method	LARSSON, ANDERS
10382956	Not Issued	161	03/07/2003	Mobile terminals programmed with wireless signaling software from a removable memory module and methods of programming the same	LARSSON, ANDERS
10466524	Not Issued	41	07/17/2003	Method and system for simulation of surgical procedures	LARSSON, ANDERS
10468949	Not Issued	161	11/26/2004	Immunological detection of prostate diseases and prostatesome-related conditions	LARSSON, ANDERS
10478486	6953030	150	05/10/2004	METHOD FOR FUEL INJECTION IN A COMBUSTION ENGINE AND COMBUSTION ENGINE	LARSSON, ANDERS
10496763	7060187	150	05/25/2004	POST-MODIFICATION OF A POROUS SUPPORT	LARSSON, ANDERS
10500677	7074335	150	06/30/2004	METHOD OF PRODUCING HIERARCHICAL POROUS BEADS	LARSSON, ANDERS
10502677	7055491	150	10/01/2004	A PISTON-CYLINDER COMBINATION FOR A COMBUSTION ENGINE	LARSSON, ANDERS
10512301	Not Issued	30	10/21/2004	Manufacture of polysaccharide beads	LARSSON, ANDERS
10517293	Not	30	12/07/2004	Surface-modified base matrices	LARSSON,

	Issued				ANDERS
10531274	Not Issued	30	04/13/2005	Method of producing a movable lens structure for a light shaping unit	LARSSON, ANDERS
10542784	Not Issued	30	01/26/2006	Use of avian antibodies	LARSSON, ANDERS
10545487	Not Issued	30	08/12/2005	Inorganic beads with hierarchical pore structures	LARSSON, ANDERS
10555236	Not Issued	30	11/01/2005	Electrophoretic support	LARSSON, ANDERS
10707273	Not Issued	161	12/02/2003	CENTRIFUGAL PUMP	LARSSON, ANDERS
10709063	Not Issued	66	04/09/2004	FUEL SYSTEM COMBINATION VALVE FOR AN INTERNAL COMBUSTION ENGINE AND SUCH A FUEL SYSTEM	LARSSON, ANDERS
10709983	Not Issued	61	06/10/2004	Fuel supply system for an internal combustion engine	LARSSON, ANDERS
10834350	Not Issued	71	04/28/2004	Microfluidic device	LARSSON, ANDERS
10905165	Not Issued	20	12/20/2004	FUEL INJECTION SYSTEM FOR AN INTERNAL COMBUSTION ENGINE	LARSSON, ANDERS

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Inventor Name Search Result

Your Search was:

Last Name = LARSSON

First Name = ANDERS

Application#	Patent#	Status	Date Filed	Title	Inventor Name
10915290	Not Issued	95	08/09/2004	METHOD OF PRODUCING MACROPOROUS CROSS-LINKED POLYMER PARTICLES	LARSSON, ANDERS
10964269	Not Issued	41	10/13/2004	Method of preparing a chromatography matrix	LARSSON, ANDERS
11017252	Not Issued	30	12/20/2004	Surface and its manufacture and uses	LARSSON, ANDERS
11177085	Not Issued	168	07/08/2005	Method of preparing a separation matrix	LARSSON, ANDERS
11266352	Not Issued	20	11/04/2005	Method for, and a topology aware resource manager in an IP-telephony system	LARSSON, ANDERS
11288436	Not Issued	30	11/29/2005	Scheduling radio resources for symmetric service data connections	LARSSON, ANDERS
11298938	Not Issued	30	12/12/2005	Connection type handover of voice over internet protocol call based low-quality detection	LARSSON, ANDERS
11298939	Not Issued	30	12/12/2005	Connection type handover of voice over internet protocol call based on resource type	LARSSON, ANDERS
11302713	Not Issued	71	12/14/2005	Microfluidic device	LARSSON, ANDERS
11314973	Not Issued	30	12/22/2005	Local switching of calls setup by multimedia core network	LARSSON, ANDERS
11346565	Not Issued	25	02/03/2006	Enhanced VoIP media flow quality by adapting speech encoding based on selected modulation and coding scheme (MCS)	LARSSON, ANDERS
11370171	Not Issued	25	03/08/2006	Authentication of an application layer media flow request for	LARSSON, ANDERS

				radio resources	
<u>11379202</u>	Not Issued	30	04/18/2006	MODE AND POLARIZATION CONTROL IN VCSELS USING SUB-WAVELENGTH STRUCTURE	LARSSON, ANDERS
<u>29147522</u>	D473281	150	08/31/2001	CASING FOR A WATER PURIFIER APPARATUS	LARSSON, ANDERS
<u>29147523</u>	D480187	150	08/31/2001	NOZZLE FOR A VACUUM CLEANER	LARSSON, ANDERS
<u>60115671</u>	Not Issued	159	01/13/1999	MICROFLUIDIC DEVICE	LARSSON, ANDERS
<u>60229544</u>	Not Issued	159	09/05/2000	IP telephony resource management method and apparatus	LARSSON, ANDERS
<u>60251246</u>	Not Issued	159	12/04/2000	Micro laser doppler velocimeter	LARSSON, ANDERS
<u>60261166</u>	Not Issued	159	01/16/2001	Resource management in IP-based wireless systems	LARSSON, ANDERS
<u>60389737</u>	Not Issued	159	06/19/2002	Fuel system for an internal combustion engine	LARSSON, ANDERS
<u>60430057</u>	Not Issued	159	12/02/2002	Centrifugal pump	LARSSON, ANDERS
<u>60558763</u>	Not Issued	159	04/01/2004	Coaxial conductor	LARSSON, ANDERS
<u>60684188</u>	Not Issued	159	05/25/2005	Pairing of uplink and downlink temporary block flow (TBF) in edge VoIP	LARSSON, ANDERS
<u>60684214</u>	Not Issued	159	05/25/2005	GSM VoIP PS-to-CS handover at low-quality detection	LARSSON, ANDERS
<u>60684215</u>	Not Issued	159	05/25/2005	Local switching AGC	LARSSON, ANDERS
<u>60684216</u>	Not Issued	159	05/25/2005	GSM VoIP PS-to-CS handover at allocation to frequency-hopping EDGE TRX	LARSSON, ANDERS
<u>60684232</u>	Not Issued	159	05/25/2005	Method to improve VoIP media flow quality by adapting speech encoder and LQC based on edge MCS	LARSSON, ANDERS
<u>60684233</u>	Not Issued	159	05/25/2005	Authenticated identification of VoIP flow in BSS	LARSSON, ANDERS
<u>60774663</u>	Not Issued	20	02/21/2006	Method to avoid that self-configuring radio base stations create unnecessarily high interference levels on	LARSSON, ANDERS

				surrounding network	
<u>60774666</u>	Not Issued	20	02/21/2006	Method to make sure only the right handsets are allowed on the femto RBS	LARSSON, ANDERS
<u>60774667</u>	Not Issued	20	02/21/2006	Method to solve handover from femto RBS to macro RBS and back again	LARSSON, ANDERS
<u>07333441</u>	<u>4936883</u>	150	04/05/1989	ARRANGEMENT IN A SUCTION CLEANER	LARSSON, ANDERS E. C.
<u>07351077</u>	<u>4940474</u>	250	05/11/1989	SUCTION CLEANER	LARSSON, ANDERS E. C.
<u>07399315</u>	<u>4944065</u>	150	08/28/1989	SUCTION CLEANER	LARSSON, ANDERS E. C.
<u>07460168</u>	<u>4969229</u>	150	01/29/1990	BATTERY-OPERATED SURFACE TREATMENT APPARATUS HAVING A BOOSTER FUNCTION	LARSSON, ANDERS E. C.
<u>07608229</u>	Not Issued	161	11/02/1990	NOZZLE FOR VACUUM CLEANER	LARSSON, ANDERS E. C.
<u>07862722</u>	<u>5257276</u>	150	04/03/1992	STRAINED LAYER INP/INGAAS QUANTUM WELL LASER	LARSSON, ANDERS G.
<u>07190835</u>	<u>4846211</u>	150	05/06/1988	INLET VALVE IN A TWO-TOWER AIR DRIER	LARSSON, ANDERS M.
<u>07420540</u>	<u>4946485</u>	150	10/12/1989	AIR DRIER TOWER	LARSSON, ANDERS M.

Inventor Search Completed: No Records to Display.

Search Another: Inventor

Last Name	First Name
LARSSON	ANDERS

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Best Available Copy

UT20 Rec'd PCT/US 15 JUL 2003 1

IFW

Attorney Docket No. 1505-1015
PATENTS

Pat# 7190698
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of
SVANBERG et al.

Confirmation No. 2567

Serial No. 10/257,248

GROUP 2663

Filed October 10, 2002

Examiner Chau T. NGUYEN

NETWORK OPTIMISATION METHOD

STATUS INQUIRY

Mail Stop PCT
Attn: DO/EO
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TC 2600 CSO
STATUS INQUIRY
RECEIVED

SEP 02 2003

Initials: UB

Sir:

The application was filed on October 10, 2002 and a Notice of Acceptance was mailed on January 31, 2003. Our records indicate that the Oath/Declaration for the above-referenced application was, in fact, not submitted with our initial filing of October 10, 2002. However, the Notice of Acceptance acknowledges receipt to the contrary. Applicants respectfully inquire as to when a Notice of Missing Requirements may be expected in this application, in order to make of record the Applicants' Combined Declaration and Power of Attorney.

Thank you for your attention to this matter.

Respectfully submitted,

YOUNG & THOMPSON

By Benoit Castel
Benoit Castel, #35,041
Attorney for Applicants
745 South 23rd Street, Suite 200
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Telephone: (703) 521-2297

RECEIVED

AUG 29 2003

Technology Center 2800

TC 2600 CSO
STATUS RESPONSE DATE

SEP - 2 2003

Initials: UB
EXD OA: 15
FAX ☐ PHONE ☐ MAILED ☐

sf
15, 2003

Ex.1002



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents, Box 401
 United States Patent and Trademark Office
 Washington, D.C. 20231
 www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
10/257,248	Emil Svanberg	1505-1015

INTERNATIONAL APPLICATION NO.

PCT/EP01/04062

I.A. FILING DATE

04/06/2001

PRIORITY DATE

04/13/2000

00466

YOUNG & THOMPSON
 745 SOUTH 23RD STREET 2ND FLOOR
 ARLINGTON, VA 22202

CONFIRMATION NO. 2567

371 ACCEPTANCE LETTER



OC00000009450863

Date Mailed: 01/31/2003

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.494 OR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as an Elected Office (37 CFR 1.495) , has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

10/10/2002

DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and
 (c)(4) REQUIREMENTS

10/10/2002

DATE OF RECEIPT OF ALL 35 U.S.C.
 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- U.S. Basic National Fee
- Copy of IPE Report
- Copy of references cited in ISR
- Copy of the International Application
- Copy of the International Search Report
- Information Disclosure Statements
- Oath or Déclaration
- Preliminary Amendments

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

PATRICIA A BOOKER
Telephone: (703) 305-3738

PART 3 - OFFICE COPY

FORM PCT/DO/EO/903 (371 Acceptance Notice)



DEP/Ref #4
307

1505-1015

PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Emil SVANBERG et al.

Serial No. 10/257,248
(PCT/EP01/04062)

Filed October 10, 2002

Refund Section
Accounting Division
Office of Finance

Confirmation No. Unknown

NETWORK OPTIMISATION METHOD

REQUEST FOR REFUND

Assistant Commissioner for Patents

Washington, D.C. 20231

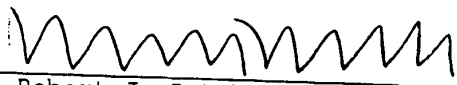
Sir:

Applicant hereby claims small entity status under 37 CFR 1.9 and 37 CFR 1.27 and requests that 1/2 of the original filing fee, namely \$510.00 be credited to Deposit Account No. 25-0120 as this claim is filed within the three-month term.

Respectfully submitted,

YOUNG & THOMPSON

By


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Repln. Ref: 05/09/2003 RWHITE1 0011244800
DAH:250120 Name/Number:10257248
FC: 9204 \$510.00 CR

January 7, 2003

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DT19 Rec'd PCT/PTO 10 OCT 2002

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		Attorney Docket No. 1505-1015
INTERNATIONAL APPLN. NO. PCT/EP01/04062	INTERNATIONAL FILING DATE April 6, 2001	U.S. Application No. 10/257248 PRIORITY DATE CLAIMED April 13, 2000
TITLE OF INVENTION: NETWORK OPTIMISATION METHOD		
APPLICANT(S) FOR DE/EO/US: Emil SVANBERG, Joachim JOHANSSON, Anders TORGER, Joakim NORRGARD, Anders LARSSON		
Applicant herewith submits to the United States Designated Elected Office (DO/EO/US) the following items and other information:		
1. ☒ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. ☐ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below. 4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31). 5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c)(2)) a. ☒ is attached hereto (required only if not communicated by the International Bureau) b. ☐ has been communicated by the International Bureau. See attached PCT/IB/308. c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US). 6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371 (c)(2)) a. ☐ is attached hereto. b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4). 7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) a. ☐ are attached hereto (required only if not communicated by the International Bureau). b. ☐ have been communicated by the International Bureau. c. ☐ have not been made, however, the time limit for making such amendments has NOT expired. d. ☐ have not been made and will not be made. 8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)). 9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).		
Items 11 to 20 below concern document(s) or information included:		
11. ☒ Information Disclosure Statement (IDS) w/PTO-1449 - ☐ Copy of IDS citations 12. ☐ Assignment Papers (cover sheet & document(s)) 13. ☒ A FIRST Preliminary Amendment. 14. ☐ A SECOND or SUBSEQUENT Preliminary Amendment. 15. ☐ A substitute specification. 16. ☐ A change of power of attorney and/or address letter. 17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4). 19. ☐ A second copy of the English language translation of the international application (35 U.S.C. 154(d)(4)). 20. ☒ Other items or information: <u>International Preliminary Examination Report (PCT/IPEA/409), Abstract of the Disclosure, Application Data Sheet</u>		

10257248 . 101002

DTOS Rec'd PCT/PTO 10 OCT 2002

U.S. APPLICATION NO. 107257248		INTERNATIONAL APPLN. NO. PCT/EP01/04062	ATTORNEY DOCKET NO. 1505-1015
21. ☒ The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1)-(5): Neither international preliminary examination fee nor international search fee paid to USPTO and international Search Report not prepared by the EPO or JPO \$1040.00 International preliminary examination fee not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 International preliminary examination fee not paid to USPTO but International search fee paid to USPTO \$740.00 International preliminary examination fee paid to USPTO but all claims did not satisfy provision of PCT Article 33 (1)-(4) \$710.00 International preliminary examination fee paid to USPTO and all claims satisfied provision of PCT Article 33 (1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT			CALCULATIONS PTO USE ONLY
Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20- ☒ 30 months from the earliest claimed priority date (37 CFR 1.492(e))			\$ 130.00
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total Claims	8 - 20 =	0	X \$18.00
Independent Claims	1 - 3 =	0	X \$84.00
MULTIPLE DEPEND CLAIM(S) (if applicable)			+ \$280.00
TOTAL OF ABOVE CALCULATION -			\$1,020.00
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.			-
SUBTOTAL =			\$1,020.00
Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492Z(f)).			\$
TOTAL NATIONAL FEE =			\$1,020.00
Fee for recording the enclosed assigned (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) \$40.00 per property +			
TOTAL FEES ENCLOSED -			\$1,020.00
			Amount to be refunded: \$
			Charged: \$
☒ A Check in the amount of \$1,020.00 to cover all fees is attached.			
☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to Deposit account No. 25-0120 in the name of Young & Thompson, as described below. A duplicate copy of this sheet is enclosed.			
☒ The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fee required under 37 C.F.R. §§ 1.16 or 1.17.			
SEND ALL CORRESPONDENCE TO: 745 South 23rd Street Arlington, VA 22202 Telephone (703) 521-2297 Y&T Customer No. 000466		 00466 PATENT, TRADEMARK OFFICE	SIGNATURE <u>Benoit Castel</u> Benoit Castel NAME 35,041 REGISTRATION NO.
BC/ia Date: October 10, 2002			

10257248 . 101002

10/257248

DT03 Rec'd PCT/PTO 10 OCT 2002

Application Data Sheet

Application Information

Application Type::	Regular
Subject Matter::	Utility
Suggested Classification::	
Suggested Group Art Unit::	
CD-ROM or CD-R?::	None
Number of CD disks::	
Number of Copies of CDs::	
Sequence Submission?::	None
Computer Readable Form (CRF)::	No
Number of copies of CRF::	0
Title::	NETWORK OPTIMISATION METHOD
Attorney Docket Number::	1505-1015
Request for Early Publication?::	No
Request for Non-Publication?::	No
Suggested Drawing Figure::	
Total Drawing Sheets::	3
Small Entity?::	No
Latin Name::	
Variety Denomination Name::	
Petition Included?::	No
Petition Type::	
Licensed US Gov't Agency::	
Contract or Grant Numbers::	
Secrecy Order in Parent Appl.?::	No

10257248 10/257248

DT02 Rec'd PCT/PTO 10 OCT 2002

Applicant Information

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10257248101002
10/257248
DTIC Rec'd PCT/PTO 10 OCT 2002

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10257248 101002

10/257248

CTD Rcd PCT/PTO 10 OCT 2002

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State or Province of Mailing Address::
Country of Mailing Address:: SWEDEN
Postal or Zip Code of Mailing Address:: S-977 15

Correspondence Information

Correspondence Customer Number:: 000466

Representative Information

Representative Customer Number::	000466
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Domestic Priority Information

Application::	Continuity Type::	Parent Application::	Parent Filing Date::
This application	National Stage of	PCT/EP01/04062	4/6/01
which is a	Non-Provisional of	60/197,006	4/13/00

10257248 . 101002

10/257248

10 OCT 2002

Foreign Priority Information

Country::	Application Number::	Filing Date::	Priority Claimed::

Assignment Information

Assignee Name::

Street of Mailing Address::

City of Mailing Address::

State or Province of Mailing Address::

Country of Mailing Address::

Postal or Zip Code of Mailing Address::

10257248 . 101002

10/257248

DTOS Rec'd PCT/PTO 10 OCT 2002
PATENT
1505-1015

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of: Emil SVANBERG et al.

Appl. No.: **NEW NATIONAL PHASE
APPLICATION IN THE
UNITED STATES** Group:

Filed: October 10, 2002 Examiner:

For: NETWORK OPTIMISATION METHOD

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, DC 20231

October 10, 2002

Sir:

Prior to the first Official Action and calculation of the filing fee, the following preliminary amendments and remarks are respectfully submitted in connection with the above-identified application.

IN THE SPECIFICATION:

Page 8

Please replace the paragraph beginning on line 9, with the following rewritten paragraph:

-- Thus, a first object of the present invention is to achieve a method that implements end-to-end services (of the VLL kind) across a set of heterogeneous MPLS domains.--

Please add the following paragraph before the paragraph beginning on line 9:

-- In Schelén O et.al. "Performance of QoS agents for provisioning network resources", Quality of Service, 1999. IWQOS '99. 1999 Seventh international workshop on London UK 31 May-4 June 1999, Piscataway, NJ, USA, IEEE, US, 31 May 1999, pages 17-26, ISBN: 0-7803-5671-3, discloses a method for providing resource reservations for VLLs between network domains. The reservations may be scheduled over time and each reserved path may have a predetermined QoS. A Qos agent (or Bandwidth Broker) performs admission control in its domain. However, this paper does not disclose a method for performing the resource reservations in a network having heterogeneous MPLS domains.--

IN THE CLAIMS:

Please substitute claims 1-11 as originally filed, which appear on pages 16-17, with claims 1-8 as filed in the Article 34 amendment of June 19, 2002. The pages containing claims 1-8 are marked "AMENDED SHEET" and are attached hereto.

Docket No. 1505-1015

REMARKS

The substitution of claims 1-8 has been done to merely place this national phase application in the same condition as it was during Chapter II of the International Phase.

Entry of the above amendments is earnestly solicited. An early and favorable first action on the merits is earnestly requested.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON



Benoit Castel, Reg. No. 35,041

745 South 23rd Street
Arlington, VA 22202
Telephone (703) 521-2297

BC/ia
Attachments

22-06-2002

10257248 . 101002

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EP0104062

DT03 Rec'd PGT/PTO 10 OCT 2002

16

Claims

1. Method in a packet based communication network including network domains, wherein at least one domain is a MultiProtocol Label Switching MPLS domain, to establish a virtual leased line, VLL, between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source (SRC) and the destination (DST), wherein a bandwidth broker (BB) is associated to each network domain and the bandwidth broker (BB) is adapted to control a hierarchical routing domain, the method comprises the following steps:
- i) generate a request from an entity for a Virtual Leased Line, VLL, having a predefined Quality of Service, QoS, from a source network (SRC) to a destination network (DST) and apply the request to a Bandwidth Broker (BB) of a domain A, BB_A, associated to the source network;
- ii) BB_A establishes the different domains involved to reach the destination network (DST);
- iii) BB_A directly or indirectly passes requests to all Bandwidth Brokers (BB) of the involved domains regarding a VLL of the predefined QoS from ingress to egress of each domain;
- iv) each involved bandwidth broker (BB) performs admission control in its domain;
- v) each involved bandwidth broker (BB) returns a result of the admission control to BB_A that passes it back to the requesting entity and if the request was admitted along all domains between the source (SRC) and the destination (DST) a VLL of the predefined QoS is granted,
- characterized in that step iv) comprises the following step:
performing LSP setup and passing resource requests from the Bandwidth Broker (BB) to at least one intra-domain broker (IDB), wherein each intra-domain

broker (IDB) is responsible for admission control and the Label Switched Path, LSP, setup.

- 5 2. Method according to claim 1, characterized in that if said domains
comprise at least one Differentiated Services, DiffServ, domain, the method
comprises the following step to be performed after step v):
vi) BB_A engages in Traffic Conditioners configuration in the ingress router for
SRC in order to establish a VLL of the predefined QoS.
- 10
3. Method according to claim 1, characterized in that said domains
comprise at least one Differentiated Services, DiffServ, domain and one
Multiprotocol Label Switching, MPLS, domain.
- 15
4. Method according to claim 1, characterized in that said
predefined QoS is a rate, R.
5. Method according to claim 1, characterized in that the bandwidth
20 broker (BB) comprises a topology map and routing information to be able to
perform path sensitive admission control of incoming requests, wherein the
information is retrieved by peering as a link-state router.
6. Method according to claim 4, characterized in that the bandwidth
25 broker (BB) comprises a data-structure which keeps resource usage information
over time for each link in the topology which enables ability to plan ahead of
time.
7. Method according to claim 1, characterized in that a bandwidth
30 broker (BB) in a specific domain performs admission control for all links in the
path that belong to that domain.
8. Method according to claim 1, characterized in that a bandwidth

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broker (BB) comprises a storage, where it stores records of all its granted requests and also user-related data such as policies or accounting information.

AMENDED SHEET

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PCT/EP01/04062

1

DT03 Rec'd PCT/PTO 10 OCT 2002

TitleNetwork optimisation method.Field of the invention

- 5 The present invention relates to a method in a packet based communication network including network domains to establish a virtual leased line (VLL) between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source and the destination

10 Background of the invention

Within the Internet community there are several initiatives towards improving different aspects of the Internet. Some of the major issues are: (1) extending the service model, (2) routing and forwarding efficiency and scalability, and (3) operations and management.

- 15 All of these are important to the continued growth and success of the Internet. The present application is related to a combination of two emerging technologies, MultiProtocol Label Switching (MPLS) and Bandwidth Brokers (BB), which have great potential in the context of all three mentioned issues. The main focus of the present invention is on the implementation of a bandwidth guaranteed
- 20 service called Virtual Leased Line, or VLL.

The following section briefly describes the two technologies MPLS and BB. MPLS is undergoing standardisation in the Internet Engineering Task Force (IETF) while there is currently no formal effort to standardise Bandwidth Brokers.

25

The MPLS working group of the IETF was started in response to the label-switching trend among router vendors back in 1997. At the time, there existed several proprietary implementations and the need for standardisation was identified.

- 30 MPLS is a method that integrates the label-switching forwarding paradigm with network layer routing. In MPLS, connection-oriented switching is provided based on IP routing and control protocols.

In short, MPLS operates as follows:

- Associate labels with specific streams of forward equivalence classes (FECs).
- 35

- Distribute the labels and their FEC bindings across the network, the MPLS domain, to establish a Label Switched Path (LSP).
- Assign packets one or more labels (a stack of labels) when entering the domain.
- 5 • Forward packets through the domain based upon the labels.

Core components of MPLS are semantics of labels, forwarding methods and label distribution methods.

- 10 The explicit routing feature of multiprotocol label switching (MPLS) was introduced to address the shortcomings associated with current IP routing schemes, which are hampered by the requirement to forward packets based only on destination addresses along shortest paths computed using mostly static and traffic characteristic independent link metrics. While this shortest path routing
- 15 is sufficient to achieve connectivity, it does not always make good use of available network resources and is not satisfactory from a traffic-engineering point of view. A prime problem is that some links on the shortest path between certain ingress-egress pairs may get congested while links on possible alternate paths remain free. Even in the best effort model, this means that available
- 20 network resources are not being used well, resulting in higher delays, and there is a potential for providing better quality of service (QoS) with the same network infrastructure.

- In MPLS networks, when bandwidth-guaranteed label-switched paths (LSPs) are set up, shortest path routing with fixed link metrics can cause LSP set-up
- 25 requests to be rejected, even though these requests may have been admissible using a different routing scheme. Therefore, routing schemes that can make better use of network infrastructure are needed. This better use of network infrastructure while maintaining QoS guarantees is the primary objective of traffic engineering. MPLS networks' ability to control the path from ingress node
- 30 to egress node to optimise utilisation of network resources and enhance performance is regarded as a primary justification for the use of MPLS.

In MPLS packets are encapsulated, at ingress points, with labels that are then used to forward the packets along LSPs. Service providers can use bandwidth-

guaranteed LSPs as components of an IP virtual private network (VPN) service with the bandwidth guarantees used to satisfy customer service level agreements (SLAs). These LSPs can be thought of as virtual traffic trunks that carry flow aggregates generated by classifying the packets arriving at the edge or ingress routers of an MPLS network into forwarding equivalence classes (FECs).
5 Classification into FECs is done using packet filters that examine header fields such as source address, destination address, and type-of-service bits. The filter rules determining the FECs can be established in a variety of ways such as downloading from a policy or route server, or interaction with routing protocols.
10 The purpose of classifying packets into FECs is to enable the service provider to traffic engineer the network and route each FEC in a specified manner. This is done by mapping arriving packets belonging to an FEC to one of the LSPs associated with the FEC. Before mapping packets onto an LSP, the LSP is set up, along an explicit route if specified, using a signalling protocol permitting
15 resource reservation such as Resource Reservation Setup Protocol (RSVP).

The cost-efficiency of IP networks is partly achieved through the connection-less traffic model resulting in efficient sharing of resources. However, this model does not allow for quality guarantees, without additional functionality for service
20 differentiation in network devices. In recent years such functionality has become common, and static Quality of Service (QoS) configurations with it. By introducing a Bandwidth Broker (BB) into the network QoS policy management can be handled in a more flexible way.

25 A bandwidth broker is an entity in a network domain that manages policies for bandwidth resources. By maintaining a database of the domain's resources it provides admission control decisions on QoS service requests. It is also responsible for configuring the network to meet the granted policies. It may be able to communicate with bandwidth brokers in neighbouring domains, allowing
30 QoS services spanning several domains.

In WO-00/30295 is described a method for providing admission control and network Quality of Service (QoS).

In the background section of the WO-application drawbacks with prior art techniques are discussed focusing inter alia on the scalability concerns leading

to the development of the Differentiated Services (DiffServ) architecture. DiffServ allows distinct levels of network service to be provided to different traffic.

However, rather than storing per-flow state information on each intermediate node in the network between the sender and the receiver(s), routers within a

5 DiffServ network handle packets on different traffic flows by applying different per-hop behaviours (PHBs) based upon the setting of bits in the TOS field of each packet's IP header. In this manner, many traffic flows may be aggregated into one of a small number of predefined PHBs, thereby allowing a reduction in the amount of processing and storage associated with packet classification and
10 forwarding. While solving the scalability issues, DiffServ fails to provide adequate guidance with regard to implementation of an admission control policy.

One approach for performing admission control suggested by the DiffServ framework involves using a centralised bandwidth broker. The centralised bandwidth broker has control over the entire domain and centrally handles

15 bandwidth allocation requests. The following example briefly describes the work performed by a bandwidth broker.

A sender wishing to establish a particular level of service for a data flow between it and a receiver transmits an indication of its requirements to a centralised bandwidth broker. The centralised bandwidth broker validates the request
20 against policies, compares the request against the current allocation of bandwidth for accepted traffic, and configures the edge devices with information needed to mark and shape (or police) incoming packets for the flow.

Subsequently, as packets that are part of the established data flow traverse the DiffServ network cloud, intermediate core devices apply a PHB that corresponds
25 to the DiffServ service level indicated in the packet header.

In WO-00/30295 the object is to achieve a network that handles the shortcomings of using a centralised broker, e.g. that a useful centralised broker may be very complex and has limited capability to handle bandwidth requests for multicast sessions.

30 Below is described the current state of the art in using MPLS alone and a combination of Bandwidth Brokers and MPLS. The main focus of this section is on extending the service model (i.e., implementing QoS).

The MPLS standards cover mechanisms and protocols that provide the basic tools for MPLS networking. Given the current standards and available equipment, many MPLS networks are manually routed. In such a network the main advantages of using MPLS are fast fail over-routing and a clear separation of inter- and intra-domain routing. These properties of MPLS do not really qualify as QoS-enablers, but are good examples of how MPLS is used. Another common application of MPLS is for VPN set-up by administrative tools (for example Orchestream). In these applications the main advantage is that the shared network is partitioned into private VPNs using the MPLS LSPs.

There is a system known as Routing and Traffic Engineering Server (RATES) which is described as an MPLS traffic-engineering server. The system is described by Aukia, Kodialam, Koppol, Lakshman, Sarin and Suter in: "*RATES: A server for MPLS Traffic Engineering*", IEEE Network Magazine, May 2000.

Referred to as [RATES] below. The model under which RATES operates is that service requests are passed to an engine that evaluates them and possibly implements the service in the network. A service request is defined by source and destination addresses (or prefixes) and a bandwidth constraint. [RATES] defines a routing algorithm, which tries to find a path that can accommodate the requests. This is in contrast to other systems, which merely use the routes available from layer three routing (normally shortest paths).

A current state of the art Bandwidth Broker (BB_{OLOV}) system is described in Olov Schelén, *Quality of Service Agents in the Internet*, Doctoral Thesis, Department of Computer Science and Electrical Engineering, Division of Computer Communication, Luleå University of Technology, Luleå, 1998. Referred to as [OLOV] below.

BB_{OLOV} has many similarities to RATES. The BB_{OLOV} is described in the context of DiffServ networks while RATES operates in MPLS. Apart from that basic difference, these two systems operate under the same model; receive service requests, evaluate them and possibly implement the service. This is schematically illustrated in figure 1. The major difference between these two systems is the underlying networking technology.

An important property of both RATES and BB_{OLov} is the implementation of path sensitive admission control. Both systems make sure that all links on a path have enough forwarding resources to keep up with the service request. Path sensitive admission control (by a centralised entity) requires detailed knowledge of the network topology, or rather, the routing topology. Both RATES and BB_{OLov} use the straightforward method of peering as a link state-router, which provides a dynamic and detailed view of the routing topology.

Routers in a link state-domain continuously synchronise topology information with each other. All routers have all information needed to build a complete view of the domain topology. Changes in one part of the network are flooded across the entire domain, making sure that all routers have information that is up to date. Peering as a link state-router simply means that a host takes part in the information exchange to receive all information dynamically. This can be done passively, which means the host does not advertise any information of its own.

Each RATES instance is limited to one flat link state-domain (e.g. an Open Shortest Path First (OSPF) area), while BB_{OLov} is assumed to control an entire routing domain, which may utilise hierarchical routing. In the case of hierarchical routing, BB_{OLov} relies on routing probes, which act as routing peers within flat link state-domains to collect routing information.

Using systems like these, which use the MPLS and BB concepts in combination, it is possible to achieve dynamic QoS service set-up and tear-down in either DiffServ or MPLS networks.

The state of the art in MPLS and the combination of MPLS traffic-engineering servers and bandwidth brokers have some shortcomings, which is briefly discussed in the following.

An overall object of the present invention is focused on the implementation of a VLL service with bandwidth guarantees, which requires path sensitive admission control. For the service to be as useful as possible it is important that service control is dynamic and managed automatically. The service issues focused on are:

- End to end-services.
- Resource planning over time.

The end-to-end issue is of great importance when service requests span multiple
 5 network provider domains and possibly a mix of DiffServ and MPLS networks. A
 service that is only available within one provider domain is unlikely to be
 successful in a world where global services of all kinds are increasingly
 important.

- 10 Planning resources over time is an important issue if bandwidth guaranteed
 services on otherwise shared networks are to become a credible alternative to
 more rigid solutions such as leased lines or circuit switched networks. Business
 users will certainly require the ability to plan ahead when it comes to QoS. A
 business whose mission critical applications fail due to unavailability of network
 15 QoS is very likely to abandon the failing provider.

- During the development of the Bandwidth Broker model the initial focus were
 end-to-end services. A Bandwidth Broker is responsible for the bandwidth
 resources within its domain and can trade bandwidth with brokers in
 20 neighbouring domains. These ideas are not tightly coupled to the way admission
 control is performed. However, to implement services like the bandwidth
 guaranteed VLL, a very specific admission control method is required.
 The above-mentioned state of the art MPLS traffic engineering server, RATES,
 covers only one link state-area which is in fact only a small part of a provider
 25 domain. This means that several RATES systems are needed to cover a single
 domain.

- The Bandwidth Broker BB_{OLQV} in the Olov Schelen thesis identified above defines
 a method, which enables planning of a VLL service over time. Admission control,
 30 which is at the core of implementing the service, is performed with time as an
 input parameter.

The [RATES] system does not consider time at all. Admission control for service
 requests is done at the time the request is made. The inability to plan over time

requires a compromise in network utilisation versus customer values. For example, if a customer relies on the availability of bandwidth resources for a business event a week ahead from now, he needs to make the request as soon as possible to make sure that his request will be admitted. Awaiting the event, the customer will be paying for a service that he has no use for. For MPLS networks, there is currently no known solution to this problem.

Thus, a first object of the present invention is to achieve a method that implements end-to-end services (of the VLL kind) across a set of heterogeneous DiffServ or MPLS domains.

A second object of the present invention is to achieve a method implementing a resource planning of a VLL service over time.

Summary of the invention

The above-mentioned objects are achieved by a method according to the independent claim.

Preferred embodiments are set forth in the dependent claims.

The present invention relates to a method using an inventive combination of the ideas in [OLOV] and [RATES] that provides a solution to both of the problems related to the first and second objects stated above.

There are lots of efforts in the area of QoS for both DiffServ and MPLS networks. Most of which deal with mechanisms or algorithms at the forwarding plane. To achieve well-defined, manageable services components like admission control are required. This invention makes use of a concept of admission control to achieve services across domain borders.

The key merits of the invention are:

- Deployment. Network operators all over the world are using different solutions for their networks. For any type of global service, support for heterogeneous networking technologies is very important. This invention

makes it possible to deploy bandwidth guaranteed end-to-end VLL services across the two of the most commonly used QoS models.

- Network utilisation. The use of admission control in advance allows network resources to be more efficiently utilised [OLOV]. This invention makes previously unknown use of this powerful tool in MPLS networks.

Short description of the appended drawings

Figure 1 is schematic illustration of a service model in DiffServ or MPLS.

- 10 Figure 2 shows functional blocks that schematically illustrate the present invention.

Figure 3 shows the overall architecture according to the present invention.

Figure 4 provides an example scenario where a VLL spanning two domains is setup using the method according to the present invention.

- 15 Figure 5 shows a flowchart describing how a bandwidth broker according to the present invention handles requests.

Figure 6 shows functional blocks of a bandwidth broker according to the present invention.

20 Detailed description of preferred embodiments of the invention

Figure 2 shows functional blocks that schematically illustrate the present invention.

Note that the routing part of [RATES] is excluded and that the method according to the present invention relies entirely on existing routing and does not itself

- 25 actively compute routes.

By referring to figure 2 the functionality of the present invention is schematically described below:

- Request management. This interface handles all incoming requests. Requests are made either by clients to the system (within the system's domain) or peering systems in other domains. This functionality of this interface can be either that of [RATES] or [OLOV] or both.

- Admission control. This block is implemented e.g. as described in [OLOV] to achieve path sensitivity and the ability to plan ahead of time. The same functionality is used for MPLS and DiffServ. The key components of this block are:
 - 5 o Topology information, which is used to compute paths for the requests (path sensitivity).
 - o A data-structure which keeps resource usage information over time for each link in the topology (ability to plan ahead of time).
- Service implementation. This is where functionality is mixed from [RATES] and [OLOV] to achieve services across heterogeneous domains. For MPLS networks the LSP set-up mechanism used in [RATES] is used. This includes setting up FEC-associations in MPLS edge-devices and to distribute labels for LSP-set-up in the MPLS core-devices. For DiffServ networks all that is required is configuration of so-called Traffic Conditioners (TC) that are arranged in the routers. Traffic conditioning may involve any of the functions classifying, metering, marking, shaping and dropping packets. DiffServ edge devices typically perform traffic conditioning to associate the correct PHB with traffic streams (classifying and marking) and make sure that the stream
10 complies with its traffic profile (metering, shaping and dropping).
15 It should be noted that there are many logical similarities between how the edge-devices in the MPLS and the TCs in the DiffServ handle the service implementation.
20 The overall architecture according to the present invention is shown in figure 3. Note in particular that the BB in the MPLS domain is responsible for inter-domain signaling and how it controls a set of Intra-Domain Brokers (IDBs) within its own domain. Within the MPLS domain the central BB is responsible for passing resource requests to the intra-domain brokers. Each intra-domain
25 broker is responsible for admission control and LSP setup in an OSPF area (or
30 other equivalent flat link state-domains).

Figure 4 provides an example scenario where a VLL spanning two domains, A and B, is setup. Domain A comprises an ingress router 2 and an egress router 4. The egress router 4 of domain A is connected to, or is equivalent to an ingress router 6 of domain B. Domain B also comprises an egress router 8. This example shows how the end-to-end problem is solved. Step by step, the following happens:

1. A request for a VLL of rate R from network SRC to network DST is passed to the BB of domain A and may be done in numerous ways. Some examples are human interaction with a request system, function invocation across a service request API from a management system, and application signaling and COPS/RSVP proxy in the ingress router. Generation of a request for a Virtual Leased Line (VLL) of rate (or bandwidth) R from a source network (SRC) to a destination network (DST) and then apply the request to a Bandwidth Broker of domain A (BB_A).
2. BB_A passes a request to a Bandwidth Broker in domain B (BB_B) regarding a VLL of rate R from the domain ingress in B to DST, provided that BB_A is aware of that DST is reached via domain B. There are numerous possible ways to treat this type of inter-domain request. For sake of this example, we say that the request passed to the BB in domain B is for a VLL of rate R, from the domain ingress in B to DST.
3. Simultaneously BB_A performs path sensitive admission control according to layer 3 routing from the SRC ingress router to the domain B egress router. This is achieved by looking up the path through domain A and evaluating the resource availability on each link in the path.
4. Upon receiving the request from domain A, the BB in domain B does the following:
 - a. Given the ingress from domain A and the destination DST, the BB finds out that the first hop area for the request is area 1 and passes a request to that intra-domain broker, which performs admission control (and possibly LSP setup) for its area.
 - b. Passing a request to one or many involved intra-domain brokers (IDB) in domain B, wherein each intra-domain broker performs admission control (and possibly LSP setup) in its area.

- c. Given the answers from both the involved intra-domain brokers, a response is passed back to the BB in domain B.
5. The BB in domain A receives the response from domain B and passes it back to the requesting party. If the request was admitted along all pieces of the path, the BB engages in Traffic Conditioners (TC) configuration in the ingress router for SRC.
6. Given that all steps were successful, there is now a VLL of rate R from SRC to DST, which is:
- Policed at the ingress for SRC,
 - routed normally through domain A,
 - policed again at the ingress for domain A into domain B,
 - Classified as a FEC at the ingress in domain B
 - Label switched through domain B until it reaches the destination DST.
- The second object of the present invention, related to the resource planning over time, is achieved by a second preferred embodiment of the invention. According to this embodiment the same steps as above are performed with the difference that no configuration action is taken until the start time for the request (the configuration in step 5 is performed at the start time for the request). Admission control for the request is made at the time of the request, and if the request is granted configuration of traffic conditioners and LSP set up are scheduled to take place at the start time of the request.

In the example illustrated with references to figure 4 only two BB were involved. In a more generalised implementation a much higher number is involved. As indicated above a BB is arranged to communicate with BBs in neighbouring domains, allowing QoS spanning several domains. Generally a BB communicates with BBs one domain hop away only (i.e. with neighbours). This is related to the way inter-domain routing is done in the Internet. For each destination outside a BBs own domain, it knows the next domain hop on the path just as border routers know the next domain hop for each destination.

Addressing information for neighbouring BBs is obtained either by configuration or some auto-discovery mechanism.

A bandwidth broker BB that performs path-sensitive admission control handles requests as described in the flowchart in figure 5. The steps in case of success are described below:

- Optionally make sure that the request is within the user policy (note that a user may be anything from a human to a neighbouring BB). This may fail if, for example, the request is for a rate that is higher than allowed by the user policy.
- Compute the path for the request. This may fail if the request contains source or destination addresses that lie outside the BBs range of known addresses.
- Admission control for all links in the path that belong to this BBs domain. This is done with respect taken to the time parameters, if any, specified in the service request. This step may fail due to lack of resources along any of the links in the path.
- If this request involves other domains, do inter-domain admission control. There are a number of options for this step:
 - If aggregation is used, neighbouring BBs may reserve trunks between their domains and allow reservations within those trunks, which means there will be no per-request inter-domain interaction. In such a case, if the current trunk is large enough to fit the current request, it can be granted immediately. If not, on the other hand, the request may be queued awaiting resources in the trunk or may even be denied, both of which events can serve as input to the process of re-evaluating the inter-domain trunk.
 - If no aggregation is used, an inter-domain request will be passed to the neighbouring BB.
- When the admission control step(s) have been taken it is time to implement the service. This step may, for example, fail due to temporary problems in networking equipment
- Respond to the requesting party that the request was granted or denied.

If one of the first three steps fails, the request will be denied immediately. If service implementation or inter-domain admission control fails, the admission roll-back step must be taken to free resources in the BBs own domain.

5 Figure 6 shows functional blocks of a bandwidth broker according to the present invention. In short the blocks are described as follows:

- Request management. A BB handles requests originating from a variety of sources ranging from humans to neighbouring BBs.
- 10 • Persistent storage. A BB with the ability to do admission control over time must have persistent storage, where it stores records of all its granted requests and also user-related data such as policies or accounting information.
- Topology map. A BB that performs path sensitive admission control must have correct topology and routing information to be able to lookup the
15 paths of incoming requests. Peering as a link-state router primarily retrieves this information. It may also be retrieved via configuration or some other mechanism.
- Resource map. To be able to do admission control for the VLL service, resource information must be coupled to the topology into a resource
20 map. This information may be collected automatically by probing the network or it may be statically configured.
- Service implementation. A BB must be able to implement granted services. According to the present invention, this is done either by configuring traffic conditioners in edge-devices in DiffServ domains or by LSP-setup in
25 MPLS domains.
- Inter-domain negotiator. Whenever a service spans more than one domain, a BB must be able to contact the BB in the neighbouring domain. This function may be implemented with or without request aggregation.

30 In general Bandwidth Brokers may deal with two different kinds of policies. The most basic type of policy, which all BBs manage, is what is often called QoS policy. This kind of policy is within this application referred to as a service. The policy to transport certain data with a certain QoS is in fact a service. The other kind of policy that a BB optionally manages is user policies. This type of policy

controls what services users are allowed to use, and possibly how much and at what times etc.

According to a preferred embodiment of the invention the QoS parameter is the rate R. Naturally, a person skilled in the art is aware of numerous alternative
5 QoS parameters.

The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used. Therefore, the above embodiments should not be taken as limiting the scope of
10 the invention, which is defined by the appending claims.

Claims

1. Method in a packet based communication network including network domains to establish a virtual leased line (VLL) between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source and the destination, wherein a bandwidth broker (BB) is associated to each network domain, the method comprises the following steps:

i) generate a request from an entity for a Virtual Leased Line (VLL) having a predefined Quality of Service (QoS) from a source network (SRC) to a destination network (DST) and apply the request to a Bandwidth Broker of a domain A (BB_A) associated to the source network;

ii) BB_A establishes the different domains involved to reach the destination network (DST);

iii) BB_A directly or indirectly passes requests to all Bandwidth Brokers of the involved domains regarding a VLL of the predefined QoS from ingress to egress of each domain;

iv) each involved bandwidth broker performs admission control in its domain;

v) each involved bandwidth broker returns a result of the admission control to BB_A that passes it back to the requesting entity and if the request was admitted along all domains between SRC and DST a VLL of the predefined QoS is granted.

2. Method according to claim 1, characterized in that the method comprises the following step to be performed after step v):

vi) BB_A engages in Traffic Conditioners (TC) configuration in the ingress router for SRC in order to establish a VLL of the predefined QoS.

3. Method according to claim 1, characterized in that step iv) comprises the following sub-step: passing a request to one or many involved intra-domain brokers (IDB) in hop areas in the involved domains, wherein each

intra-domain broker performs admission control.

4. Method according to claim 1, characterized in that in step iv) in addition to the admission control a Label-Switched Path (LSP) setup is performed.

5. Method according to claim 1, characterized in that said domains comprise at least one Differentiated Services (DiffServ) domain and one Multiprotocol Label Switching (MPLS) domain.

6. Method according to claim 5, characterized in that in a MPLS domain the BB is responsible for passing resource requests to the intra-domain brokers (IDB), wherein each intra-domain broker is responsible for admission control and LSP setup.

7. Method according to claim 1, characterized in that said predefined QoS is a rate R.

8. Method according to claim 1, characterized in that the bandwidth broker comprises a topology map and routing information to be able to perform path sensitive admission control of incoming requests, wherein the information is retrieved by peering as a link-state router.

9. Method according to claim 8, characterized in that the bandwidth broker comprises a data-structure which keeps resource usage information over time for each link in the topology which enables ability to plan ahead of time.

10. Method according to claim 1, characterized in that a bandwidth broker in a specific domain performs admission control for all links in the path that belong to that domain.

11. Method according to claim 1, characterized in that a bandwidth broker comprises a storage, where it stores records of all its granted requests and also user-related data such as policies or accounting information.

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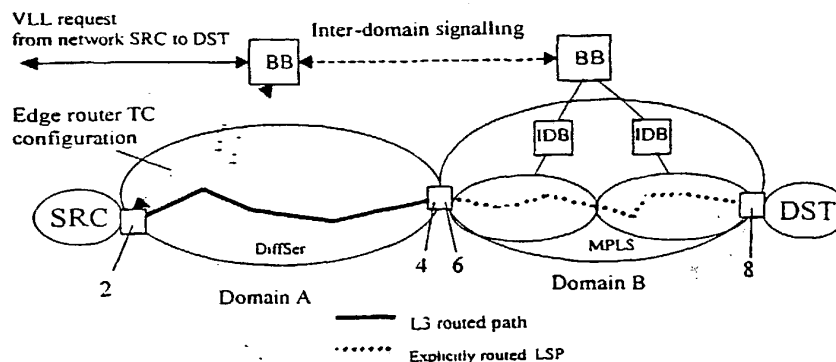
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: NETWORK OPTIMISATION METHOD



(57) **Abstract:** Method in a packet based communication network including network domains to establish a virtual leased line (VLL) between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source and the destination, wherein a bandwidth broker (BB) is associated to each network domain.

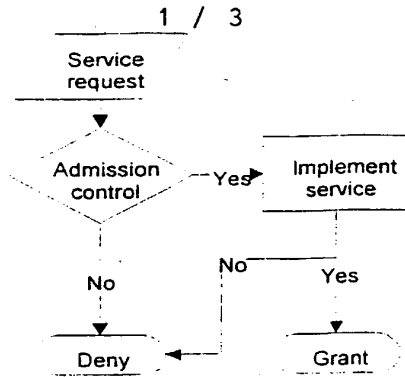


Fig. 1

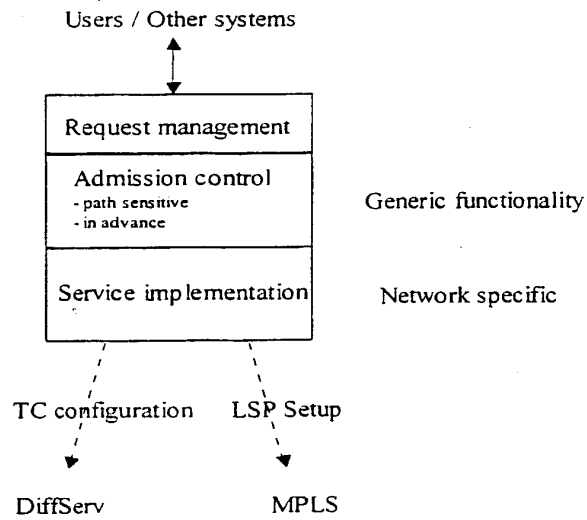


Fig. 2

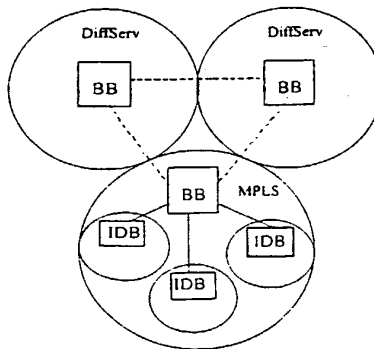


Fig. 3

2 / 3

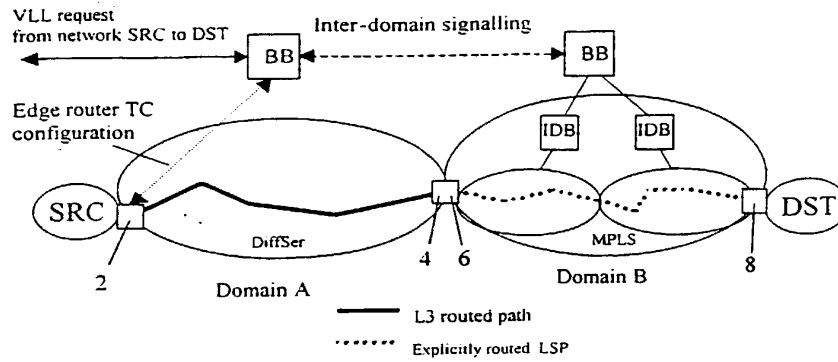


Fig. 4

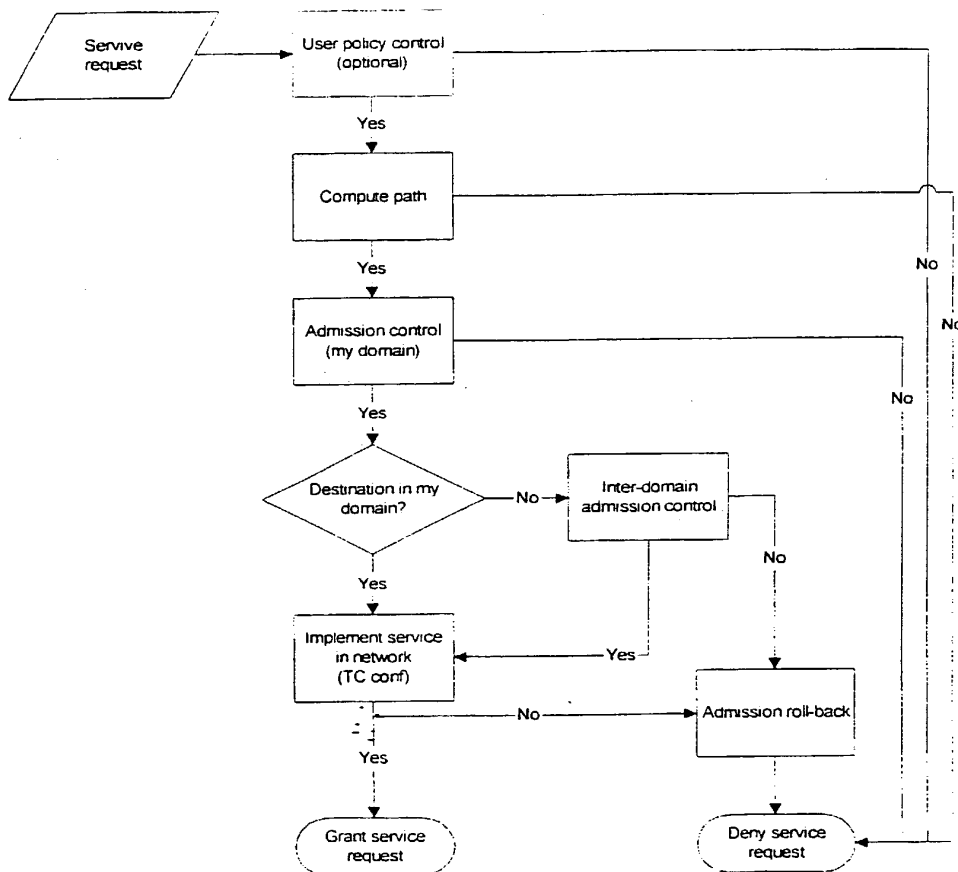


Fig. 5

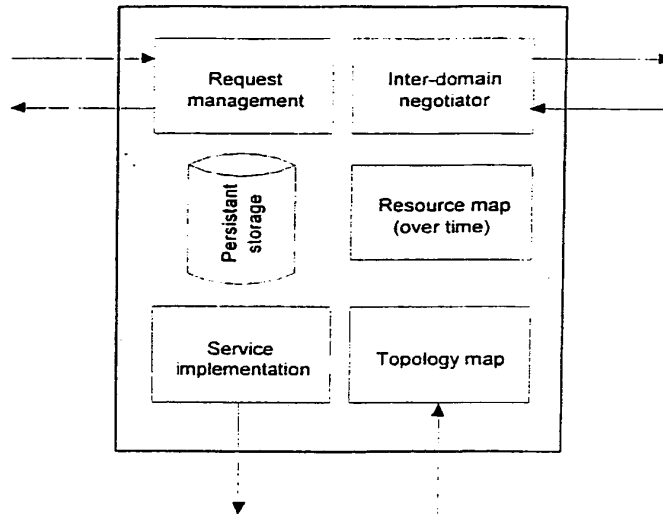


Fig. 6

Sheet No. 5.....

Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)
The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

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I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/EP 01/04062..... (if furnishing declaration pursuant to Rule 26ter).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications: US 60/197006 of 13 April 2000.....

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

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Date: 9 April 2001
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☒ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Sheet No.

Continuation of Box No. VIII (i) to (v) DECLARATION

If the space is insufficient in any of Boxes Nos. VIII (i) to (v) to furnish all the information, including in the case where more than two inventors are to be named in Box No. VIII (iv), in such case, write "Continuation of Box No. VIII ..." (indicate the item number of the Box) and furnish the information in the same manner as required for the purposes of the Box in which the space was insufficient. If additional space is needed in respect of two or more declarations, a separate continuation box must be used for each such declaration. If this Box is not used, this sheet should not be included in the request.

Continuation of Box VIII (iv)

**Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv))
for the purposes of the designation of the United States of America:**

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/EP01/04062 (if furnishing declaration pursuant to Rule 26ter).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications: US 60/197006 of 13 April 2000

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name: TORGER, Anders

Residence: Luleå, Sweden

(city and either US state, if applicable, or country)

Mailing Address: Regnvägen 59:47
SE-976 32 LULEÅ, Sweden

Citizenship: Swedish

Inventor's Signature: [Signature]
(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date: 9 April 2001
(of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

Name: NORRGÅRD, Joakim

Residence: Luleå, Sweden

(city and either US state, if applicable, or country)

Mailing Address: Porsögården 24
SE-977 54 LULEÅ, Sweden

Citizenship: Swedish

Inventor's Signature: [Signature]
(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date: 9 April 2001
(of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Sheet No. 7

Continuation of Box No. VIII (i) to (v) DECLARATION

If the space is insufficient in any of Boxes Nos. VIII (i) to (v) to furnish all the information, including in the case where more than two inventors are to be named in Box No. VIII (iv), in such case, write "Continuation of Box No. VIII ..." (indicate the item number of the Box) and furnish the information in the same manner as required for the purposes of the Box in which the space was insufficient. If additional space is needed in respect of two or more declarations, a separate continuation box must be used for each such declaration. If this Box is not used, this sheet should not be included in the request.

Continuation of Box VIII (iv)

**Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv))
for the purposes of the designation of the United States of America:**

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/EP 01/04062 (if furnishing declaration pursuant to Rule 26ter).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications: US 60/197006 of 13 April 2000

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name: LARSSON Anders

Residence: Luleå, Sweden
(city and either US state, if applicable, or country)

Mailing Address: Professorsvägen 68A Sex
SE-977 51 LULEÅ, Sweden

Citizenship: Swedish

Inventor's Signature: [Signature] Date: 9 April 2001
(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent) (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

Name:

Residence:
(city and either US state, if applicable, or country)

Mailing Address:

Citizenship:

Inventor's Signature: Date:
(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent) (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)



Commissioner for Patents
Washington, DC 20231
www.uspto.gov



Bib Data Sheet

CONFIRMATION NO. 2567

SERIAL NUMBER 10/257,248	FILING DATE 10/10/2002 RULE	CLASS 370	GROUP ART UNIT 2661	ATTORNEY DOCKET NO. 1505-1015
APPLICANTS Emil Svanberg, Lulea, SWEDEN; Joachim Johansson, Lulea, SWEDEN; Anders Torger, Lulea, SWEDEN; Joakim Norrgard, Lulea, SWEDEN; Anders Larsson, Lulea, SWEDEN;				
** CONTINUING DATA ***** This application is a 371 of PCT/EP01/04062 04/06/2001				
** FOREIGN APPLICATIONS ***** UNITED STATES OF AMERICA 60197006 04/13/2000				
Foreign Priority claimed ☐ yes ☐ no 35 USC 119 (a-d) conditions ☐ yes ☐ no ☐ Met after Allowance Verified and Acknowledged _____ Examiner's Signature _____ Initials _____		STATE OR COUNTRY SWEDEN	SHEETS DRAWING 3	TOTAL CLAIMS 8
			INDEPENDENT CLAIMS 1	
ADDRESS 00466				
TITLE Network optimisation method				
FILING FEE RECEIVED 1020	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	

PATENT APPLICATION SERIAL NO. 10/257248

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

Adjustment date: 05/09/2003 RWHITE1
10/16/2002 GFREY1 00000110 10257248
01 FC:1613 -890.00 OP
02 FC:1617 -130.00 OP

05/09/2003 RWHITE1 00000006 10257248

01 FC:2613 445.00 OP
02 FC:2617 65.00 OP

~~10/16/2002 GFREY1 00000110 10257248~~

~~01 FC:1613 -890.00 OP~~
~~02 FC:1617 -130.00 OP~~

Repln. Ref: 05/09/2003 RWHITE1 0011244800
DAH:250120 Name/Number:10257248
FC: 9204 \$510.00 CR

PTO-1556
(5/87)

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number

10/257248

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS		
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	8 minus 20 = *	
INDEPENDENT CLAIMS	1 minus 3 = *	
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐ OR

OTHER THAN SMALL ENTITY

RATE	FEE		RATE	FEE
BASIC FEE	370.00	OR	BASIC FEE	890 ~~740.00~~
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL		OR	TOTAL	890

CLAIMS AS AMENDED - PART II

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* Minus **	=
	Independent	* Minus ***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐		

SMALL ENTITY OR

OTHER THAN SMALL ENTITY

RATE	ADDI-TIONAL FEE		RATE	ADDI-TIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* Minus **	=
	Independent	* Minus ***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐		

RATE	ADDI-TIONAL FEE		RATE	ADDI-TIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* Minus **	=
	Independent	* Minus ***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐		

RATE	ADDI-TIONAL FEE		RATE	ADDI-TIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number entered in the appropriate fee schedule.

BEST AVAILABLE COPY

Ex.1002

Pat Booker
(703) 305-3738

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET (FOR USE WITH FORM PTO-876)							SERIAL NO. 10/257248		FILING DATE	
							APPLICANT(S)			
CLAIMS										
	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT					
	IND.	DEP.	IND.	DEP.	IND.	DEP.				IND.
1	/		/							
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49										
50										
TOTAL IND.	1		1							
TOTAL DEP.	10		7							
TOTAL CLAIMS	11		8							
PTO-1380 (3-78)							U.S. DEPARTMENT OF COMMERCE Patent and Trademark Office			

Best Available Copy

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: Emil SVANBERG et al.
Appl. No.: **NEW NATIONAL PHASE** Group:
Filed: October 10, 2002 Examiner:
For: NETWORK OPTIMISATION METHOD

INFORMATION DISCLOSURE STATEMENT
(SUBMISSION CONCURRENT WITH THE
FILING OF A NEW PATENT APPLICATION)

Assistant Commissioner for Patents
Washington, DC 20231

October 10, 2002

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, and in fulfillment of the duty of disclosure under 37 C.F.R. § 1.56, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on PTO-1449, attached hereto.

II. COPIES

- ☐ Submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.
- ☒ This application is a National Phase of a PCT application. Some or all of the documents listed on the PTO-1449 are not enclosed because they were cited in the International Search Report and copies should have been forwarded from the International Search Authority pursuant to the trilateral agreement between the USPTO, EPO and JPO. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

- a. ☐ **DOCUMENTS IN THE ENGLISH LANGUAGE**

The attached patents, publications, or other information in the English language do not require a statement of relevancy.

10/257248

Docket No. 1505-1015

IDS Rec'd PCT/PTO 10 OCT 2002

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☒ **FOREIGN SEARCH REPORT OR ACTION**

An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(A)(3).

d. ☐ **OTHER**

The following additional information is provided for the Examiner's consideration.

FEES

This Information Disclosure Statement is being filed concurrently with the filing of a new patent application; therefore, no fee is required.

If The Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned.

Respectfully submitted,

YOUNG & THOMPSON

Benoit Castel

Benoit Castel, Reg. No. 35,041

745 South 23rd Street
Arlington, VA 22202
Telephone (703) 521-2297

BC/ia

Enclosures: ☒ Form PTO-1449(s)
☐ Documents
☒ Foreign Search Report
☐ Other: _____

(Use several sheets if necessary)

Application No.:
NEW NATIONAL PHASE

Filing Date:
October 10, 2002

Group Art Unit:

[illegible][illegible]

	O SCHELEN et al. "Performance of QoS agents for provisioning network resources" QUALITY OF SERVICE, 1999. IWQOS '99. 1999 SEVENTH INTERNATIONAL WORKSHOP ON LONDON, UK 31 MAY-4 JUNE 1999, PISCATAWAY, NJ, USA, IEEE, US, 31 May 1999, pp 17-26

DATE CONSIDERED

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.

Y&T September 26, 2002

Booke

DO/EO WORKSHEET

U.S. Appl. No. 10/257248

International Appl. No. EP01/04062

Application filed by : ☐ 20 months ☐ 30 months

WIPO PUBLICATION INFORMATION :

Publication No.: WO 01/80485

Publication Language : ☒ English ☐ Japanese
☐ German ☐ French ☐ Other

Publication Date: 25 Oct 01

Not Published : ☐ U.S. only designated ☐ EP request

Screening Done by VB

INTERNATIONAL APPLICATION PAPERS IN THE APPLICATION FILE :

- | | |
|---|--|
| ☒ International Application (RECORD COPY) | ☐ International Appl. on Double Sided Paper (COPIES M.) |
| ☐ Article 19 Amendments | ☐ Request form PCT/RO/101 |
| ☒ PCT/IB/331 | ☒ PCT/ISA/210 - Search Report |
| ☒ PCT/IPEA/409 IPER (PCT/IPEA/416 on front) | ☒ Search Report References |
| ☐ Annexes to 409 | ☒ Other : <u>data sheet</u> |
| ☐ Priority Document (s) No. _____ | |

RECEIPTS FROM THE APPLICANT (other than checked above) :

- | | |
|--|---|
| ☒ Basic National Fee (or authorization to charge) | ☒ Preliminary Amendment(s) Filed on :
1. _____ 2. _____ 3. _____ |
| ☒ Description <u>8/1</u> | ☒ Information Disclosure Statement(s) Filed on :
1. _____ 2. _____ 3. _____ |
| ☒ Claims | ☐ Assignment Document |
| ☐ Words in the Drawing Figure(s) | ☐ Power of Attorney/ Change of Address |
| ☐ Article 19 Amendments
☐ english transl. of annexes NOT present
☐ entered ☐ not entered :
☐ not a page for page substitution
☐ other : _____ | ☐ Substitute Specification Filed on :
1. _____ 2. _____ |
| ☒ Annexes to 409
☐ english transl. of annexes NOT present
☐ entered ☒ not entered :
☐ not a page for page substitution
☐ other : _____ | ☐ Verified Small Status Statement (executed) |
| | ☒ Oath/ Declaration (executed)
☐ surcharge was paid at the time of filing |
| | ☐ DNA Diskette |
| | ☐ Other : 1. _____ 2. _____ |

NOTES : ☐ I.A. used as Specification ☐ Other :

35 U.S.C. 371 - Receipt of Request (PTO-1390)	<u>3 print</u>
Date Acceptable Oath/ Declaration Received	
Date of Completion of requirements under 35 U.S.C. 371	
102(e) Date	
Date of Completion of DO/ EO 906 - Notification of Missing 102(e) Requirements	
Date of Completion of DO/ EO 907 - Notification of Acceptance for 102(e) Date	
Date of Completion of DO/ EO 911 - Application Accepted Under 35 U.S.C. 111	
Date of Completion of DO/ EO 905 - Notification of Missing Requirements	
Date of Completion of DO/ EO 916 - Notification of Defective Response	
Date of Completion of DO/ EO 903 - Notification of Acceptance	
Date of Completion of DO/ EO 909 - Notification of Abandonment	

PATENT COOPERATION TREATY

PCT

NOTIFICATION CONCERNING
DOCUMENT TRANSMITTED

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as designated Office

Date of mailing (day/month/year)
25 October 2001 (25.10.01)

International application No.
PCT/EP01/04062

International filing date (day/month/year)
06 April 2001 (06.04.01)

Applicant

OPERAX AB et al

The International Bureau transmits herewith the following documents and number thereof:

_____ copy(ies) of declaration(s) (Rule 47.1(a-ter))

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

M. OUCHOUKHI

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 14 December 2001 (14.12.01)	
International application No. PCT/EP01/04062	Applicant's or agent's file reference P05101PC00
International filing date (day/month/year) 06 April 2001 (06.04.01)	Priority date (day/month/year) 13 April 2000 (13.04.00)
Applicant SVANBERG, Emil et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 05 October 2001 (05.10.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38
--	---

Not entered

PATENT COOPERATION TREATY

PCT

REC'D 08 AUG 2002

WIPO

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P05101PC00		FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP01/04062	International filing date (day/month/year) 06/04/2001	Priority date (day/month/year) 13/04/2000	
International Patent Classification (IPC) or national classification and IPC H04L12/00			
Applicant OPERAX AB			
1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 5 sheets, including this cover sheet. ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of 5 sheets.			
3. This report contains indications relating to the following items: - I ☒ Basis of the report - II ☐ Priority - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability - IV ☐ Lack of unity of invention - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement - VI ☐ Certain documents cited - VII ☐ Certain defects in the international application - VIII ☐ Certain observations on the international application			
Date of submission of the demand 05/10/2001		Date of completion of this report 06.08.2002	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Bertini, S Telephone No. +49 89 2399 8985 	

Form PCT/IPEA/409 (cover sheet) (January 1994)

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP01/04062

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-7,9-15	as originally filed			
8,8a	as received on	22/06/2002	with letter of	19/06/2002

Claims, No.:

1-8	as received on	22/06/2002	with letter of	19/06/2002
-----	----------------	------------	----------------	------------

Drawings, No.:

1-6	as originally filed			
-----	---------------------	--	--	--

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP01/04062

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-8
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-8
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-8
	No:	Claims	

2. Citations and explanations
see separate sheet

**V. REASONED STATEMENT UNDER RULE 66.2(A)(II) WITH REGARD TO NOVELTY, INVENTIVE
STEP AND INDUSTRIAL APPLICABILITY**

1. The following documents are cited:

D1: SCHELEN O ET AL: 'Performance of QoS agents for provisioning network resources' QUALITY OF SERVICE, 1999. IWQOS '99. 1999 SEVENTH INTERNATIONAL WORKSHOP ON LONDON, UK 31 MAY-4 JUNE 1999, PISCATAWAY, NJ, USA, IEEE, US, 31 May 1999 (1999-05-31), pages 17-26, XP010335401 ISBN: 0-7803-5671-3

D2: US-A-5 953 338 (MA PATRICK S ET AL) 14 September 1999 (1999-09-14)

2. It is considered that method claim 1 relates to new and inventive subject-matter (Articles 33 (2) and (3) PCT), since the prior art does not disclose or suggest the specifically claimed method in a packet based communication network including network domains according to claim 1.

Document D1 (cited in the International Search Report) discloses a method in a packet based network for implementing end-to-end service of a pre-determined QoS. In document D1 there is no disclosure or hint that the method with bandwidth broker, BB, is used in combination with the MultiProtocol Label Switching MPLS protocol.

Document D2 concerns an ATM (Asynchronous Transfer Mode) network, which utilizes an entirely different transmission technology than IP (Internet Protocol) networks. The VPNs that are discussed in D2 relies on the ATM-protocol and not the IP. Therefore, D2 is not within the field of IP packets routing.

The present claim 1, amended during the PCT procedure, is now directed to a method in a network including at least one MPLS domain and wherein the BB is adapted to control a hierarchical routing domain, wherein Label Switch Path LSP setup is performed and resource requests are passed from the Bandwidth Broker, BB, to at least one Intra-Domain Broker, IDB. By using the method according to the amended claim 1, it is possible to perform inter-domain reservations over several heterogeneous MPLS domains. All these features are not disclosed or

hinted in document D1. Furthermore, document D1 does not mention Label Switched Paths LSP at all or introduction of IDB.

Advantageously, the present invention provides a method which implements end-to-end services across a set of heterogeneous DiffServ or MPLS domains, implementing a resource planning of a VLL service over time.

The characterising features of the invention are neither anticipated by documents D1-D2 cited above nor are rendered obvious by taking into account the disclosure of the other documents mentioned in the description of the present application.

3. Dependent claims 2 to 8 contain further details of the method of claim 1. As they are dependent on claim 1, they also satisfy the requirements for novelty and inventive step (Articles 33 (2) and (3) PCT).
4. The abbreviation LSP in claim 1, characterizing part, is not introduced in the claim; the inclusion of the term "Label Switching Path LSP" instead of "LSP" only should be performed when entering the national phase (Article 6 PCT).

requires a compromise in network utilisation versus customer values. For example, if a customer relies on the availability of bandwidth resources for a business event a week ahead from now, he needs to make the request as soon as possible to make sure that his request will be admitted. Awaiting the event, the customer will be paying for a service that he has no use for.

5 For MPLS networks, there is currently no known solution to this problem.

(*) → Page 8a

Thus, a first object of the present invention is to achieve a method that implements end-to-end services (of the VLL kind) across a set of heterogeneous

10 ~~DiffServ or~~ MPLS domains.

A second object of the present invention is to achieve a method implementing a resource planning of a VLL service over time.

15 Summary of the invention

The above-mentioned objects are achieved by a method according to the independent claim.

Preferred embodiments are set forth in the dependent claims.

20 The present invention relates to a method using an inventive combination of the ideas in [OLOV] and [RATES] that provides a solution to both of the problems related to the first and second objects stated above.

25 There are lots of efforts in the area of QoS for both DiffServ and MPLS networks. Most of which deal with mechanisms or algorithms at the forwarding plane. To achieve well-defined, manageable services components like admission control are required. This invention makes use of a concept of admission control to achieve services across domain borders.

30 The key merits of the invention are:

- Deployment. Network operators all over the world are using different solutions for their networks. For any type of global service, support for heterogeneous networking technologies is very important. This invention

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(*)

- In Schelén O et. al. "Performance of QoS agents for provisioning network resources", Quality of Service, 1999. IWQOS '99. 1999 Seventh international workshop on
- 5 London UK 31 May- 4 June 1999, Piscataway, NJ, USA, IEEE, US, 31 May 1999, pages 17-26, ISBN: 0-7803-5671-3, discloses a method for providing resource reservations for VLLs between network domains. The reservations may be scheduled over time and each reserved path may have a predetermined QoS. A QoS agent (or Bandwidth Broker) performs admission control in its domain. However,
- 10 this paper does not disclose a method for performing the resource reservations in a network having heterogeneous MPLS domains.

AMENDED SHEET

Claims

1. Method in a packet based communication network including network domains, wherein at least one domain is a MultiProtocol Label Switching MPLS domain, to establish a virtual leased line, VLL, between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source (SRC) and the destination (DST), wherein a bandwidth broker (BB) is associated to each network domain and the bandwidth broker (BB) is adapted to control a hierarchical routing domain, the method comprises the following steps:
- i) generate a request from an entity for a Virtual Leased Line, VLL, having a predefined Quality of Service, QoS, from a source network (SRC) to a destination network (DST) and apply the request to a Bandwidth Broker (BB) of a domain A, BB_A, associated to the source network;
- ii) BB_A establishes the different domains involved to reach the destination network (DST);
- iii) BB_A directly or indirectly passes requests to all Bandwidth Brokers (BB) of the involved domains regarding a VLL of the predefined QoS from ingress to egress of each domain;
- iv) each involved bandwidth broker (BB) performs admission control in its domain;
- v) each involved bandwidth broker (BB) returns a result of the admission control to BB_A that passes it back to the requesting entity and if the request was admitted along all domains between the source (SRC) and the destination (DST) a VLL of the predefined QoS is granted,
- characterized in that step iv) comprises the following step:
performing LSP setup and passing resource requests from the Bandwidth Broker (BB) to at least one intra-domain broker (IDB), wherein each intra-domain

broker (IDB) is responsible for admission control and the Label Switched Path, LSP, setup.

- 5 2. Method according to claim 1, characterized in that if said domains
comprise at least one Differentiated Services, DiffServ, domain, the method
comprises the following step to be performed after step v):
vi) BB_A engages in Traffic Conditioners configuration in the ingress router for
SRC in order to establish a VLL of the predefined QoS.
- 10
3. Method according to claim 1, characterized in that said domains
comprise at least one Differentiated Services, DiffServ, domain and one
Multiprotocol Label Switching, MPLS, domain.
- 15
4. Method according to claim 1, characterized in that said
predefined QoS is a rate, R.
5. Method according to claim 1, characterized in that the bandwidth
20 broker (BB) comprises a topology map and routing information to be able to
perform path sensitive admission control of incoming requests, wherein the
information is retrieved by peering as a link-state router.
6. Method according to claim 4, characterized in that the bandwidth
25 broker (BB) comprises a data-structure which keeps resource usage information
over time for each link in the topology which enables ability to plan ahead of
time.
7. Method according to claim 1, characterized in that a bandwidth
30 broker (BB) in a specific domain performs admission control for all links in the
path that belong to that domain.
8. Method according to claim 1, characterized in that a bandwidth

broker (BB) comprises a storage, where it stores records of all its granted requests and also user-related data such as policies or accounting information.

AMENDED SHEET

1 / 3

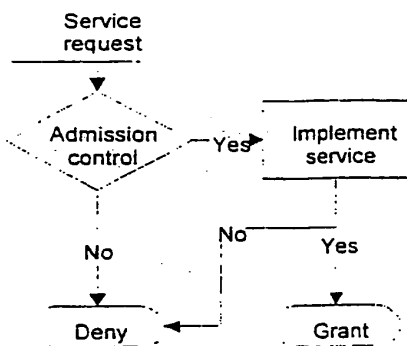


Fig. 1

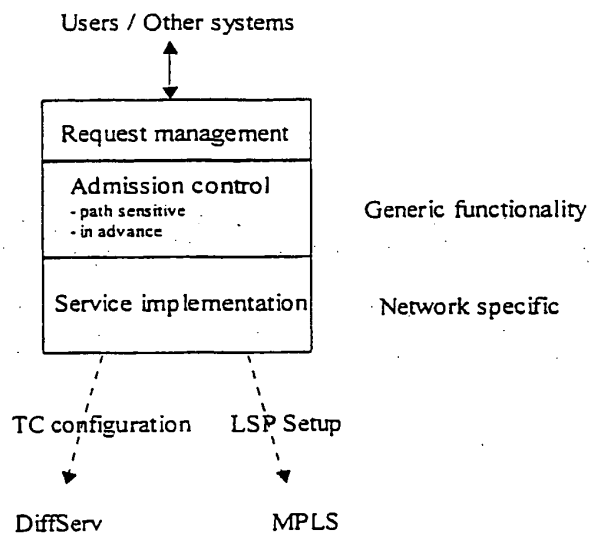


Fig. 2

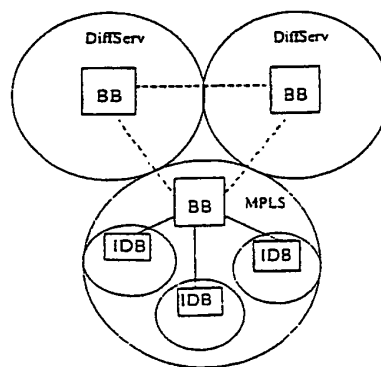


Fig. 3

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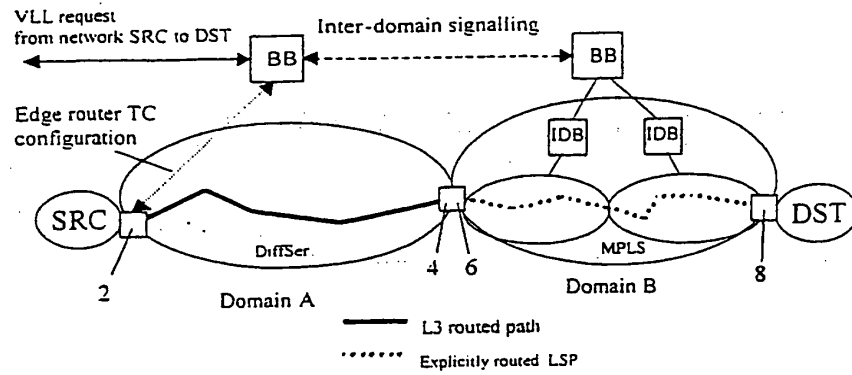


Fig. 4

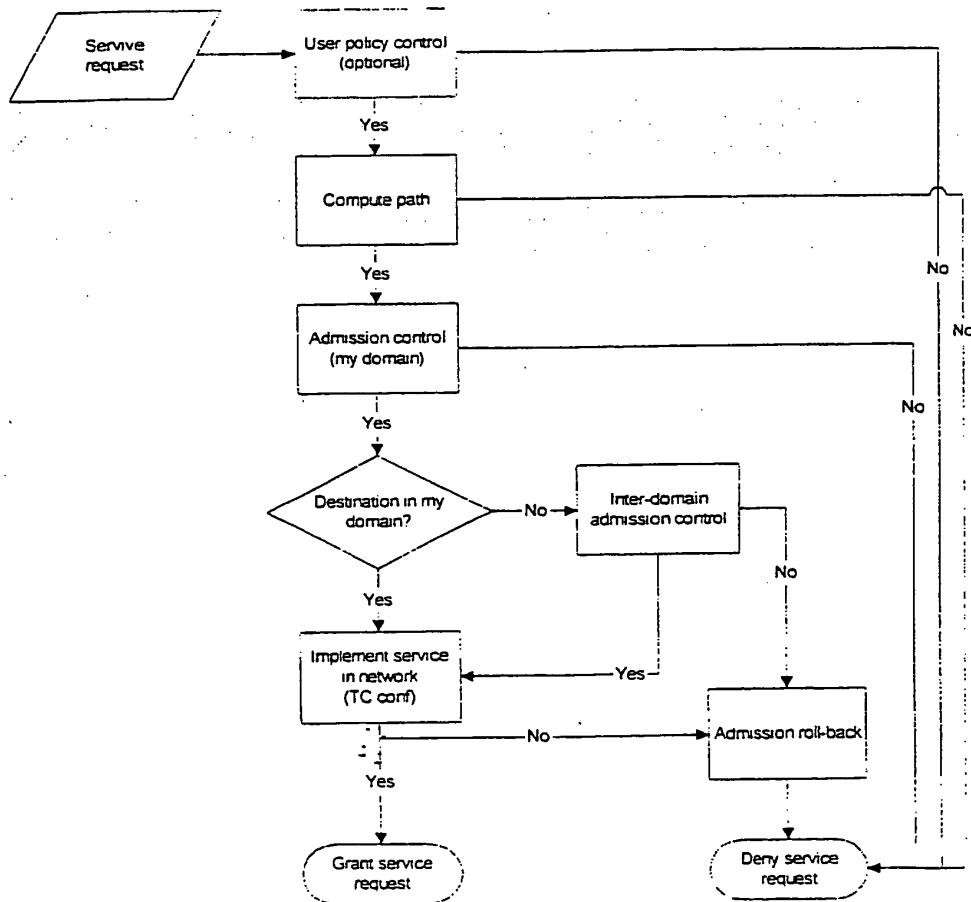


Fig. 5

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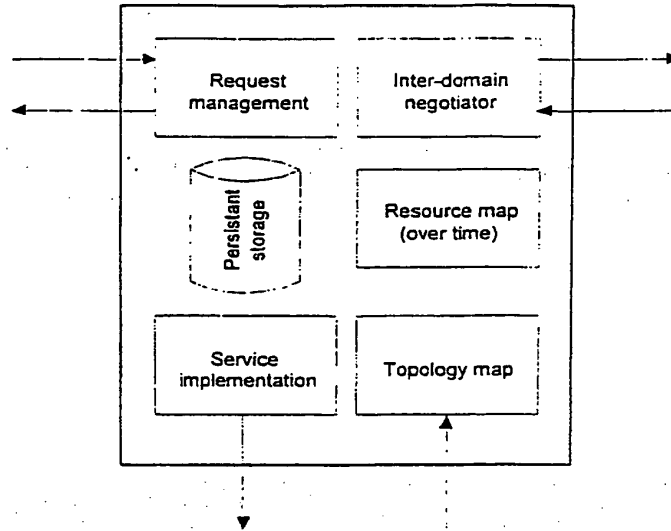


Fig. 6

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Declaration under Rule 4.17:

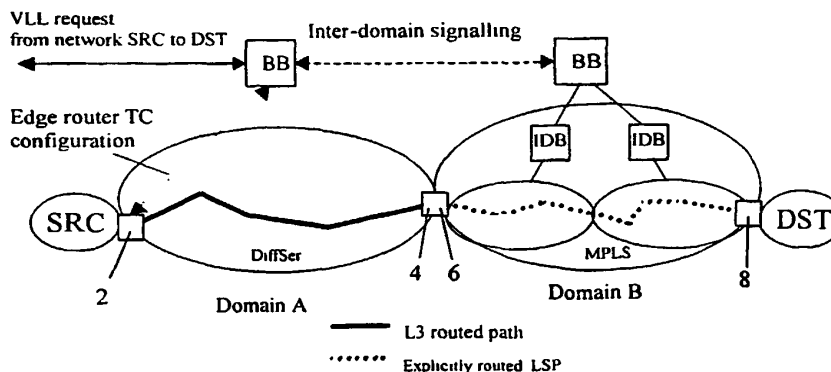
— of inventorship (Rule 4.17(iv)) for US only

Published:

— without international search report and to be republished upon receipt of that report

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: NETWORK OPTIMISATION METHOD



(57) Abstract: Method in a packet based communication network including network domains to establish a virtual leased line (VLL) between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source and the destination, wherein a bandwidth broker (BB) is associated to each network domain.

WO 01/80485 A2

Title

Network optimisation method.

Field of the invention

- 5 The present invention relates to a method in a packet based communication network including network domains to establish a virtual leased line (VLL) between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source and the destination

10 Background of the invention

Within the Internet community there are several initiatives towards improving different aspects of the Internet. Some of the major issues are: (1) extending the service model, (2) routing and forwarding efficiency and scalability, and (3) operations and management.

- 15 All of these are important to the continued growth and success of the Internet. The present application is related to a combination of two emerging technologies, MultiProtocol Label Switching (MPLS) and Bandwidth Brokers (BB), which have great potential in the context of all three mentioned issues. The main focus of the present invention is on the implementation of a bandwidth guaranteed
20 service called Virtual Leased Line, or VLL.

The following section briefly describes the two technologies MPLS and BB. MPLS is undergoing standardisation in the Internet Engineering Task Force (IETF) while there is currently no formal effort to standardise Bandwidth Brokers.

25

The MPLS working group of the IETF was started in response to the label-switching trend among router vendors back in 1997. At the time, there existed several proprietary implementations and the need for standardisation was identified.

- 30 MPLS is a method that integrates the label-switching forwarding paradigm with network layer routing. In MPLS, connection-oriented switching is provided based on IP routing and control protocols.

In short, MPLS operates as follows:

- Associate labels with specific streams of forward equivalence classes (FECs).
- 35

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- Distribute the labels and their FEC bindings across the network, the MPLS domain, to establish a Label Switched Path (LSP).
- Assign packets one or more labels (a stack of labels) when entering the domain.
- 5 • Forward packets through the domain based upon the labels.

Core components of MPLS are semantics of labels, forwarding methods and label distribution methods.

- 10 The explicit routing feature of multiprotocol label switching (MPLS) was introduced to address the shortcomings associated with current IP routing schemes, which are hampered by the requirement to forward packets based only on destination addresses along shortest paths computed using mostly static and traffic characteristic independent link metrics. While this shortest path routing
- 15 is sufficient to achieve connectivity, it does not always make good use of available network resources and is not satisfactory from a traffic-engineering point of view. A prime problem is that some links on the shortest path between certain ingress-egress pairs may get congested while links on possible alternate paths remain free. Even in the best effort model, this means that available
- 20 network resources are not being used well, resulting in higher delays, and there is a potential for providing better quality of service (QoS) with the same network infrastructure.

- In MPLS networks, when bandwidth-guaranteed label-switched paths (LSPs) are set up, shortest path routing with fixed link metrics can cause LSP set-up
- 25 requests to be rejected, even though these requests may have been admissible using a different routing scheme. Therefore, routing schemes that can make better use of network infrastructure are needed. This better use of network infrastructure while maintaining QoS guarantees is the primary objective of traffic engineering. MPLS networks' ability to control the path from ingress node
- 30 to egress node to optimise utilisation of network resources and enhance performance is regarded as a primary justification for the use of MPLS.

In MPLS packets are encapsulated, at ingress points, with labels that are then used to forward the packets along LSPs. Service providers can use bandwidth-

guaranteed LSPs as components of an IP virtual private network (VPN) service with the bandwidth guarantees used to satisfy customer service level agreements (SLAs). These LSPs can be thought of as virtual traffic trunks that carry flow aggregates generated by classifying the packets arriving at the edge or ingress routers of an MPLS network into forwarding equivalence classes (FECs). Classification into FECs is done using packet filters that examine header fields such as source address, destination address, and type-of-service bits. The filter rules determining the FECs can be established in a variety of ways such as downloading from a policy or route server, or interaction with routing protocols. The purpose of classifying packets into FECs is to enable the service provider to traffic engineer the network and route each FEC in a specified manner. This is done by mapping arriving packets belonging to an FEC to one of the LSPs associated with the FEC. Before mapping packets onto an LSP, the LSP is set up, along an explicit route if specified, using a signalling protocol permitting resource reservation such as Resource Reservation Setup Protocol (RSVP).

The cost-efficiency of IP networks is partly achieved through the connection-less traffic model resulting in efficient sharing of resources. However, this model does not allow for quality guarantees, without additional functionality for service differentiation in network devices. In recent years such functionality has become common, and static Quality of Service (QoS) configurations with it. By introducing a Bandwidth Broker (BB) into the network QoS policy management can be handled in a more flexible way.

A bandwidth broker is an entity in a network domain that manages policies for bandwidth resources. By maintaining a database of the domain's resources it provides admission control decisions on QoS service requests. It is also responsible for configuring the network to meet the granted policies. It may be able to communicate with bandwidth brokers in neighbouring domains, allowing QoS services spanning several domains.

In WO-00/30295 is described a method for providing admission control and network Quality of Service (QoS).

In the background section of the WO-application drawbacks with prior art techniques are discussed focusing inter alia on the scalability concerns leading

to the development of the Differentiated Services (DiffServ) architecture. DiffServ allows distinct levels of network service to be provided to different traffic.

However, rather than storing per-flow state information on each intermediate node in the network between the sender and the receiver(s), routers within a

5 DiffServ network handle packets on different traffic flows by applying different per-hop behaviours (PHBs) based upon the setting of bits in the TOS field of each packet's IP header. In this manner, many traffic flows may be aggregated into one of a small number of predefined PHBs, thereby allowing a reduction in the amount of processing and storage associated with packet classification and
10 forwarding. While solving the scalability issues, DiffServ fails to provide adequate guidance with regard to implementation of an admission control policy.

One approach for performing admission control suggested by the DiffServ framework involves using a centralised bandwidth broker. The centralised

15 bandwidth broker has control over the entire domain and centrally handles bandwidth allocation requests. The following example briefly describes the work performed by a bandwidth broker.

A sender wishing to establish a particular level of service for a data flow between it and a receiver transmits an indication of its requirements to a centralised bandwidth broker. The centralised bandwidth broker validates the request
20 against policies, compares the request against the current allocation of bandwidth for accepted traffic, and configures the edge devices with information needed to mark and shape (or police) incoming packets for the flow.

Subsequently, as packets that are part of the established data flow traverse the DiffServ network cloud, intermediate core devices apply a PHB that corresponds
25 to the DiffServ service level indicated in the packet header.

In WO-00/30295 the object is to achieve a network that handles the shortcomings of using a centralised broker, e.g. that a useful centralised broker may be very complex and has limited capability to handle bandwidth requests for multicast sessions.

30

Below is described the current state of the art in using MPLS alone and a combination of Bandwidth Brokers and MPLS. The main focus of this section is on extending the service model (i.e., implementing QoS).

The MPLS standards cover mechanisms and protocols that provide the basic tools for MPLS networking. Given the current standards and available equipment, many MPLS networks are manually routed. In such a network the main advantages of using MPLS are fast fail over-routing and a clear separation of inter- and intra-domain routing. These properties of MPLS do not really qualify as QoS-enablers, but are good examples of how MPLS is used. Another common application of MPLS is for VPN set-up by administrative tools (for example Orchestream). In these applications the main advantage is that the shared network is partitioned into private VPNs using the MPLS LSPs.

There is a system known as Routing and Traffic Engineering Server (RATES) which is described as an MPLS traffic-engineering server. The system is described by Aukia, Kodialam, Koppol, Lakshman, Sarin and Suter in: "*RATES: A server for MPLS Traffic Engineering*", IEEE Network Magazine, May 2000. Referred to as [RATES] below. The model under which RATES operates is that service requests are passed to an engine that evaluates them and possibly implements the service in the network. A service request is defined by source and destination addresses (or prefixes) and a bandwidth constraint. [RATES] defines a routing algorithm, which tries to find a path that can accommodate the requests. This is in contrast to other systems, which merely use the routes available from layer three routing (normally shortest paths).

A current state of the art Bandwidth Broker (BB_{OLOV}) system is described in Olov Schelén, *Quality of Service Agents in the Internet*, Doctoral Thesis, Department of Computer Science and Electrical Engineering, Division of Computer Communication, Luleå University of Technology, Luleå, 1998. Referred to as [OLOV] below.

BB_{OLOV} has many similarities to RATES. The BB_{OLOV} is described in the context of DiffServ networks while RATES operates in MPLS. Apart from that basic difference, these two systems operate under the same model; receive service requests, evaluate them and possibly implement the service. This is schematically illustrated in figure 1. The major difference between these two systems is the underlying networking technology.

An important property of both RATES and BB_{OLOV} is the implementation of path sensitive admission control. Both systems make sure that all links on a path have enough forwarding resources to keep up with the service request. Path sensitive admission control (by a centralised entity) requires detailed knowledge of the network topology, or rather, the routing topology. Both RATES and BB_{OLOV} use the straightforward method of peering as a link state-router, which provides a dynamic and detailed view of the routing topology.

Routers in a link state-domain continuously synchronise topology information with each other. All routers have all information needed to build a complete view of the domain topology. Changes in one part of the network are flooded across the entire domain, making sure that all routers have information that is up to date. Peering as a link state-router simply means that a host takes part in the information exchange to receive all information dynamically. This can be done passively, which means the host does not advertise any information of its own.

Each RATES instance is limited to one flat link state-domain (e.g. an Open Shortest Path First (OSPF) area), while BB_{OLOV} is assumed to control an entire routing domain, which may utilise hierarchical routing. In the case of hierarchical routing, BB_{OLOV} relies on routing probes, which act as routing peers within flat link state-domains to collect routing information.

Using systems like these, which use the MPLS and BB concepts in combination, it is possible to achieve dynamic QoS service set-up and tear-down in either DiffServ or MPLS networks.

The state of the art in MPLS and the combination of MPLS traffic-engineering servers and bandwidth brokers have some shortcomings, which is briefly discussed in the following.

An overall object of the present invention is focused on the implementation of a VLL service with bandwidth guarantees, which requires path sensitive admission control. For the service to be as useful as possible it is important that service control is dynamic and managed automatically. The service issues focused on are:

- End to end-services.
- Resource planning over time.

The end-to-end issue is of great importance when service requests span multiple network provider domains and possibly a mix of DiffServ and MPLS networks. A service that is only available within one provider domain is unlikely to be successful in a world where global services of all kinds are increasingly important.

- Planning resources over time is an important issue if bandwidth guaranteed services on otherwise shared networks are to become a credible alternative to more rigid solutions such as leased lines or circuit switched networks. Business users will certainly require the ability to plan ahead when it comes to QoS. A business whose mission critical applications fail due to unavailability of network QoS is very likely to abandon the failing provider.

- During the development of the Bandwidth Broker model the initial focus were end-to-end services. A Bandwidth Broker is responsible for the bandwidth resources within its domain and can trade bandwidth with brokers in neighbouring domains. These ideas are not tightly coupled to the way admission control is performed. However, to implement services like the bandwidth guaranteed VLL, a very specific admission control method is required. The above-mentioned state of the art MPLS traffic engineering server, RATES, covers only one link state-area which is in fact only a small part of a provider domain. This means that several RATES systems are needed to cover a single domain.

- The Bandwidth Broker BB_{OLov} in the Olov Schelen thesis identified above defines a method, which enables planning of a VLL service over time. Admission control, which is at the core of implementing the service, is performed with time as an input parameter.

The [RATES] system does not consider time at all. Admission control for service requests is done at the time the request is made. The inability to plan over time

requires a compromise in network utilisation versus customer values. For example, if a customer relies on the availability of bandwidth resources for a business event a week ahead from now, he needs to make the request as soon as possible to make sure that his request will be admitted. Awaiting the event, the customer will be paying for a service that he has no use for. For MPLS networks, there is currently no known solution to this problem.

Thus, a first object of the present invention is to achieve a method that implements end-to-end services (of the VLL kind) across a set of heterogeneous DiffServ or MPLS domains.

A second object of the present invention is to achieve a method implementing a resource planning of a VLL service over time.

Summary of the invention

The above-mentioned objects are achieved by a method according to the independent claim.

Preferred embodiments are set forth in the dependent claims.

The present invention relates to a method using an inventive combination of the ideas in [OLOV] and [RATES] that provides a solution to both of the problems related to the first and second objects stated above.

There are lots of efforts in the area of QoS for both DiffServ and MPLS networks. Most of which deal with mechanisms or algorithms at the forwarding plane. To achieve well-defined, manageable services components like admission control are required. This invention makes use of a concept of admission control to achieve services across domain borders.

The key merits of the invention are:

- Deployment. Network operators all over the world are using different solutions for their networks. For any type of global service, support for heterogeneous networking technologies is very important. This invention

makes it possible to deploy bandwidth guaranteed end-to-end VLL services across the two of the most commonly used QoS models.

- Network utilisation. The use of admission control in advance allows network resources to be more efficiently utilised [OLOV]. This invention makes previously unknown use of this powerful tool in MPLS networks.

Short description of the appended drawings

Figure 1 is schematic illustration of a service model in DiffServ or MPLS.

Figure 2 shows functional blocks that schematically illustrate the present invention.

Figure 3 shows the overall architecture according to the present invention.

Figure 4 provides an example scenario where a VLL spanning two domains is setup using the method according to the present invention.

Figure 5 shows a flowchart describing how a bandwidth broker according to the present invention handles requests.

Figure 6 shows functional blocks of a bandwidth broker according to the present invention.

Detailed description of preferred embodiments of the invention

Figure 2 shows functional blocks that schematically illustrate the present invention.

Note that the routing part of [RATES] is excluded and that the method according to the present invention relies entirely on existing routing and does not itself actively compute routes.

By referring to figure 2 the functionality of the present invention is schematically described below:

- Request management. This interface handles all incoming requests. Requests are made either by clients to the system (within the system's domain) or peering systems in other domains. This functionality of this interface can be either that of [RATES] or [OLOV] or both.

- Admission control. This block is implemented e.g. as described in [OLOV] to achieve path sensitivity and the ability to plan ahead of time. The same functionality is used for MPLS and DiffServ. The key components of this block are:
 - 5 ○ Topology information, which is used to compute paths for the requests (path sensitivity).
 - A data-structure which keeps resource usage information over time for each link in the topology (ability to plan ahead of time).
 - Service implementation. This is where functionality is mixed from [RATES] and [OLOV] to achieve services across heterogeneous domains. For MPLS networks the LSP set-up mechanism used in [RATES] is used. This includes setting up FEC-associations in MPLS edge-devices and to distribute labels for LSP-set-up in the MPLS core-devices. For DiffServ networks all that is required is configuration of so-called Traffic Conditioners (TC) that are arranged in the routers. Traffic conditioning may involve any of the functions classifying, metering, marking, shaping and dropping packets. DiffServ edge devices typically perform traffic conditioning to associate the correct PHB with traffic streams (classifying and marking) and make sure that the stream complies with its traffic profile (metering, shaping and dropping).
It should be noted that there are many logical similarities between how the edge-devices in the MPLS and the TCs in the DiffServ handle the service implementation.
- 25 The overall architecture according to the present invention is shown in figure 3. Note in particular that the BB in the MPLS domain is responsible for inter-domain signaling and how it controls a set of Intra-Domain Brokers (IDBs) within its own domain. Within the MPLS domain the central BB is responsible for passing resource requests to the intra-domain brokers. Each intra-domain broker is responsible for admission control and LSP setup in an OSPF area (or
30 other equivalent flat link state-domains).

Figure 4 provides an example scenario where a VLL spanning two domains, A and B, is setup. Domain A comprises an ingress router 2 and an egress router 4. The egress router 4 of domain A is connected to, or is equivalent to an ingress router 6 of domain B. Domain B also comprises an egress router 8. This example shows how the end-to-end problem is solved. Step by step, the following happens:

1. A request for a VLL of rate R from network SRC to network DST is passed to the BB of domain A and may be done in numerous ways. Some examples are human interaction with a request system, function invocation across a service request API from a management system, and application signaling and COPS/RSVP proxy in the ingress router. Generation of a request for a Virtual Leased Line (VLL) of rate (or bandwidth) R from a source network (SRC) to a destination network (DST) and then apply the request to a Bandwidth Broker of domain A (BB_A).
2. BB_A passes a request to a Bandwidth Broker in domain B (BB_B) regarding a VLL of rate R from the domain ingress in B to DST, provided that BB_A is aware of that DST is reached via domain B. There are numerous possible ways to treat this type of inter-domain request. For sake of this example, we say that the request passed to the BB in domain B is for a VLL of rate R, from the domain ingress in B to DST.
3. Simultaneously BB_A performs path sensitive admission control according to layer 3 routing from the SRC ingress router to the domain B egress router. This is achieved by looking up the path through domain A and evaluating the resource availability on each link in the path.
4. Upon receiving the request from domain A, the BB in domain B does the following:
 - a. Given the ingress from domain A and the destination DST, the BB finds out that the first hop area for the request is area 1 and passes a request to that intra-domain broker, which performs admission control (and possibly LSP setup) for its area.
 - b. Passing a request to one or many involved intra-domain brokers (IDB) in domain B, wherein each intra-domain broker performs admission control (and possibly LSP setup) in its area.

- c. Given the answers from both the involved intra-domain brokers, a response is passed back to the BB in domain B.
- 5 5. The BB in domain A receives the response from domain B and passes it back to the requesting party. If the request was admitted along all pieces of the path, the BB engages in Traffic Conditioners (TC) configuration in the ingress router for SRC.
6. Given that all steps were successful, there is now a VLL of rate R from SRC to DST, which is:
- Policed at the ingress for SRC,
 - 10 • routed normally through domain A,
 - policed again at the ingress for domain A into domain B,
 - Classified as a FEC at the ingress in domain B
 - Label switched through domain B until it reaches the destination DST.
- 15 The second object of the present invention, related to the resource planning over time, is achieved by a second preferred embodiment of the invention. According to this embodiment the same steps as above are performed with the difference that no configuration action is taken until the start time for the request (the configuration in step 5 is performed at the start time for the request). Admission
- 20 control for the request is made at the time of the request, and if the request is granted configuration of traffic conditioners and LSP set up are scheduled to take place at the start time of the request.

In the example illustrated with references to figure 4 only two BB were involved.

25 In a more generalised implementation a much higher number is involved. As indicated above a BB is arranged to communicate with BBs in neighbouring domains, allowing QoS spanning several domains. Generally a BB communicates with BBs one domain hop away only (i.e. with neighbours). This is related to the way inter-domain routing is done in the Internet. For each

30 destination outside a BBs own domain, it knows the next domain hop on the path just as border routers know the next domain hop for each destination.

Addressing information for neighbouring BBs is obtained either by configuration or some auto-discovery mechanism.

A bandwidth broker BB that performs path-sensitive admission control handles requests as described in the flowchart in figure 5. The steps in case of success are described below:

- Optionally make sure that the request is within the user policy (note that a user may be anything from a human to a neighbouring BB). This may fail if, for example, the request is for a rate that is higher than allowed by the user policy.
- Compute the path for the request. This may fail if the request contains source or destination addresses that lie outside the BBs range of known addresses.
- Admission control for all links in the path that belong to this BBs domain. This is done with respect taken to the time parameters, if any, specified in the service request. This step may fail due to lack of resources along any of the links in the path.
- If this request involves other domains, do inter-domain admission control. There are a number of options for this step:
 - If aggregation is used, neighbouring BBs may reserve trunks between their domains and allow reservations within those trunks, which means there will be no per-request inter-domain interaction. In such a case, if the current trunk is large enough to fit the current request, it can be granted immediately. If not, on the other hand, the request may be queued awaiting resources in the trunk or may even be denied, both of which events can serve as input to the process of re-evaluating the inter-domain trunk.
 - If no aggregation is used, an inter-domain request will be passed to the neighbouring BB.
- When the admission control step(s) have been taken it is time to implement the service. This step may, for example, fail due to temporary problems in networking equipment
- Respond to the requesting party that the request was granted or denied.

If one of the first three steps fails, the request will be denied immediately. If service implementation or inter-domain admission control fails, the admission roll-back step must be taken to free resources in the BBs own domain.

5 Figure 6 shows functional blocks of a bandwidth broker according to the present invention. In short the blocks are described as follows:

- Request management. A BB handles requests originating from a variety of sources ranging from humans to neighbouring BBs.
- 10 • Persistent storage. A BB with the ability to do admission control over time must have persistent storage, where it stores records of all its granted requests and also user-related data such as policies or accounting information.
- 15 • Topology map. A BB that performs path sensitive admission control must have correct topology and routing information to be able to lookup the paths of incoming requests. Peering as a link-state router primarily retrieves this information. It may also be retrieved via configuration or some other mechanism.
- 20 • Resource map. To be able to do admission control for the VLL service, resource information must be coupled to the topology into a resource map. This information may be collected automatically by probing the network or it may be statically configured.
- 25 • Service implementation. A BB must be able to implement granted services. According to the present invention, this is done either by configuring traffic conditioners in edge-devices in DiffServ domains or by LSP-setup in MPLS domains.
- Inter-domain negotiator. Whenever a service spans more than one domain, a BB must be able to contact the BB in the neighbouring domain. This function may be implemented with or without request aggregation.

30 In general Bandwidth Brokers may deal with two different kinds of policies. The most basic type of policy, which all BBs manage, is what is often called QoS policy. This kind of policy is within this application referred to as a service. The policy to transport certain data with a certain QoS is in fact a service. The other kind of policy that a BB optionally manages is user policies. This type of policy

controls what services users are allowed to use, and possibly how much and at what times etc.

According to a preferred embodiment of the invention the QoS parameter is the rate R. Naturally, a person skilled in the art is aware of numerous alternative

5 QoS parameters.

The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used.

Therefore, the above embodiments should not be taken as limiting the scope of
10 the invention, which is defined by the appending claims.

Claims

1. Method in a packet based communication network including network domains to establish a virtual leased line (VLL) between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source and the destination, wherein a bandwidth broker (BB) is associated to each network domain, the method comprises the following steps:
- 5
- i) generate a request from an entity for a Virtual Leased Line (VLL) having a predefined Quality of Service (QoS) from a source network (SRC) to a destination network (DST) and apply the request to a Bandwidth Broker of a domain A (BB_A) associated to the source network;
- 10
- ii) BB_A establishes the different domains involved to reach the destination network (DST);
- 15
- iii) BB_A directly or indirectly passes requests to all Bandwidth Brokers of the involved domains regarding a VLL of the predefined QoS from ingress to egress of each domain;
- 20
- iv) each involved bandwidth broker performs admission control in its domain;
- v) each involved bandwidth broker returns a result of the admission control to BB_A that passes it back to the requesting entity and if the request was admitted along all domains between SRC and DST a VLL of the predefined QoS is granted.
- 25
2. Method according to claim 1, characterized in that the method comprises the following step to be performed after step v):
- vi) BB_A engages in Traffic Conditioners (TC) configuration in the ingress router for SRC in order to establish a VLL of the predefined QoS.
- 30
3. Method according to claim 1, characterized in that step iv) comprises the following sub-step: passing a request to one or many involved intra-domain brokers (IDB) in hop areas in the involved domains, wherein each

intra-domain broker performs admission control.

4. Method according to claim 1, characterized in that in step iv) in addition to the admission control a Label-Switched Path (LSP) setup is performed.

5. Method according to claim 1, characterized in that said domains comprise at least one Differentiated Services (DiffServ) domain and one Multiprotocol Label Switching (MPLS) domain.

6. Method according to claim 5, characterized in that in a MPLS domain the BB is responsible for passing resource requests to the intra-domain brokers (IDB), wherein each intra-domain broker is responsible for admission control and LSP setup.

7. Method according to claim 1, characterized in that said predefined QoS is a rate R.

8. Method according to claim 1, characterized in that the bandwidth broker comprises a topology map and routing information to be able to perform path sensitive admission control of incoming requests, wherein the information is retrieved by peering as a link-state router.

9. Method according to claim 8, characterized in that the bandwidth broker comprises a data-structure which keeps resource usage information over time for each link in the topology which enables ability to plan ahead of time.

10. Method according to claim 1, characterized in that a bandwidth broker in a specific domain performs admission control for all links in the path that belong to that domain.

11. Method according to claim 1, characterized in that a bandwidth broker comprises a storage, where it stores records of all its granted requests and also user-related data such as policies or accounting information.

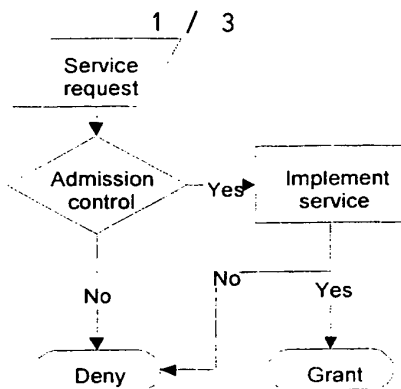


Fig. 1

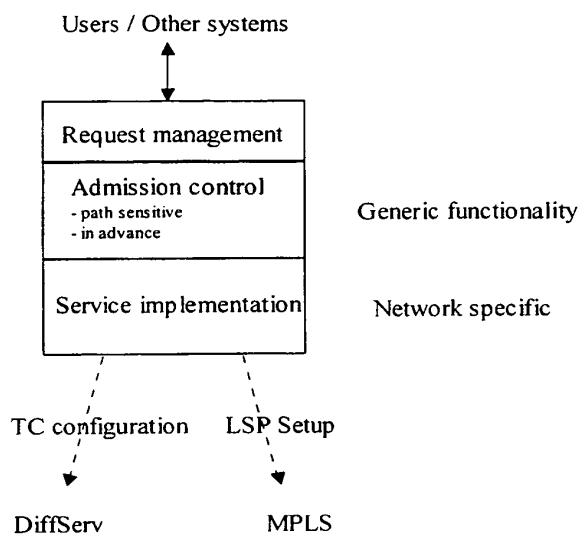


Fig. 2

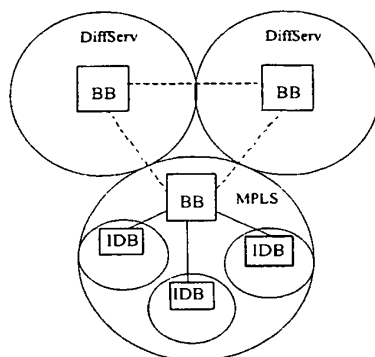


Fig. 3

2 / 3

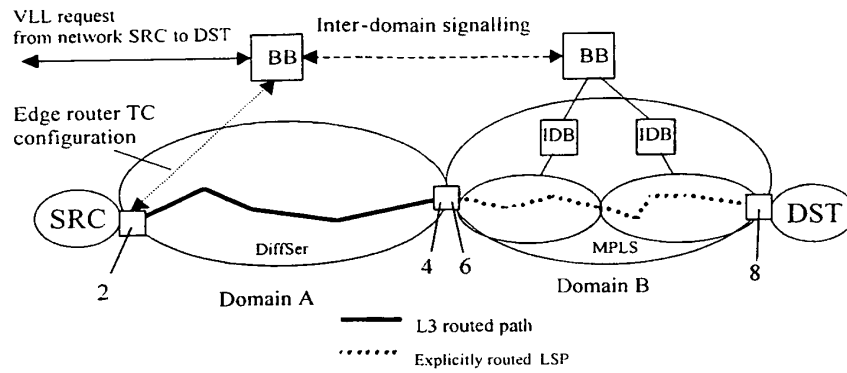


Fig. 4

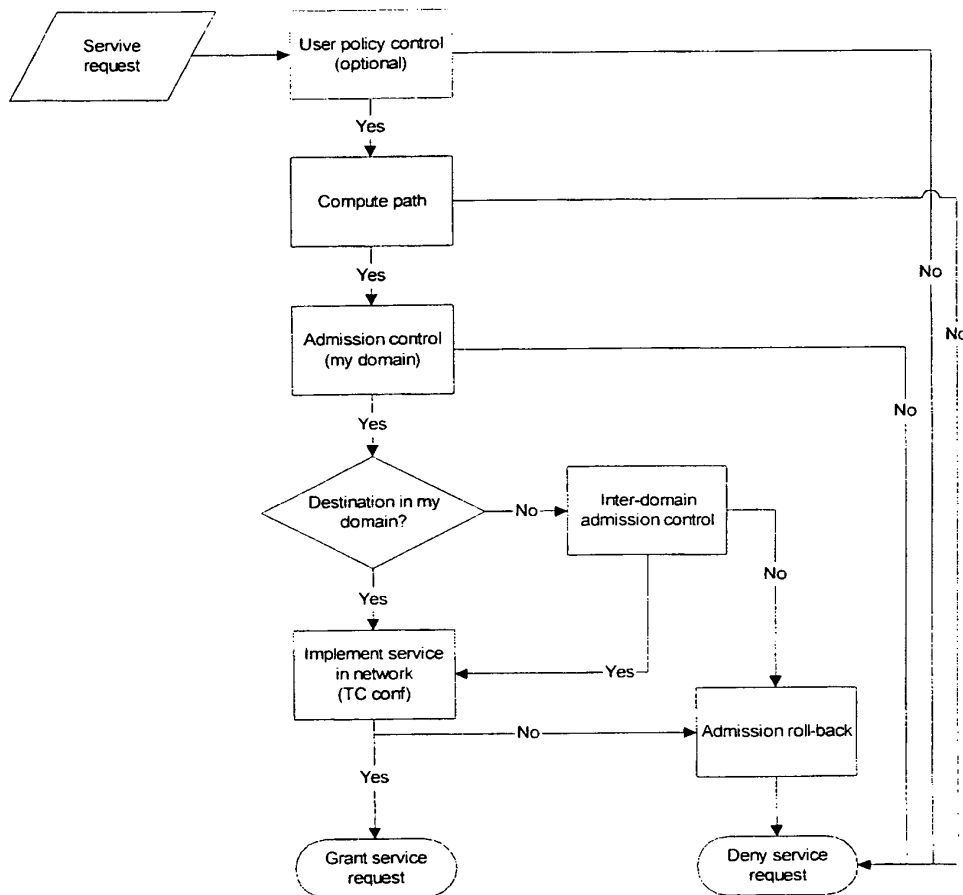


Fig. 5

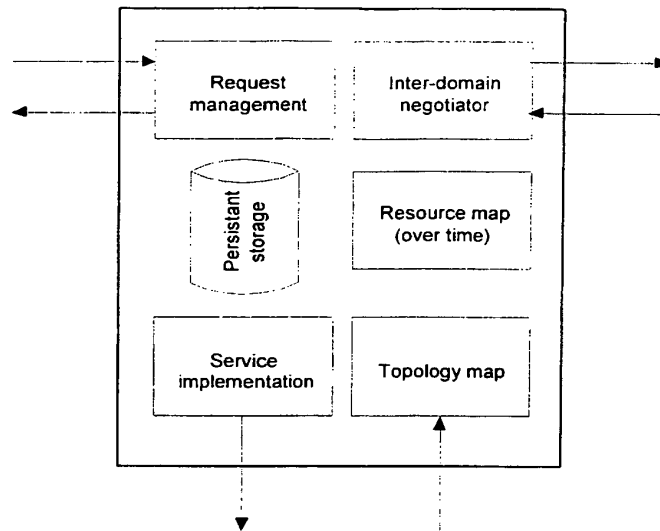


Fig. 6

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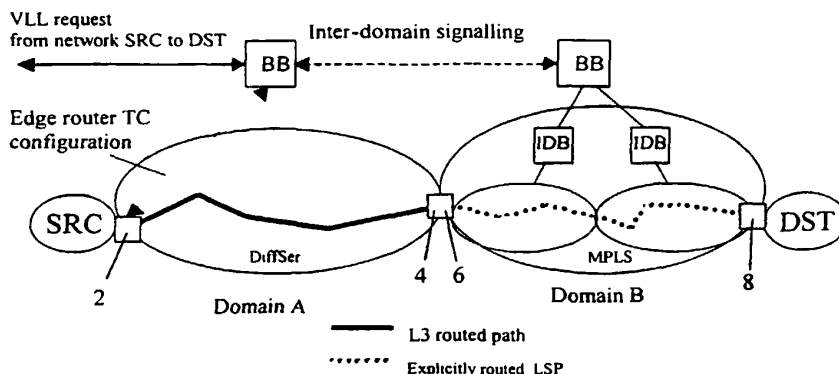
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: NETWORK OPTIMISATION METHOD



(57) Abstract: Method in a packet based communication network including network domains to establish a virtual leased line (VLL) between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source and the destination, wherein a bandwidth broker (BB) is associated to each network domain.

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INTERNATIONAL SEARCH REPORT

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SCHELEN O ET AL: "Performance of QoS agents for provisioning network resources" QUALITY OF SERVICE, 1999. IWQOS '99. 1999 SEVENTH INTERNATIONAL WORKSHOP ON LONDON, UK 31 MAY-4 JUNE 1999, PISCATAWAY, NJ, USA, IEEE, US, 31 May 1999 (1999-05-31), pages 17-26, XP010335401 ISBN: 0-7803-5671-3 abstract page 17, right-hand column, paragraph 3 -page 18, right-hand column, paragraph 4 page 24, right-hand column, paragraph 4 - paragraph 7	1,2,7-11
A	---	3-5
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☒ Patent family members are listed in annex.

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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	US 5 953 338 A (MA PATRICK S ET AL) 14 September 1999 (1999-09-14) column 5, line 51 -column 8, line 12 -----	1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)



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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5953338 A	14-09-1999	AU WO	03-07-1998 18-06-1998

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Effective October 1, 2001

Application or Docket Number

10/257248

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS		
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	8 minus 20=	*
INDEPENDENT CLAIMS	1 minus 3=	*
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

10/10/02

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	* 8	Minus ** 20	= 0
Independent	* 1	Minus *** 3	= 0
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
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Independent	*	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

	(Column 1)	(Column 2)	(Column 3)
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Independent	*	Minus ***	=
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RATE	FEE	OR	RATE	FEE
BASIC FEE	370.00	OR	BASIC FEE	870.00
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL		OR	TOTAL	890

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RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
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+140=		OR	+280=	
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