



## UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/088,517	06/05/2012	8194538	AKAM-74C2	8610

26579 7590 05/16/2012  
Akamai Technologies, Inc.  
ATTN: DAVID H. JUDSON  
15950 Dallas Parkway, Suite 225  
Dallas, TX 75248

### 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 0 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 Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

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

Claudson F. Bornstein, Cambridge, MA;  
Timothy K. Canfield, Cambridge, MA;  
Gary L. Miller, Pittsburgh, PA;  
Satish B. Rao, Berkeley, CA;  
Ravi Sundaram, Cambridge, MA;

# **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)

Akamai Technologies, Inc.  
ATTN: DAVID H. JUDSON  
15950 Dallas Parkway, Suite 225  
Dallas, TX 75248

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.
13/088,517	04/18/2011	Claudson F. Bornstein	AKAM-74C2	8610

TITLE OF INVENTION:

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
non-provisional	NO	\$1740	\$300	\$2040	05/03/2012
EXAMINER		ART UNIT	CLASS-SUBCLASS		

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, 1 David H. Judson  
(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. 2 \_\_  
3 \_\_

## 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

Akamai Technologies, Inc.

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

Cambridge, Massachusetts

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 enclosed:

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

4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☒ The Director is hereby authorized to charge the required fee(s), or credit any overpayment, to Deposit Account Number 501269.

## 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).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above. 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 /David H. Judson/

Date May 3, 2012

Typed or printed name David H. Judson

Registration No. 30,467

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.

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.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>		13088517		
<b>Filing Date:</b>		18-Apr-2011		
<b>Title of Invention:</b>		OPTIMAL ROUTE SELECTION IN A CONTENT DELIVERY NETWORK		
<b>First Named Inventor/Applicant Name:</b>		Claudson F. Bornstein		
<b>Filer:</b>		David Judson		
<b>Attorney Docket Number:</b>		AKAM-74C2		
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
Utility Appl issue fee	1501	1	1740	1740
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				2040

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	12691756
<b>Application Number:</b>	13088517
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	8610
<b>Title of Invention:</b>	OPTIMAL ROUTE SELECTION IN A CONTENT DELIVERY NETWORK
<b>First Named Inventor/Applicant Name:</b>	Claudson F. Bornstein
<b>Customer Number:</b>	26579
<b>Filer:</b>	David Judson
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	AKAM-74C2
<b>Receipt Date:</b>	03-MAY-2012
<b>Filing Date:</b>	18-APR-2011
<b>Time Stamp:</b>	08:45:43
<b>Application Type:</b>	Utility under 35 USC 111(a)

### **Payment information:**

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$2040
RAM confirmation Number	10049
Deposit Account	501269
Authorized User	

### **File Listing:**

<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
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1	Issue Fee Payment (PTO-85B)	ptol85b.pdf	225617 a074b80255de29132838aa7f09e5c7b892d7c7c9	no	2
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	31835 abb981b6cccd5a454063f6d77ee125e492c382165	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			257452		
<p>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.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  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.</p>					

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Akamai Technologies, Inc.  
ATTN: DAVID H. JUDSON  
15950 Dallas Parkway, Suite 225  
Dallas, TX 75248



**Courtesy Reminder for  
Application Serial No: 13/088,517**

Attorney Docket No: AKAM-74C2  
Customer Number: 26579  
Date of Electronic Notification: 02/03/2012

This is a courtesy reminder that new correspondence is available for this application. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

mail@davidjudson.com  
scasterl@akamai.com  
jmatt@akamai.com

Please verify that these email addresses are correct.

To view your correspondence online or update your email addresses, please visit us anytime at **<https://sportal.uspto.gov/secure/myportal/privatepair>**. If you have any questions, please email the Electronic Business Center (EBC) at [EBC@uspto.gov](mailto:EBC@uspto.gov) or call 1-866-217-9197.





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## NOTICE OF ALLOWANCE AND FEE(S) DUE

26579 7590 02/03/2012  
Akamai Technologies, Inc.  
ATTN: DAVID H. JUDSON  
15950 Dallas Parkway, Suite 225  
Dallas, TX 75248

EXAMINER

BOAKYE, ALEXANDER O

ART UNIT

PAPER NUMBER

2471

DATE MAILED: 02/03/2012

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/088,517	04/18/2011	Claudson F. Bornstein	AKAM-74C2	8610

TITLE OF INVENTION: OPTIMAL ROUTE SELECTION IN A CONTENT DELIVERY NETWORK

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1740	\$300	\$0	\$2040	05/03/2012

**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**

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

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Akamai Technologies, Inc.  
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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/088,517	04/18/2011	Claudson F. Bornstein	AKAM-74C2	8610

TITLE OF INVENTION: OPTIMAL ROUTE SELECTION IN A CONTENT DELIVERY NETWORK

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1740	\$300	\$0	\$2040	05/03/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
BOAKYE, ALEXANDER O	2471	370-227000

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, 1 \_\_\_\_\_  
(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. 2 \_\_\_\_\_  
3 \_\_\_\_\_

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. \_\_\_\_\_

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13/088,517	04/18/2011	Claudson F. Bornstein	AKAM-74C2	8610

26579	7590	02/03/2012
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Akamai Technologies, Inc.  
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Dallas, TX 75248

EXAMINER	
BOAKYE, ALEXANDER O	

ART UNIT	PAPER NUMBER
2471	

DATE MAILED: 02/03/2012

## 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 0 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 0 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>).

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**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	13/088,517	BORNSTEIN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	ALEXANDER BOAKYE	2471	

**-- 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 01/25/2012.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 1,5,4,10,6-9; renumbered as 1-8 respectively.

4. ☐ 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.**

5. ☐ 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.

6. ☐ 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).**

7. ☐ 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)**

1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date ____ 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material	5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date ____ . 7. <input type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other ____
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## REASONS FOR ALLOWANCE

1. The following is an examiner's statement of reasons for allowance: 1, 4-10 are considered allowable since when reading the claims in light of the , specification none of the references of record alone or in combination disclose or suggest the combinations of limitations specified in the independent claims. As to claim 1, the prior art of record does not teach for each given server node and a content provider origin server, identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path including at least one other content delivery network edge server that is external to the given server node; upon receipt at a particular edge server in the given server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server over the at least one alternate path, wherein the object has an associated cacheability setting, wherein the cacheability setting indicates that the object should not be cached in the particular edge server.

As to claims 5, 4,10, the prior art of record does not teach for each given server node and a content provider origin server, identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path including at least one other content delivery network edge server that is external to the given server node; upon receipt at a particular edge server in the given

server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server over the at least one alternate path; receiving the object over the at least one alternate path; serving the object in response to the request; and identifying a new alternate path as a result of changing Internet conditions.

As to claims 6-9, the prior art of record does not teach for each given server node and a content provider origin server, identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path including at least one other content delivery network edge server that is external to the given server node, wherein the alternate path is determined by the particular edge server as a result of performing a performance test; upon receipt at a particular edge server in the given server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server over the at least one alternate path; receiving the object over the at least one alternate path; and serving the object in response to the request. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

## Conclusion

**2.** Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Boakye whose telephone number is (571) 272-3183. The examiner can normally be reached on M-F from 8:30am to 6:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's

Art Unit: 2471

supervisor, Chi Pham, can be reached on (571) 272-3179. The Fax number 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>. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Electronic Business Center (EBC) numbers at 866-217-9197 and 703-305-3028

/ALEXANDER BOAKYE/


Examiner of Art Unit 2471

1/27/2012

/Chi H Pham/


Supervisory Patent Examiner, Art Unit 2471



<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 13088517	<b>Applicant(s)/Patent Under Reexamination</b> BORNSTEIN ET AL.
	<b>Examiner</b> ALEXANDER BOAKYE	<b>Art Unit</b> 2471

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>


<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47										
CLAIM		DATE								
Final	Original	01/27/2012								
1	1	=								
	2	-								
	3	-								
3	4	=								
2	5	=								
5	6	=								
6	7	=								
7	8	=								
8	9	=								
4	10	=								

<b>Search Notes</b> 	<b>Application/Control No.</b>		<b>Applicant(s)/Patent under Reexamination</b>	
	13/088,517		BORNSTEIN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
ALEXANDER BOAKYE		2471		

SEARCHED			
Class	Subclass	Date	Examiner
370	227,351,2 35,237,23 8,400,401	1/27/2012	AB
455	556.2	1/27/2012	AB
	414.1	1/27/2012	AB
709	217,122	1/27/2012	AB
705	400,51	1/27/2012	AB

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner
INTERFERENCE HISTORY (US-PGPUB DATABASE IN EAST)		1/27/2012	AB

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
(SEE SEARCH HISTORY PRINTOUT)	1/27/2012	AB

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13088517	<b>Applicant(s)/Patent Under Reexamination</b> BORNSTEIN ET AL.
	<b>Examiner</b> ALEXANDER BOAKYE	<b>Art Unit</b> 2471

ORIGINAL						INTERNATIONAL CLASSIFICATION												
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED							
370			227			H	0	4	J	1 / 16 (2006.01.01)								
CROSS REFERENCE(S)																		
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																	

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1														
	2														
	3														
	4														
	5														
	6														
	7														
	8														
	9														
	10														

/ALEXANDER BOAKYE/ Examiner.Art Unit 2471		1/27/2012 (Date)		<b>Total Claims Allowed:</b> 8	
(Assistant Examiner)		(Date)			
/CHI PHAM/ Supervisory Patent Examiner.Art Unit 2471		01/30/2012 (Date)		O.G. Print Claim(s) 1	O.G. Print Figure 1
(Primary Examiner)		(Date)			

## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	(CONTENT ADJ DELIVERY ADJ NETWORK WITH SERVER ADJ NODES).CLM.	US-PGPUB	OR	ON	2012/01/27 16:05
L2	2	(CONTENT ADJ DELIVERY ADJ NETWORK WITH SERVER ADJ NODES AND EDGE ADJ SERVER).CLM.	US-PGPUB	OR	ON	2012/01/27 16:07
L3	13649	(370/227,351,235,237,238,400,401).CCLS.	USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/01/27 16:08
L4	1257	CONTENT ADJ DELIVERY ADJ NETWORK	USPAT; EPO; DERWENT; IBM_TDB	OR	ON	2012/01/27 16:08
L5	31	L3 AND L4	USPAT; EPO; DERWENT; IBM_TDB	OR	ON	2012/01/27 16:09
L6	16	CONTENT ADJ DELIVERY ADJ NETWORK ADJ EDGE ADJ SERVERS	USPAT; EPO; DERWENT; IBM_TDB	OR	ON	2012/01/27 16:11
L7	0	L3 AND L6	USPAT; EPO; DERWENT; IBM_TDB	OR	ON	2012/01/27 16:12
L8	16	DELIVERY ADJ NETWORK ADJ EDGE ADJ SERVERS	USPAT; EPO; DERWENT; IBM_TDB	OR	ON	2012/01/27 16:12
L9	3480	(455/556.2,414.1).CCLS.	USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/01/27 16:12

L10	8	L9 AND L4	USPAT; EPO; DERWENT; IBM_TDB	OR	ON	2012/01/27 16:13
L11	6917	(709/217,122).CCLS.	USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/01/27 16:14
L12	98	L11 AND L4	USPAT; EPO; DERWENT; IBM_TDB	OR	ON	2012/01/27 16:14
L13	2524	(705/400,51).CCLS.	USPAT; EPO; DERWENT; IBM_TDB	OR	OFF	2012/01/27 16:15
L14	3	L4 AND L13	USPAT; EPO; DERWENT; IBM_TDB	OR	ON	2012/01/27 16:16

1/ 27/ 12 4:16:48 PM

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application: Bornstein et al.  
Serial Number: 13/088,517  
Filing Date: April 18, 2011  
Art Unit: 2471  
Examiner: Boakye, Alexander O.  
For: **Optimal route selection in a content  
delivery network**

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**RESPONSE TO NON-FINAL OFFICE ACTION**

This paper is filed in response to the Office action mailed July 26, 2011. The Examiner is thanked for the indication of allowable subject matter. The following amendments are made solely to place this case in condition for prompt allowance.

Please amend the application as follows:

**IN THE CLAIMS**

Please cancel claims 2-3 without prejudice or disclaimer, and please amend claims 1, 4-6 and 10 as set forth below.

A complete claim listing is included beginning on the next page.

1. (currently amended) A method operative in a content delivery network having a set of server nodes organized into regions, wherein the server nodes provide delivery of content on behalf of participating content providers, wherein a server node comprises a cluster of content delivery network edge servers, the method comprising:

for each given server node and a content provider origin server, identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path ~~includes~~ including at least one other content delivery network edge server that is external to the given server node;

upon receipt at a particular edge server in the given server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server over the at least one alternate path, wherein the object has an associated cacheability setting, wherein the cacheability setting indicates that the object should not be cached in the particular edge server;

receiving the object over the at least one alternate path; and

serving the object in response to the request.

2-3. (cancelled)

4. (currently amended) The method as described in claim 1 ~~5~~ wherein the alternate path is valid for a given time period.

5. (currently amended) ~~The method as described in claim 1 further including~~ A method operative in a content delivery network having a set of server nodes organized into regions, wherein the server nodes provide delivery of content on behalf of participating content providers, wherein a server node comprises a cluster of content delivery network edge servers, the method comprising:

for each given server node and a content provider origin server, identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path including at least one other content delivery network edge server that is external to the given server node;

upon receipt at a particular edge server in the given server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server over the at least one alternate path;

receiving the object over the at least one alternate path;

serving the object in response to the request; and

identifying a new alternate path as a result of changing Internet conditions.



6. (currently amended) ~~The method as described in claim 1~~ A method operative in a content delivery network having a set of server nodes organized into regions, wherein the server nodes provide delivery of content on behalf of participating content providers, wherein a server node comprises a cluster of content delivery network edge servers, the method comprising:

for each given server node and a content provider origin server, identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path including at least one other content delivery network edge server that is external to the given server node, wherein the alternate path is determined by the particular edge server as a result of performing a performance test;

upon receipt at a particular edge server in the given server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server over the at least one alternate path;

receiving the object over the at least one alternate path; and

serving the object in response to the request.

7. (original) The method as described in claim 6 wherein the performance test comprises a race, wherein the race comprises downloading a file to the particular edge server over at least the alternate path and a default Border Gateway Routing (BGP) path.

8. (original) The method as described in claim 7 wherein the race is executed by the particular edge server upon receipt of the request for the object.

9. (original) The method as described in claim 8 wherein the file that is downloaded during the race is also the object.

10. (currently amended) The method as described in claim ~~4~~ 5 wherein the at least one alternate path is other than a default Border Gateway Routing (BGP) path.

**REMARKS**

The Examiner again is thanked for the indication of allowable subject matter.

The word “include” in the first full paragraph of the body of claim 1 has been changed to “including” to improve the readability of the claim.

Claims 2-3 are cancelled, with the subject matter therein rewritten into claim 1. As amended, claim 1 now corresponds to dependent claim 3 as originally filed. Claim 1 is now in condition for allowance.

Dependent claim 5 has been rewritten into independent form. It is now in condition for allowance, as our claims 4 and 10 (each as amended) that are dependent therefrom.

Dependent claim 6 has been rewritten into independent form. It is now in condition for allowance, as our claims 7-9 that are dependent therefrom.

(See, Office action, at page 4, concerning “Allowable Subject Matter”).

**Alleged obviousness**

The rejection of original claims 1-2, 4 and 10 under § 103 as being unpatentable over McCanne, U.S. Patent No. 6,785,704, in view of Dutra et al., U.S. Patent No. 5,369,686, is acknowledged. With respect, this rejection is traversed. While the fact findings regarding McCanne are not contested, the findings regarding Dutra are believed to be inapposite. Dutra is not “within the same field of endeavor,” as it concerns point-to-point delivery of digitally encoded messages over the public-switched telephone network (PSTN). The PSTN is just the conventional public telephone network; it does not include or utilize “edge servers” or alternative paths for delivery of objects. Nevertheless, given the indication of allowable subject matter, the case can proceed to allowance on the amended claims set forth herein.

Nothing herein shall be deemed an admission regarding the Examiner’s factual findings or conclusions including, without limitation, the findings and conclusions regarding original claims 1-2, 4 and 10.

For the above reasons, a Notice of Allowance is requested.

Respectfully submitted,

/David H. Judson/

By: \_\_\_\_\_  
David H. Judson, Reg. No. 30,467

-5-

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.

<b>PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)</b>		Docket Number (Optional) AKAM-74C2	
Application Number 13/088,517		Filed April 18, 2011	
For			
Art Unit 2471		Examiner Boakye, Alexander O.	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	<u>Fee</u>	<u>Small Entity Fee</u>	
<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$150	\$75	\$ _____
<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$560	\$280	\$ _____
<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1270	\$635	\$ <u>1270</u>
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$1980	\$990	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$2690	\$1345	\$ _____

☐ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 50-1269.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

I am the ☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71.  
Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☒ attorney or agent of record. Registration Number 30,467

☐ attorney or agent under 37 CFR 1.34.  
Registration number if acting under 37 CFR 1.34 \_\_\_\_\_

/David H. Judson/

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Signature

David H. Judson

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Typed or printed name

January 25, 2012

---

Date

214-939-7659

---

Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
Application Number:		13088517		
Filing Date:		18-Apr-2011		
Title of Invention:		Optimal route selection in a content delivery network		
First Named Inventor/Applicant Name:		Claudson F. Bornstein		
Filer:		David Judson		
Attorney Docket Number:		AKAM-74C2		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with \$0 paid	1253	1	1270	1270

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				1270

Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	11920404
<b>Application Number:</b>	13088517
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	8610
<b>Title of Invention:</b>	Optimal route selection in a content delivery network
<b>First Named Inventor/Applicant Name:</b>	Claudson F. Bornstein
<b>Customer Number:</b>	26579
<b>Filer:</b>	David Judson
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	AKAM-74C2
<b>Receipt Date:</b>	25-JAN-2012
<b>Filing Date:</b>	18-APR-2011
<b>Time Stamp:</b>	16:58:56
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1270
RAM confirmation Number	3991
Deposit Account	501269
Authorized User	
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)</p> <p>Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)</p>	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)					
<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	ROA25Jan2012.pdf	34440	no	5
			4453999423bc55e747b559d364086f5d4b5d8c08		
<b>Warnings:</b>					
<b>Information:</b>					
2	Extension of Time	sb0022_25Jan2012.pdf	285678	no	2
			f28608f45df08b66fcd9d08ac3cc65fcc7e5f1c1		
<b>Warnings:</b>					
<b>Information:</b>					
3	Fee Worksheet (SB06)	fee-info.pdf	29908	no	2
			d0e009c8fa061517d6a5cd94d17fa1e881d93350		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			350026		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  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.</p>					



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.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>13/088,517</b>		Filing Date <b>04/18/2011</b>		<input type="checkbox"/> To be Mailed	
<b>APPLICATION AS FILED – PART I</b>										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s)) If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).										
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL				
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			(Column 3)		SMALL ENTITY OR OTHER THAN SMALL ENTITY		
<b>AMENDMENT</b>	<b>01/25/2012</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 8	Minus	** 20	= 0	X \$ =		OR	X \$60= 0	
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	X \$ =		OR	X \$250= 0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))									
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	<b>0</b>	
<b>AMENDMENT</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))									
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
					TOTAL ADD'L FEE		OR	TOTAL ADD'L 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 found in the appropriate box in column 1.										

 Legal Instrument Examiner:  
 /MARQUETTA MCGEE/

This collection of information is required by 37 CFR 1.16. 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, 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.



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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/088,517	04/18/2011	Claudson F. Bornstein	AKAM-74C2

**CONFIRMATION NO. 8610**

26579  
Akamai Technologies, Inc.  
ATTN: DAVID H. JUDSON  
15950 Dallas Parkway, Suite 225  
Dallas, TX 75248

## PUBLICATION NOTICE



OC000000049259878

**Title:**Optimal route selection in a content delivery network

**Publication No.**US-2011-0196943-A1

**Publication Date:**08/11/2011

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at [www.uspto.gov](http://www.uspto.gov) using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/088,517	04/18/2011	Claudson F. Bornstein	AKAM-74C2	8610
26579 7590 07/26/2011 Akamai Technologies, Inc. ATTN: DAVID H. JUDSON 15950 Dallas Parkway, Suite 225 Dallas, TX 75248			EXAMINER BOAKYE, ALEXANDER O	
			ART UNIT 2471	PAPER NUMBER
			NOTIFICATION DATE 07/26/2011	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mail@davidjudson.com  
scasterl@akamai.com  
jmatt@akamai.com

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	13/088,517	BORNSTEIN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	ALEXANDER BOAKYE	2471	

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

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on 18 April 2011.

2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) 1-10 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 1,2,4 and 10 is/are rejected.

7) ☒ Claim(s) 3,5-9 is/are objected to.

8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) ☐ 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:

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)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

<p>1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.</p>	<p>4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.</p> <p>5) <input type="checkbox"/> Notice of Informal Patent Application</p> <p>6) <input type="checkbox"/> Other: _____.</p>
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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCanne. (US Patent # 6,785,704) in view of Dutra et al. (US Patent # 5,369,686).

Regarding claims 1, 4, 10, McCanne teaches a method operative in a content delivery network having a set of server nodes organized into regions wherein the server nodes provide delivery of content on behalf of participating content providers, wherein a server node comprises a cluster of content delivery network edge servers (Figs.1-2), the method comprising: for each given server node (14, Fig.1) and a content provider origin server, serving the object in response to the request (column 6, lines 23-44 and column 9, lines 61-67). McCanne differs from the claimed invention in that McCanne explicitly fails to disclose identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path includes at least one other content delivery network edge server that is external to the given server node; upon receipt at a particular edge server in the given

server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server; receiving the object over at least one alternate path.

However, Dutra with the same field of endeavor teaches identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path includes at least one other content delivery network edge server (14) that is external to the given server node (column 8, lines 43-47); upon receipt at a particular edge server in the given server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server, (column 6, lines 23-44 and column 9, lines 61-67) ; receiving the object over the at least one alternate path (column 8, lines 43-47). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Dutra into the communication network of McCanne. One is motivated as such in order to be able to provide a system capable of providing an efficient fail-over mechanism for routing protocol messages.

Regarding claim 2, McCanne teaches wherein the object has an associated cacheability setting (column 3, lines 57-65).

***Allowable Subject Matter***

Claims 3, 5, 6-9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### Conclusion

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Boakye whose telephone number is (571) 272-3183. The examiner can normally be reached on M-F from 8:30am to 6:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi Pham, can be reached on (571) 272-3179. The Fax number 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>. Any inquiry of a general nature or relating to the status of this application or proceeding **should be directed to the Electronic Business Center (EBC) numbers at 866-217-9197 and 703-305-3028.**

/ALEXANDER BOAKYE  
Examiner of Art Unit 2471  
7/15/2011

/Chi H Pham/  
Supervisory Patent Examiner, Art Unit 2471

<b>Notice of References Cited</b>	Application/Control No. 13/088,517	Applicant(s)/Patent Under Reexamination BORNSTEIN ET AL.	
	Examiner ALEXANDER BOAKYE	Art Unit 2471	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,785,704	08-2004	McCanne, Steve	718/105
*	B	US-5,369,686	11-1994	Dutra et al.	379/93.24
	C	US-			
	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.



<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 13088517	<b>Applicant(s)/Patent Under Reexamination</b> BORNSTEIN ET AL.
	<b>Examiner</b> ALEXANDER BOAKYE	<b>Art Unit</b> 2471

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47										
CLAIM		DATE								
Final	Original	07/16/2011								
	1	✓								
	2	✓								
	3	○								
	4	✓								
	5	○								
	6	○								
	7	○								
	8	○								
	9	○								
	10	✓								

<b>Search Notes</b> 	<b>Application/Control No.</b>		<b>Applicant(s)/Patent under Reexamination</b>	
	13/088,517		BORNSTEIN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	ALEXANDER BOAKYE		2471	

SEARCHED			
Class	Subclass	Date	Examiner
370	227,351,2 35,237,23 8,400,401	7/15/2011	AB
455	556.2	7/15/2011	AB
	414.1	7/15/2011	AB
709	217,122	7/15/2011	AB
705	400,51	7/15/2011	AB

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
EAST TEXT SEARCH	7/15/2011	AB



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## BIB DATA SHEET

CONFIRMATION NO. 8610

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
13/088,517	04/18/2011	370	2471	AKAM-74C2		
<b>APPLICANTS</b> Claudson F. Bornstein, Cambridge, MA; Timothy K. Canfield, Cambridge, MA; Gary L. Miller, Pittsburgh, PA; Satish B. Rao, Berkeley, CA; Ravi Sundaram, Cambridge, MA;						
<b>** CONTINUING DATA *****</b> This application is a CON of 11/858,261 09/20/2007 PAT 7,929,429 and is a CON of 10/087,033 03/01/2002 PAT 7,274,658 which claims benefit of 60/273,241 03/01/2001						
<b>** FOREIGN APPLICATIONS *****</b>						
<b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 04/27/2011						
Foreign Priority claimed	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<b>STATE OR COUNTRY</b>	<b>SHEETS DRAWINGS</b>	<b>TOTAL CLAIMS</b>	<b>INDEPENDENT CLAIMS</b>
35 USC 119(a-d) conditions met	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Met after Allowance	MA	4	10	1
Verified and	/ALEXANDER O BOAKYE/	AB				
Acknowledged	Examiner's Signature	Initials				
<b>ADDRESS</b> Akamai Technologies, Inc. ATTN: DAVID H. JUDSON 15950 Dallas Parkway, Suite 225 Dallas, TX 75248 UNITED STATES						
<b>TITLE</b> Optimal route selection in a content delivery network						
<b>FILING FEE RECEIVED</b> 1090	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees		
				<input type="checkbox"/> 1.16 Fees (Filing)		
				<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)		
				<input type="checkbox"/> 1.18 Fees (Issue)		
				<input type="checkbox"/> Other _____		
				<input type="checkbox"/> Credit		



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
13/088,517	04/18/2011	2447	1090	AKAM-74C2	10	1

CONFIRMATION NO. 8610

26579

Akamai Technologies, Inc.  
ATTN: DAVID H. JUDSON  
15950 Dallas Parkway, Suite 225  
Dallas, TX 75248

FILING RECEIPT



\*OC000000047392946\*

Date Mailed: 05/03/2011

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**Assignment For Published Patent Application**

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**Domestic Priority data as claimed by applicant**

This application is a CON of 11/858,261 09/20/2007 PAT 7,929,429  
and is a CON of 10/087,033 03/01/2002 PAT 7,274,658  
which claims benefit of 60/273,241 03/01/2001

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**If Required, Foreign Filing License Granted: 04/27/2011**

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/088,517**

**Projected Publication Date:** 08/11/2011

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**Early Publication Request:** No  
**Title**

Optimal route selection in a content delivery network

**Preliminary Class**

709

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875						Application or Docket Number 13/088,517				
<b>APPLICATION AS FILED - PART I</b>										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	330			
SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A			N/A	540			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	220			
TOTAL CLAIMS (37 CFR 1.16(i))	10	minus 20 = *				x 52 =	0.00			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *				x 220 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$270 (\$135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00			
			TOTAL			TOTAL	1090			
* If the difference in column 1 is less than zero, enter "0" in column 2.										
<b>APPLICATION AS AMENDED - PART II</b>										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L 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 found in the appropriate box in column 1.										

## OPTIMAL ROUTE SELECTION IN A CONTENT DELIVERY NETWORK

This application is a continuation of Serial No. 11/858,261, filed September 20, 2007, now U.S. Patent No. 7,929,429, which application was a continuation of Serial No. 10/087,033, filed March 1, 2002, now U.S. Patent No. 7,274,658, which application was based on and claimed priority from Serial No. 60/273,241, filed March 1, 2001.

### BACKGROUND OF THE INVENTION

#### Technical Field

The present invention relates generally to finding the best way to route messages between various locations across the Internet while quickly adjusting to changing network conditions.

#### Description of the Related Art

Optimal online performance has become a paramount focus for enterprises seeking to deliver a rich, interactive user experience. As more and more of today's business transactions are conducted via the Internet, companies must make certain that transactions are executed without interruption. Whether it is a purchase form, an online reservation, a customer survey or an information update, the enterprise must have some way to ensure that the transaction is complete.

One way that enterprises have sought to manage and move information effectively via the Internet is through the use of content delivery networks. A content delivery network or "CDN" is a network of geographically distributed content delivery nodes that are arranged for efficient delivery of content on behalf of third party content providers. A request from a requesting end user for given content is directed to a "best" replica, where "best" usually means that the item is served to the client quickly compared to the time it would take to fetch it from the content provider origin server.

Typically, a CDN is implemented as a combination of a content delivery infrastructure, a request-routing mechanism, and a distribution infrastructure. The content delivery infrastructure usually comprises a set of "surrogate" origin servers that are located



at strategic locations (e.g., Internet network access points, Internet Points of Presence, and the like) for delivering copies of content to requesting end users. The request-routing mechanism allocates servers in the content delivery infrastructure to requesting clients in a way that, for web content delivery, minimizes a given client's response time and, for  
5 streaming media delivery, provides for the highest quality. The distribution infrastructure consists of on-demand or push-based mechanisms that move content from the origin server to the surrogates. An effective CDN serves frequently-accessed content from a surrogate that is optimal for a given requesting client. In a typical CDN, a single service provider operates the request-routers, the surrogates, and the content distributors. In addition, that  
10 service provider establishes business relationships with content publishers and acts on behalf of their origin server sites to provide a distributed delivery system. A well-known commercial CDN service that provides web content and media streaming is provided by Akamai Technologies, Inc. of Cambridge, Massachusetts.

While content delivery networks provide significant advantages over prior  
15 techniques (e.g., proxy caching and mirroring), their performance is dependent generally on the performance of the Internet, which is far from an ideal communications medium. When a path in the network is either congested or faulty, packets sent over that path can get dropped or delayed. In spite of the existence of less congested paths, Internet routers might not be aware, willing or allowed to use these paths. Economical issues can also interfere  
20 with the best routing. Some routers might be configured to route packets using the cheapest route as opposed to the fastest route. Similarly, contractual issues also affect routing: for instance, first tier network providers must talk directly at their peering points and are not allowed to route through an intermediary provider. The peering points themselves often become a bottleneck at certain times of the day.

25 When a problem occurs on the Internet, it takes a certain amount of time for the routers to converge on a new view of the network, and to decide on the appropriate routing. Possible causes of these problems include router misconfiguration, software and hardware problems, and even fiber cuts. For example, a number of router problems can last about 5 minutes, and then simply go away. An actual misconfiguration can last significantly longer.

In December, 2000, a router misconfiguration on a large network caused a large number of other routers to route their traffic to that particular router, thus overloading it. This condition lasted for a few hours, and it caused a significant slowdown on the Internet. A common problem in certain routers can cause partial network unreachability that can last  
5 for a few hours and can be very hard to detect. In June, 2001, two network providers stopped peering for administrative reasons. This made hosts in one provider's network simply unreachable by hosts in the other provider's network. This situation lasted for a few days.

In reality, it is not practical to understand all possible Internet problems and reasons  
10 why the best route between two points is not always followed. Edge servers operating within a content delivery network often have need to return to a content provider's origin server, e.g., when requested data is not available at the server or is otherwise stale, to obtain non-cacheable content, and the like. While sophisticated CDNs can route around network congestion and other problems, there remains a need to provide improved  
15 techniques to optimize the edge server-origin server communication path.

The present invention, in particular, addresses the problem of finding the best way to route data between content delivery network (CDN) regions and content providers, while quickly adjusting to changing network conditions.

**BRIEF SUMMARY OF THE INVENTION**

It is a general object of the present invention to improve the speed and reliability of data transfers in a distributed networking environment, such as a content delivery network.

It is another general object of this invention to provide techniques for transferring  
5 data packets from one node to another node via an intermediate node based on network performance data collected over time.

It is another more specific object of the invention to provide a routing service within a distributed network such as a content delivery network whereby traffic is moved from a first region to a second region by sending it (i.e., “tunneling”) through an  
10 intermediate region.

It is still another specific object to provide a novel routing mechanism, service or system in a content delivery network. The invention enables an edge server operating within a given CDN region to retrieve content (cacheable, non-cacheable and the like) more efficiently by selectively routing through the CDN’s own nodes, thereby avoiding  
15 network congestion and hot spots. The invention thus enables an edge server to fetch content from an origin server through an intermediate CDN server or, more generally, enables an edge server within a given first region to fetch content from the origin server through an intermediate CDN region. As used herein, this routing through an intermediate server, node or region is sometimes referred to as “tunneling.”

It is yet another more specific object of the invention to provide a routing service  
20 that predicts a best path for a data transfer between a source location (e.g., a content provider origin server) and a target location (e.g., a CDN edge server) by analyzing some performance metric common to a set of possible routes. In an illustrative embodiment, the performance metric is download time. In this embodiment, the performance metric is  
25 evaluated by having the edge server initiate a file download “race” in response to receiving a request for given content. In particular, a number of simultaneous downloads of the given content are initiated from the source location over a plurality of routes, some of which may include intermediate nodes. The winning path is then used for transfers between the source and the target locations for a given time period (e.g., until the next

race).

According to an embodiment of the present invention implemented within a CDN, the identification of the intermediate nodes (and, thus, the alternative routes) to use for the race is determined in an off-line mapping process by performing given network traffic tests. In particular, a map making process operable within the CDN preferably determines the distances between given CDN “core” regions and the content provider, preferably based on ping data (age, loss and latency). The map making process then computes the best one and two-hop paths to the content provider from every CDN datacenter and publishes those paths (e.g., via DNS) as a “map.” The usable intermediate CDN servers are typically set on a per content provider basis according to a given content provider policy, which is sometimes referred to as a strategy.

Thus, according to one embodiment of the invention, a map making process (which may be global-based) typically performs given network tests (e.g., pings) and uses the results of those tests to generate a map comprising a plurality of routes: the best route to the customer site, the best intermediate or “middle” region for tunneling, and the next best middle region. These routes may then be ordered according to some performance metric (e.g., actual download times) determined by periodic analysis (e.g., file download races) carried out locally by or under control of a given edge server.

According to another aspect of the present invention, a routing service may operate in one of two different modes: performance and failover. The performance mode continually polls the potential retrieval routes to rank their performance and uses the best route to retrieve content. The failover mode instructs the CDN edge server to go forward to the origin directly, but, in the event the direct route fails, to try one of the alternate routes. In the event the direct route fails, the alternate routes are tried in turn. This strategy need not use races to choose a route, because the direct route is to be used unless it completely fails to respond.

The foregoing has outlined some of the more pertinent features of the present invention. These features should be construed to be merely illustrative. Many other beneficial results can be attained by applying the disclosed invention in a different manner

or by modifying the invention as will be described.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a block diagram of a known content delivery network in which the present invention may be implemented;

5 Figure 2 is a simplified block diagram of a CDN edge server that is provisioned with a guide process for implementing certain functions of the present invention;

Figure 3 is a simplified illustration showing how an edge server in a content delivery network fetches content from a content provider origin server without use of the present invention;

10 Figure 4 illustrates how the present invention may be used to enable the edge server to fetch content from the content provider origin server over one or more alternative routes that may each include an intermediate CDN node;

Figure 5 is a simplified diagram of how the present invention operates in a performance mode;

15 Figure 6 is a simplified diagram of how the present invention operates in a failover mode;

Figure 7 is a simplified diagram of the modules that comprise the routing system of the present invention; and

Figure 8 illustrates how a shortest path may be computed between a pair of nodes in a network.

20

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

As described above, it is known in the art to delivery HTTP, streaming media and applications over an Internet content delivery network (CDN or ICDN). The present invention may leverage Internet CDN architecture and functionality such as now generally described.

As seen in Figure 1, an Internet content delivery infrastructure usually comprises a set of "surrogate" origin servers 102 that are located at strategic locations (e.g., Internet network access points, and the like) for delivering copies of content to requesting end users 119. A surrogate origin server is defined, for example, in IETF Internet Draft titled "Requirements for Surrogates in the HTTP" dated August 9, 2000, which is incorporated herein by reference. The request-routing mechanism 104 allocates servers 102 in the content delivery infrastructure to requesting clients in a way that, for web content delivery, minimizes a given client's response time and, for streaming media delivery, provides for the highest quality. The distribution infrastructure consists of on-demand or push-based mechanisms that move content from the origin server to the surrogates. A CDN service provider (CDNSP) may organize sets of surrogate origin servers as a "region." In this type of arrangement, a CDN region 106 typically comprises a set of one or more content servers that share a common backend, e.g., a LAN, and that are located at or near an Internet access point. Thus, for example, a typical CDN region may be co-located within an Internet Service Provider (ISP) Point of Presence (PoP) 108. A representative CDN content server is a Pentium-based caching appliance running an operating system (e.g., Linux, Windows NT, Windows 2000) and having suitable RAM and disk storage for CDN applications and content delivery network content (e.g., HTTP content, streaming media and applications). Such content servers are sometimes referred to as "edge" servers as they are located at or near the so-called outer reach or "edges" of the Internet. The CDN typically also includes network agents 109 that monitor the network as well as the server loads. These network agents are typically co-located at third party data centers or other locations. Map maker software 107 receives data generated from the network agents and periodically creates maps that dynamically associate IP addresses (e.g., the IP addresses of

client-side local name servers) with the CDN regions.

In one type of service offering, known as Akamai FreeFlow, from Akamai Technologies, Inc. of Cambridge, Massachusetts, content is tagged for delivery from the CDN using a content migrator or rewrite tool 106 operated, for example, at a participating  
5 content provider server. Tool 106 rewrites embedded object URLs to point to the CDNSP domain. A request for tagged content is resolved through a CDNSP-managed DNS to identify a “best” region, and then to identify an edge server within the region that is not overloaded and that is likely to host the requested content.

Instead of using content provider-side migration (e.g., using the tool 106), a  
10 participating content provider may simply direct the CDNSP to serve an entire domain (or subdomain) by a DNS directive (e.g., a CNAME). In such case, the CDNSP may provide object-specific metadata to the CDN content servers to determine how the CDN content servers will handle a request for an object being served by the CDN. Metadata, as used  
15 herein, thus refers to the set of all control options and parameters for the object (e.g., coherence information, origin server identity information, load balancing information, customer code, other control codes, etc.), and such information may be provided to the CDN content servers via a configuration file, in HTTP headers, or in other ways. A  
20 configuration file is advantageous as it enables a change in the metadata to apply to an entire domain, to any set of directories, or to any set of file extensions. In one approach, the CDNSP operates a metadata transmission system 116 comprising a set of one or more servers to enable metadata to be provided to the CDNSP content servers. The system 116 may comprise at least one control server 118, and one or more staging servers 120a-n, each of which is typically an HTTP server (e.g., Apache). Metadata is provided to the control server 118 by the CDNSP or the content provider (e.g., using a secure extranet application)  
25 and periodically delivered to the staging servers 120a-n. The staging servers deliver the metadata to the CDN content servers as necessary.

Figure 2 illustrates a typical machine configuration for a CDN content edge server. Typically, the content server 200 is a caching appliance running an operating system kernel 202, a file system cache 204, CDN software 206, TCP connection manager 208, and disk



storage 210. CDN software 206, among other things, is used to create and manage a “hot” object cache 212 for popular objects being served by the CDN. For HTTP content, the content server 200 receives end user requests for content, determines whether the requested object is present in the hot object cache or the disk storage, serves the requested object via HTTP (if it is present), or establishes a connection to another content server or an origin server to attempt to retrieve the requested object upon a cache miss. Generalizing, a cache miss can occur when the requested object is not in cache, when the requested object is in cache but is stale, when the requested object is non-cacheable, or the like. In all such cases, it may be necessary for the edge server to contact a content provider origin server to fetch the requested object. The present invention provides a technique for enabling the edge server to use an optimal path for that communication. To that end, CDN software 206 includes a guide process 215 that performs various functions to facilitate the optimized routing technique of the present invention. Generally, guide process 215 fetches a route map from a map maker process 220 (running elsewhere in the network), initiates performance metric tests (e.g., download races) on various routes identified in the map, collects and analyzes the results of those tests, and orders the routes accordingly so that the edge server can communicate with a content provider origin server via an optimal route whenever necessary. As used herein, “optimal” is not necessarily the best possible route in any kind of absolute sense; rather, it is a best route found given whatever constraints are then imposed on the network, various systems, connectivity constraints, and the like. The guide process is a computer program code, i.e., a series of program instructions, executable by a processor.

Generalizing, the present invention may be implemented as a routing mechanism, service or system in a distributed networking environment. One preferred environment is a content delivery network wherein the present invention provides improved connectivity back to an origin server for HTTP traffic. As noted above, a CDN service provider typically segments its servers into regions, with each region comprising a set of content servers (e.g., up to about ten (10) servers) that preferably operate in a peer-to-peer manner and share data across a common backbone such as a local area network (LAN). The

inventive routing technique enables an edge server operating within a given CDN region to retrieve content (cacheable, non-cacheable and the like) more efficiently by selectively routing through the CDN's own nodes, thereby avoiding network congestion and hot spots. The invention thus enables an edge server to fetch content from an origin server through an intermediate CDN server or, more generally, enables an edge server within a given first region to fetch content from the origin server through an intermediate CDN region. As used herein, this routing through an intermediate server, node or region is sometimes referred to as "tunneling."

The present invention identifies alternate paths from a CDN edge server to an origin server and uses these alternates to either improve the performance of content delivery, or to provide for fail-over in the event that the direct route is congested or otherwise unavailable. When an edge server contacts the origin server, the "direct" route typically is the route obtained through the Border Gateway Protocol (BGP). When the inventive routing technique is used, in contrast, alternate routes to the origin server are accessed by sending the request from the edge server to another intermediate (preferably CDN-managed) server/region before going to the origin. While one might assume that adding the intermediate step would reduce performance, it frequently improves performance, because CDN servers and regions typically are well-connected, and the indirect route can often bypass network congestion.

Preferably, given CDN edge servers are configured with a plurality (e.g., at least two) alternate routes to use in addition to the direct route to the origin. These intermediate servers preferably are specific to the given edge server and origin server to be contacted. Figures 3-4 illustrate the basic concept of routing through intermediate CDN regions according to the present invention. In Figure 3, an end user request is directed (e.g., through a DNS request routing mechanism) to an edge server located at a datacenter 300 in Texas. In this case the content provider is operating mirrored origin servers at a datacenter 302 on the East Coast, and at a datacenter 304 on the West Coast. In a typical scenario, the edge server connects to the datacenter 302 over a direct connection 306 if it becomes necessary to fetch content from the origin server. In Figure 4, in contrast, a pair of

alternative routes is made available to the edge server. One alternative route 402 uses region 406, which is located intermediate of the datacenter 402 and the datacenter 400 to which the end user was originally directed. Another alternative route 408 uses region 410, which is located intermediate of the datacenter 404 and the datacenter 400. In the example  
5 shown in Figure 4, there are thus three (3) routes over which the edge server in datacenter 400 can fetch the desired content from the origin server: over the direct connection, over route 402, or over route 408. According to the invention, one of these routes is selected as optimal, preferably by having the edge server evaluate some given performance metric, such as file download time. The various alternative routes are exposed to the edge server  
10 in a map that is published by a (preferably global-based) map making process. Preferably, a given map is specific to a given customer and to the specific region at which the initial request is received from an end user.

The routing system of the present invention may operate in one of two basic modes. In a performance mode, illustrated in Figure 5, an edge server provisioned with the guide  
15 process carries out periodic races to find the fastest route to the origin server. This ensures that content required by (but unavailable from) the edge server is delivered from the origin server in the quickest fashion. In a failover mode, illustrated in Figure 6, the edge server automatically detects when the route to the origin server is inaccessible and invokes the routing service to find an alternative route to reach the origin server. The failover mode  
20 enhances reliability of the overall content delivery network, and ensures that even dynamic, uncacheable content can always be delivered.

Preferably, the intermediate servers that are available for alternative routes between a given edge server (or region) and a given origin server are updated frequently (e.g., every 15-30 minutes) based on the current performance of connections between CDN servers.

25 In the preferred embodiment of the invention, the choice of which route an edge server should use to reach a given origin server preferably is made in three phases, which are described below: (a) a map of potential alternate routes is created (preferably by a global-based process called a mapmaker); (b) current ping data is used to identify the two best alternates for each CDN edge server (again, preferably by the mapmaker); and (c) each

CDN edge server chooses among the direct route and the alternate routes based on the current actual performance with real requests for content. In particular, in a preferred embodiment, the CDN edge servers use occasional "races" among identical requests to determine which of the plurality (e.g., typically three (3)) possible routes is performing the best and then choose the route to use when going forward for the current and future requests. As will be described below, the parameters for these races are highly configurable to optimize the performance for the type of content being served and the intended result.

Before the inventive routing service is enabled for a given site, a large number (e.g., up to 100 CDN server regions) are identified as potential intermediate servers. These regions may be chosen on any available network performance metrics, e.g., such as analysis of ping data between CDN edge servers and well-connected CDN core servers and from these core servers to the origin. Once intermediate servers have been identified, they are used to define a "map" from CDN edge servers and the origin server. The invention preferably uses a custom map for each site because sites are hosted all over the Internet, on different backbones and in different geographic locations. As a result, the indirect routes that result in the best behavior are different for each CDN customer that uses the routing service. The indirect routes are then ordered such that the intermediate servers that provide the best performance for each given edge server are listed first. Notice that in the preferred embodiment the indirect routes are specific to each edge server and each customer origin server. The mapping is updated frequently (e.g., approximately every 15-30 minutes) based on current ping data to ensure optimal performance. When a CDN edge server requests its current map (preferably via a DNS lookup on a given routing service domain), it receives a given number (e.g., the two) top performing routes as alternates. The edge server then chooses among these alternate routes and the direct route by occasionally testing the performance of each connection, e.g., with a request for content.

As noted above, the inventive routing service preferably determines which route is the best at any given time by performing "races." These races consist of having the edge server forward a client request through the a given number (e.g., three (3)) available routes

simultaneously and observing which route performed the best in serving the request. The information is then used to choose the primary route for future requests. Moreover, that route preferably remains the primary route until the next race is conducted. These races allow the routing service to react to changes in the Internet very quickly. A race preferably  
5 is initiated upon arrival of a request from an end user, and the CDNSP preferably configures how often a race will occur by setting one or more of the following preferred parameters: (a) the minimum amount of time that should elapse between races (with a default to, e.g., 30 seconds); (b) the minimum number of client requests that should arrive before each new race (with a default to, e.g., 40 requests); (c) the maximum amount of time  
10 that should elapse between races (with a default to, e.g., five minutes). The last parameter ensures that a race will occur at least this often and thus ensures that the best route is the one being used.

According to the invention, races are configurable to use either the actual object requested by a client (called a Request Object) or a predetermined test object on the origin  
15 server (called a Test Object), or both. Request Object races are generally preferable to Test Object races because the end user client that initiated the Request Object race can take advantage of the results, in particular, because the end user is served from the route that provided the fastest first-byte turn-around time. However, there are some cases where Request Objects are not possible and Test Objects are a good alternative. A Request  
20 Object race uses the object requested by the end user as the object it requests from the origin server. That is, if a browser requests ...://us.a1.yimg.com/us.yimg.com/i/ww/m5v5.gif, the CDN edge server will request ...://us.yimg.com/i/ww/m5v5.gif from all three forward servers. When this type of race is used, one may also configure a maximum number of bytes that should be downloaded  
25 through the losing routes. For example, the default configuration is to download up to 56K of data on the losing routes and then terminate the connection(s). The entire file is downloaded from the winning route, because this response is served to the end user client. The race preferably is scored based on the performance retrieving the 56Kbytes of data, although this is not a limitation of the invention.

Races that use Request Objects may cause a problem for some sites because the origin server will receive three identical requests. If these requests impact billing or initiate some backend transaction, several anomalies may occur. A Test Object race uses an object specified in metadata as the object requested from the origin server across the three  
5 routes. The benefit of this is that the Test Object can be a special object that does not impact the origin server's logging or initiate backend transactions.

The edge server scores the races preferably based on three measurements: Request End Time; Turnaround Time (the first byte returned); Turnaround Time (the first byte returned). One can apply weightings to these measurements to influence the final scoring.  
10 For example, one could weight the transfer time more heavily to ensure that a rapid first byte score from a route would not erroneously determine the choice of the optimal route for fairly large files. Once the individual races have been scored, the CDN edge server compares those scores to choose the best route. Just as it is possible to weight one of the measurements in determining the score for the routes, it is also possible to favor the direct  
15 or indirect routes depending on the desired result. Normally the direct route is favored over the indirect routes. One could specify that, to be chosen, an indirect route must be faster than the direct route: by a given percent; by a specific number of milliseconds; by a given percent and an absolute number of milliseconds, or some combination thereof.

As noted above, the routing service operates in one of two modes: performance and  
20 failover. The performance mode continually polls the potential retrieval routes to rank their performance and uses the best route to retrieve content. The strategy preferably comes in two versions: origin-weighted and indirect-weighted. The origin-weighted strategy weights going direct to the origin as slightly more favorable than taking the indirect route. The indirect-weighted strategy favors the indirect route over the direct route  
25 to the origin server. This can be useful in providing a buffer for the origin server, while still allowing for direct contact to the origin in the event that the parent server is not providing sufficiently better service. The failover mode instructs the CDN edge server to go forward to the origin directly, but, in the event the direct route fails, to try one of the alternate routes. In the event the direct route fails, the alternate routes are tried in turn.

This strategy need not use races to choose a route, because the direct route is to be used unless it completely fails to respond. The alternate routes preferably are determined based on the ping data and are listed in the order that they should be used.

Normally the CDN edge server will try to reach the origin server a given number of  
5 times with a specified timeout for each attempt. This timeout may be generally fairly long (several seconds), to ensure that a congested route does not cause the timeout to be triggered unnecessarily. When the inventive technique is enabled, each attempt to reach the origin server for a given request may involve trying the three possible routes in sequence as the connection attempts timeout. Because there are three routes to try, the  
10 timeout for each attempt can be relatively short (one second) in the hope that the timeout is a problem with the route, and not with the origin server. Only after all three routes have failed does the CDN edge server then attempt to reach the origin directly with the normal full-timeout. The logic being that if all routes have timed out, the problem is not likely to be a congested route, and it may be necessary to give the origin server more time to  
15 respond to the connection attempt. If that final connection attempt times out, the CDN edge server can initiate the fail-action to serve an error, serve default content, or retrieve content from an alternate origin server.

Referring to Figure 7, the routing system has two basic modules that are now described: a mapmaker 700, which resides in a small number of preferably well-located  
20 regions (three to six regions) and that has a global view of the network, and the guide 702, which is integrated into each provisioned edge server and that gives the edge server a more precise, but local view of the network. The mapmaker 700 is responsible for collecting information and computing the best routes to get to content providers from each of the CDN regions. It makes the best route information available to other mechanisms in the  
25 CDN network. These routes preferably are computed based on ping data from a subset of the CDN regions, which may be referred to as “core” regions. These regions are the candidate intermediate regions for the tunneling operation. Preferably there are multiple mapmaker machines, with each machine being a server running commodity hardware and operating system software. The mapmaker machines are dynamically configurable.

Preferably, they receive a file that specifies the content providers for which maps should be built, and the information about the content provider necessary to build a map. This information includes, for example, a list of datacenters and pingable IPs for that datacenter, whether by name, IP address or ping equivalency with existing CDN regions. Further  
 5 information about the content provider may include reverse proxies, a serial number, a metric to be used in computing distances, the number of alternative routes to provide, and other configuration parameters. The information for each content providers forms what is sometimes called a strategy. One strategy may be used for more than one actual content provider: an example might be a generic strategy for a company which delivers content out  
 10 one site and another in a mirror site. On the other hand, one content provider may have one strategy for HTML and another for images.

Preferably, the datacenters that are usable as intermediate regions are set on a per strategy basis. Candidate regions may be removed for various reasons, e.g., the region is disabled, the region is at or near a given load capacity, or the like, and it may be desirable  
 15 to allocate given intermediate regions to given customers.

The mapmaker constantly gathers liveness as well as ping data about the CDN regions. For example, a given agent in the CDN pings at least one edge server per region, and one IP address per each datacenter listed in the strategies. The mapmaker relies on the ability to predict how good a path is based on ping data. Ping latency and ping loss  
 20 between pairs of regions may be used to compute value that is considered the effective distance between those two regions, or some other convenient estimate may be used. It is assumed that pings are symmetric with respect to pinger and pingee as illustrated in Figure 8. In particular, Figure 8 illustrates three (3) regions A, B and C. In computing paths, a question arises as to whether the distance “dist” between region A and C should be:  $L_1 = \text{dist}_1 + \text{dist}_2$ ,  $L_2 = (\text{dist}_1^2 + \text{dist}_2^2)^{1/2}$ ,  $L_{\text{infinity}} = \max\{\text{dist}_1, \text{dist}_2\}$ , or some other metric, where  
 25  $\text{dist}_1$  is the distance between regions A and B and  $\text{dist}_2$  is the distance between regions A and B. For the sake of understanding how these distances should be combined to infer the distance through a middle region, it is assumed that there is no ping loss. In this case, the latency incurred by tunneling through an intermediate node should be the sum of the ping



times plus a retransmission time for processing at the intermediate node. However, when moving an arbitrarily large file, then it has been found that the maximum of the download times between the two pairs of regions is a good estimator of the time required to transfer the file, since the actual transfer can be “pipelined.” Instead of using either of the two  
5 extremes (the  $L_1$  and  $L_2$  metrics), a good estimator for the transmission latency may be the  $L_2$  norm.  $L_{1.4}$  strikes a good balance between the two extremes.

For each content provider the mapmaker logically generates a number of maps, which can be identified as follows: Closest CP Map: the domain name of the closest mirror site for the content provider; Closest Reverse Proxy Map: the domain name of the closest  
10 reverse proxy if one exists; and Best Two-Hop Map: a list of usually two parent regions that should used to reach the mirror site. The first two maps are very similar in nature — they map each region to the closest possible source of data for each content provider. The Closest Reverse Proxy Map is not needed if there is no reverse proxy. Other factors can affect the choice of paths for the Two-Hop map. In general terms, the Two-Hop map  
15 encodes the two (or more) shortest paths from each region to mirror site of the content-provider, that go through at most one (active) middle region. The regions that can be used as an intermediate hop in the paths are usually the same regions that do the pinging, but the intermediate hop can also be explicitly specified as a subset of those regions.

As noted above, preferably the mapmaker relies on ping data as opposed to  
20 information about the actual download times each region experiences, or even what paths are actually used by the region to perform downloads. That information preferably is kept locally at each region. The guide process is the component within the edge server responsible for deciding which of the possible paths should be used. An edge server that is provisioned for the routing service thus includes the guide process, which is typically  
25 software. More generally, the guide computes an ordering or list of the possible paths/parents that could be used to obtain the content. The edge server tries parents in order: if a parent fails or times-out then the edge server will request content from the next parent. If the routing service is enabled for a given site and the edge server receives requests for data in that site, the edge server will occasionally, while responding to the

request, measure the performance of a given number (e.g., three) simultaneous downloads from that site: one directly from the content provider, and a plurality (e.g., two) from the intermediate regions suggested by the two-hop map published by the mapmaker. The edge server then uses the results of this test to estimate which route should be used to access that site, until a new test occurs. If a long time elapses without a test, the previous results expire. It may also be desirable to allow for the downloads between tests to affect the predicted quality of each of the routes, thus allowing for an even faster response time to a network problem, without requiring additional tests.

When a request comes in and is not purely cacheable, it results in the download of a file from the content provider. This is what is sometimes called a forward request. On forward requests for sites that are provisioned to use the routing system and service, the results of the previous test are used to choose the route for the download. The exceptions to this rule occur if the content can be and is itself used for a test or if there are no recent test results available. In the first case, the download preferably occurs through all (e.g., three (3)) routes, and the one that returns the first byte faster will be used to serve a client. The other two will have their results recorded and will be allowed to proceed for up to 56k bytes, after which they will be aborted. If however, the content cannot be used for a test and there are no recent test results available, a default ranking is used to decide on which route to use. The default order can either specify that the direct or the indirect route should be favored.

Preferably, tests are linked to a forward request, meaning they do not happen if there has been no forward request to that site. In the case of a forward request, a test is by default preferably run when: no test occurred in a given number of minutes, or at least a given number of seconds have passed since the last test, or if at least a given number of forward requests from this site did not result in tests. These settings try to ensure that for a site with a reasonable amount of volume there will always be fresh statistics for the download paths while at the same time limiting the amount of testing that is performed over the network as a whole.

Once a decision is made to use the routing service, one must also decide on what

map to use. Preferably, the CDNSP creates a new strategy for the customer's site. Once the mapmaker machines receive the new strategy, they update their list of pingees, start collecting ping data for the updated list, and start producing maps for the additional strategy. Once a map is being published for the site, the routing service is enabled for the  
 5 site. When an edge server receives a request that results in a forward request, the edge server has to decide what route to take.

As noted above, preferably the CDN includes a metadata transmission system. Metadata can be used to control the routing service, as is now described. Some representative metadata tags that may be used are listed below, with a brief explanation of  
 10 their meanings:

<u>Metadata Tag</u>	<u>Meaning</u>
use-hierarchy	the map that should be used
cdnroute-test-object-url	url to be used in tests
cdnroute-use-test-object	test-objects should be used, i.e., tests should use the selected url
cdnroute-max-time-before-tobj	desired time between tests
cdnroute-direct-scale	ratio between direct and indirect test results before indirect is used
cdnroute-non-tail-connect-timeout	time before routing fails-over to another parent if it cannot connect
cdnroute-direct-at-end	specifies if indirect should be favored in the absence of tests results

Thus, to provide an illustrative embodiment, the use-hierarchy tag is first enabled to enable the routing service to take effect, e.g., with default settings. In addition to the use-hierarchy tag, the following metadata tags (among others) could then be set to configure the  
 15 routing service for the best performance:

```
<md name="cdnroute-non-tail-connect-timeout">1</md>
<md name="cdnroute-direct-scale">95</md>
```

As noted above, the inventive routing service can be configured in a failover mode that does not use performance testing. In such case, the edge server is given three parents: that of the content provider (direct) and two indirect routes. In failover mode, the edge  
 5 server contacts direct first. If for some reason this connection fails, the edge server will try its first parent, then its second parent, and finally back to direct. Because the mapmaker is constantly publishing up-to-date indirect routes, these failover servers are likely to serve the content successfully. When failover mode is used, the configuration may include a metadata tag for disabling test clients:

10 <md name="cdnroute-no-test-client">on</md>.

The following provides additional detail regarding how to configure races in the performance mode. Preferably, races for a given route strategy occur when the edge server receives a request for content configured to use that strategy. When a request arrives, the server preferably looks at two pieces of data: the amount of time since the last race for this  
 15 strategy, and the number of connections since the last race for this strategy. There are preferably three (3) conditions that can be applied (e.g., via metadata) to these two pieces of information:

cdnroute-max-time-before-tc: The maximum amount of time before performing a race (default: 5m): <md name="cdnroute-max-time-before-tc">500</md>

20 cdnroute-max-req-before-tc: The maximum number of requests after which a race will be performed (default: 40): <md name="cdnroute-max-req-before-tc">1000</md>

cdnroute-min-tc-period: The minimum amount of time that must have elapsed before performing a race (default: 30s): <md name="cdnroute-min-tc-period">120</md>.

Request Object races use the client request for the test client and use the settings  
 25 above to control the frequency of the races. In addition to these settings, there may be additional tags for controlling the use of request object races. For example, a tag such as

racer-max-byte takes as its value a number in bytes from 0 to 2MB. It defaults to 56K and may be set as follows: `<md name="racer-max-byte">32000</md>`. This metadata limits the amount of data downloaded by the losing routes when a race is performed. The following header will cause the inclusion of a header binding the test client requests together so that the duplicate requests can be identified as such: `-CDNSP-TC-Identifier: t[co]-<IP>-<edgeserver_curtime>-<incrementing counter>`. The initial string is "tc" for test clients and "to" for test objects. Test objects are like request objects, except the URL being requested is replaced with a fixed URL configured through metadata. The following is an example of how to set this up:

```
10 <md name="cdnroute-use-test-object">on</md>
    <md name="cdnroute-test-object-url">http://www-
    es1.customer.com/cdnroute/test_object.txt</md>
    <md name="cdnroute-use-my-metadata">on</md>
```

An illustrative technique for scoring the races is now described. This description is merely representative. The score for each of the routes is made up of the request\_end\_time, the turnaround\_time and the transfer\_time. These times are multiplied by their specified weights and then summed. Each of the items may be weighed using a separate metadata tag and, preferably, each of these tags has an equivalent value. In this example, the cdnroute weighting tags all take as their value a number between -20 and +20. The default setting is one "1".

cdnroute-ret-weight - Request End Time Weighting

```
<md name="cdnroute-ret-weight">0</md>
```

Default is 0

cdnroute-tt-weight - Turnaround Time Weighting (first byte)

```
25 <md name="cdnroute-tt-weight">1</md>
```

Default is 1

cdnroute-xt-weight - Transfer Time Weighting

<md name=cdnrout-xt-weight>1</md>

Default is 1

- 5           The cdn route-direct-scale tag is used to apply a weighting to the total score for the direct route. This value of the tag is a number, and it works like a percent. The scores of the indirect parents are automatically multiplied by 100, so a number less than 100 will decrease the score for the direct route relative to the other routes and make it more likely to be chosen. For example, setting the value to 50 will favor the direct route twice as much as
- 10   the indirect route. A setting of 120 would favor the indirect routes. The tag may be configured as follows: md name="cdnroute-direct-scale">100</md>. The cdnroute-direct-scale takes as its value a number between 0 and 255. The default value is 100, but 95 is a useful value.

- The cdnroute-absolute-direct-scale tag takes a number from –2000 to +2000 that
- 15   represents a number of milliseconds. This is normally set to 10. The number is an offset that is subtracted from the direct route score to ensure that the indirect route must be at least this amount better than the direct route before it is chosen as the best route.

- One of ordinary skill in the art will appreciate that the technique of tunneling through an intermediate CDN node for the purpose of faster and more reliable region-to-
- 20   origin server may be extended to facilitate region-to-region communication. Each CDN server for a given client request may play one of three different roles: edge-server, middle-server or root-server. An edge-server is a server receiving an HTTP request from a client. A root-server is a CDN server that retrieves the content directly from the content provider origin server. Thus, a root-server may be co-located or located near a content provider
- 25   origin server, although this is not a requirement. Any CDN server node that lies between the edge-server and the root-server is a middle-server. These CDN servers simply forward

packets between the edge and root servers, i.e., a child CDN server and its parent CDN server.

Consistent with the methodology described above, the following are representative steps that would take place after an edge-server gets an HTTP request from a client. First, the edge-server determine a list of parent IP addresses as well as an IP address for the content provider origin server. In an illustrative embodiment, such information is obtained from a map generated by a mapmaker machine. To obtain the map, the edge server preferably issues a name query (i.e., a DNS lookup). Any convenient domain name construct can be used to direct the requesting server to a given map for a given CDN customer. Then, the edge server determines if it is to apply a race and/or Rsync to the request. If a race is used, the client becomes a VIP-client. Based on how long it has been since the edge server has picked a VIP-client, the edge server determines if this client will be a VIP-client or not. As noted above, certain rules or policies may be used to determine whether the edge server picks the client to be a VIP-client. Thus, for example, the request may be considered to be from a VIP-client according to the following constraints: (a) if a VIP-client has been picked for this content provider in the last 30 seconds, do not pick this client; (b) if no VIP-client has been picked for this content provider in the last 5 minutes, pick this client; (c) if no VIP-client has been picked for this content provider in the last 40 downloads, pick this client; (d) for large downloads ensure that the network is not overloaded by aborting a download after the first 56Kbytes are received over a particular route. Of course, the above rules are merely exemplary.

It is assumed that parent zero is a root-server. The edge-server preferably keeps a running average of download times per content provider and parent over the VIP-client downloads. If the client is a VIP-client, the edge-server will download a copy of the file from all or some number of the parents. It preferably returns the first file to arrive to the client and records the time for each of the downloads. This information is then used in the running averages. If the client is a normal client, then the edge-server picks the parent with the best estimator that is computed from the running averages. If the content provider is

multi-homed, it has servers in more than one location. In such case, the edge-server will use a default method provided by the content provider to determine the closest home.

As described above, a Closest Reverse Proxy Map may be used where the CDN service provider maintains reverse proxy regions. This map may be generated as follows.

- 5 Let  $\hat{R}$  be the list of RootProxy regions for some content provider. For each region  $R$ , consider all two-hop paths from the region  $R$  to some region in  $\hat{R}$ . Return the shortest two such paths. Not all two-hop paths are considered. Let  $D$  be the distance from  $R$  to the closest RootProxy. Discard a path  $R \rightarrow R_1 \rightarrow R_2$ , if one of the following is true: (a)  $.8 \times D < Dist(R_1, R_2)$  (b)  $1.2 \times D < Dist(R, R_1) + Dist(R_1, R_2)$ .

- 10 The following algorithm may also be used to estimate the distance between regions. To adjust ping time and ping loss into a distance, use the following  $Dist = (100/(101 - \%Loss))^2 \times pingTime$ . This formula has the following effect: for a 10% loss, increase the ping time by 20%; for a 20% loss, increase the ping time by 50%; for a 30% loss, increase the ping time by 100%. If desired the ratio above may be cubed instead of squared.

- 15 The tunneling technique provides a significant (e.g., two times) decrease in average file download time. Although not required, preferably the tunneling technique is coupled with a data compression and difference algorithm so that the number of bytes transmitted from a root-server to an edge-server is also reduced. A representative algorithm for this purpose is Rsync, although other such algorithms may be used. The use of Rsync (or a  
20 similar approach wherein file differences are transmitted) decreases bandwidth used on expensive longhaul links and provides addition reduction in download time due to the smaller file sizes being transmitted.

- The present invention provides numerous advantages. The inventive techniques are especially useful for any CDN customer seeking to optimize performance in content  
25 delivery and for many customers interested in improved reliability. The performance benefit is greatest when the connection from an edge server to the customer's origin is frequent, because this is the transfer that is optimized by the present invention. This applies regardless of whether the connection is used to transfer an entire file or an If-Modified-Since request to revalidate content or authorize a request before serving the



client. Specifically, any content that uses dynamic content assembly, no-store, bypass-cache, centralized authorization, zero-TTL or low TTL settings, is a good candidate for use of the techniques described above. Of course, the above is merely illustrative and should not be taken to limit the scope of the present invention in any way.

5           One of ordinary skill in the art will appreciate that the inventive technique for tunneling data from the content provider origin server (or a reverse proxy) to the edge server is not meant to be limited to data transfers in one direction. There are many instances where data transfer will go from the edge server to the origin, e.g., when an application executing on the edge server provides data to the origin. Thus, the inventive  
10   technique should be considered bi-directional or uni-directional.

          As described above, the present invention is not limited to use of file download races to prioritize the set of routes that are exposed in a given content provider map. Other performance metric tests may be used in addition to or in lieu of the file downloads. For example, a simple liveness check may tell the edge server that a given route identified in  
15   the map is no longer active. Moreover, other well-known techniques may be used to determine which path (either direct or indirect) is the best or optimal one for edge server to origin/proxy server (or vice versa) communications. Such additional methodologies may be used to select the optimal routes include, without limitation: analysis of BGP data, analysis of historical TCP/IP statistics, measurements conducted as a result of exchanges of  
20   data between regions, additional network statistics generated from traceroutes, pings, udp traffic, and combinations of the above.

          One of ordinary skill in the art will appreciate that “tunneling” as used herein is distinct from the concept of Internet Protocol (IP) packet encapsulation, such as described in RFC 1048 (1994). In RFC 1048, a “tunnel” is created through a given node by  
25   encapsulating the data to be transferred in another packet and then sending the packet. As described herein, “tunneling” does not necessarily move data from point A (the edge server) to point B (the origin server) directly, as typically content does not pass through the intermediate node (e.g., on a path from point A to point B); rather (and because the CDN typically operates as an overlay on top of other networks), when the intermediate CDN

node receives a request from the edge server, it creates a new request, and then the intermediate CDN node sends the new request forward to the origin server. Thus, as used herein, a “route” (e.g., between a CDN server and an origin server) may also be described conveniently as a “path.”

5           Having described our invention, what we now claim is set forth below.

## CLAIMS

1. A method operative in a content delivery network having a set of server nodes organized into regions, wherein the server nodes provide delivery of content on behalf of participating content providers, wherein a server node comprises  
5 a cluster of content delivery network edge servers, the method comprising:  
for each given server node and a content provider origin server, identifying at least one alternate path to be used for edge server-to-content provider origin server communications, the at least one alternate path includes at least one other content delivery network edge server that is external to the given server node;  
10 upon receipt at a particular edge server in the given server node of a request for an object that is not available for delivery from the particular edge server, issuing a new request for the object from the particular edge server over the at least one alternate path;  
receiving the object over the at least one alternate path; and  
15 serving the object in response to the request.
2. The method as described in claim 1 wherein the object has an associated cacheability setting.
- 20 3. The method as described in claim 2 wherein the cacheability setting indicates that the object should not be cached in the particular edge server.
4. The method as described in claim 1 wherein the alternate path is valid  
for a given time period.

25

5. The method as described in claim 1 further including identifying a new alternate path as a result of changing Internet conditions.

6. The method as described in claim 1 wherein the alternate path is  
5 determined by the particular edge server as a result of performing a performance test.

7. The method as described in claim 6 wherein the performance test comprises a race, wherein the race comprises downloading a file to the particular edge server over at least the alternate path and a default Border Gateway Routing (BGP)  
10 path.

8. The method as described in claim 7 wherein the race is executed by the particular edge server upon receipt of the request for the object.

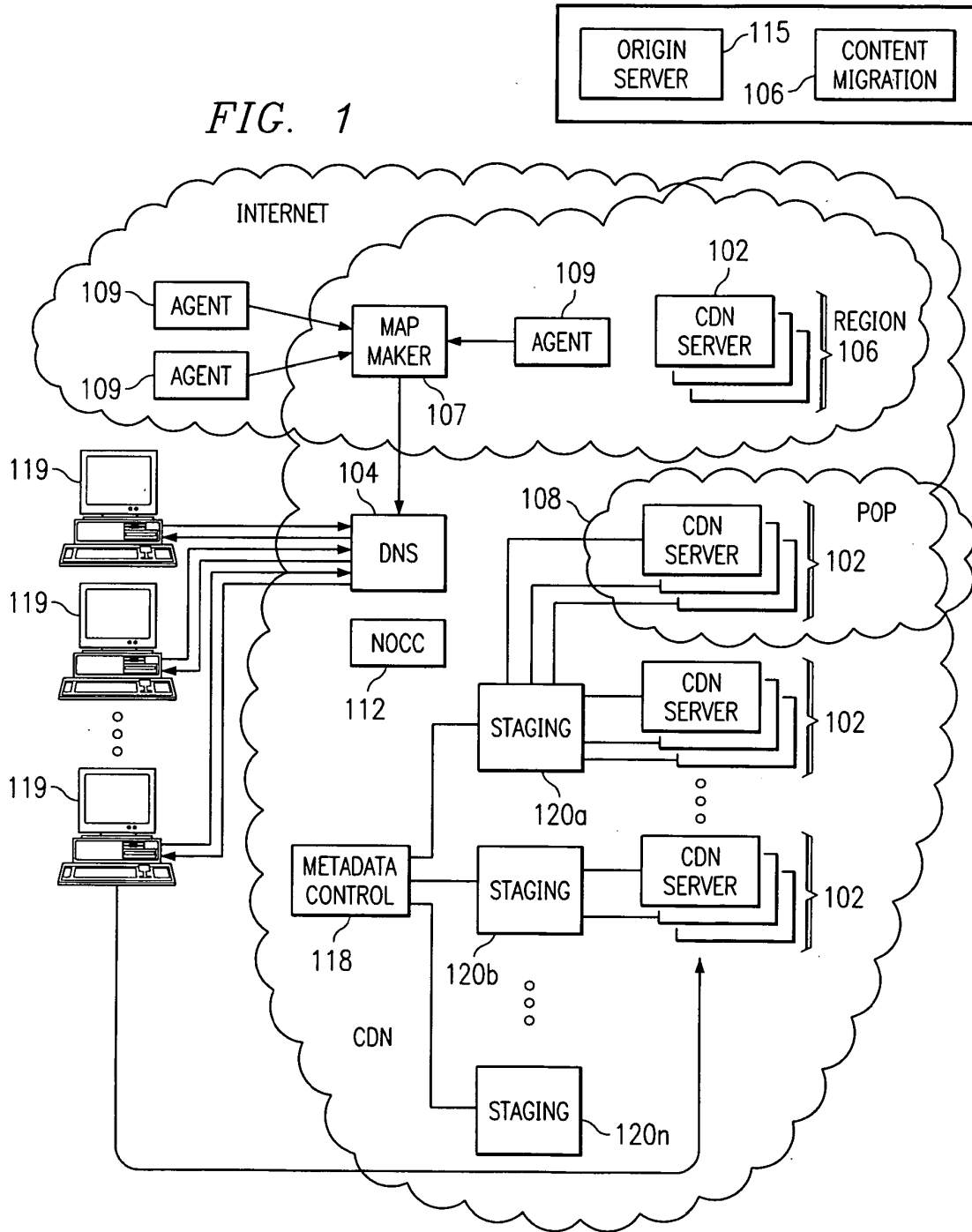
9. The method as described in claim 8 wherein the file that is  
15 downloaded during the race is also the object.

10. The method as described in claim 1 wherein the at least one alternate path is other than a default Border Gateway Routing (BGP) path.  
20

**ABSTRACT OF THE DISCLOSURE**

A routing mechanism, service or system operable in a distributed networking environment. One preferred environment is a content delivery network (CDN) wherein the present invention provides improved connectivity back to an origin server, especially for HTTP traffic. In a CDN, edge servers are typically organized into regions, with each region comprising a set of content servers that preferably operate in a peer-to-peer manner and share data across a common backbone such as a local area network (LAN). The inventive routing technique enables an edge server operating within a given CDN region to retrieve content (cacheable, non-cacheable and the like) from an origin server more efficiently by selectively routing through the CDN's own nodes, thereby avoiding network congestion and hot spots. The invention enables an edge server to fetch content from an origin server through an intermediate CDN server or, more generally, enables an edge server within a given first region to fetch content from the origin server through an intermediate CDN region.

FIG. 1



2/4

FIG. 2

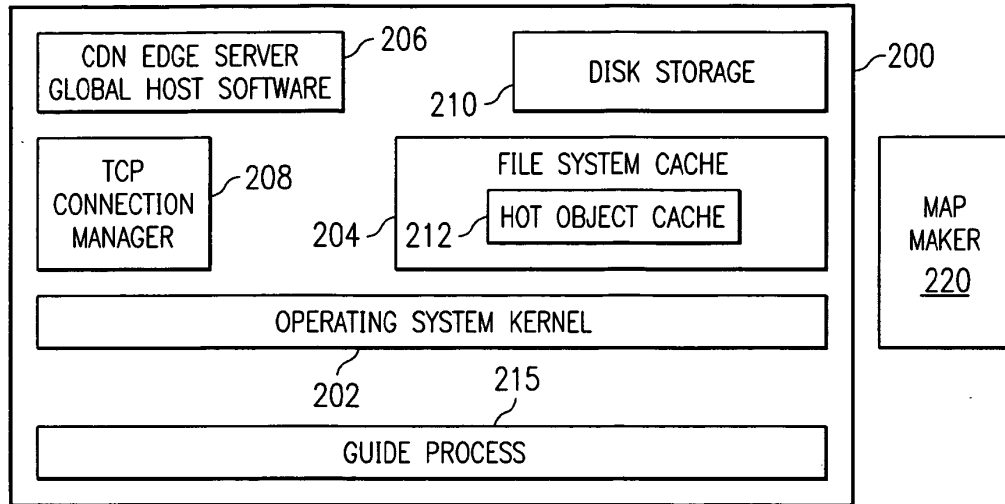
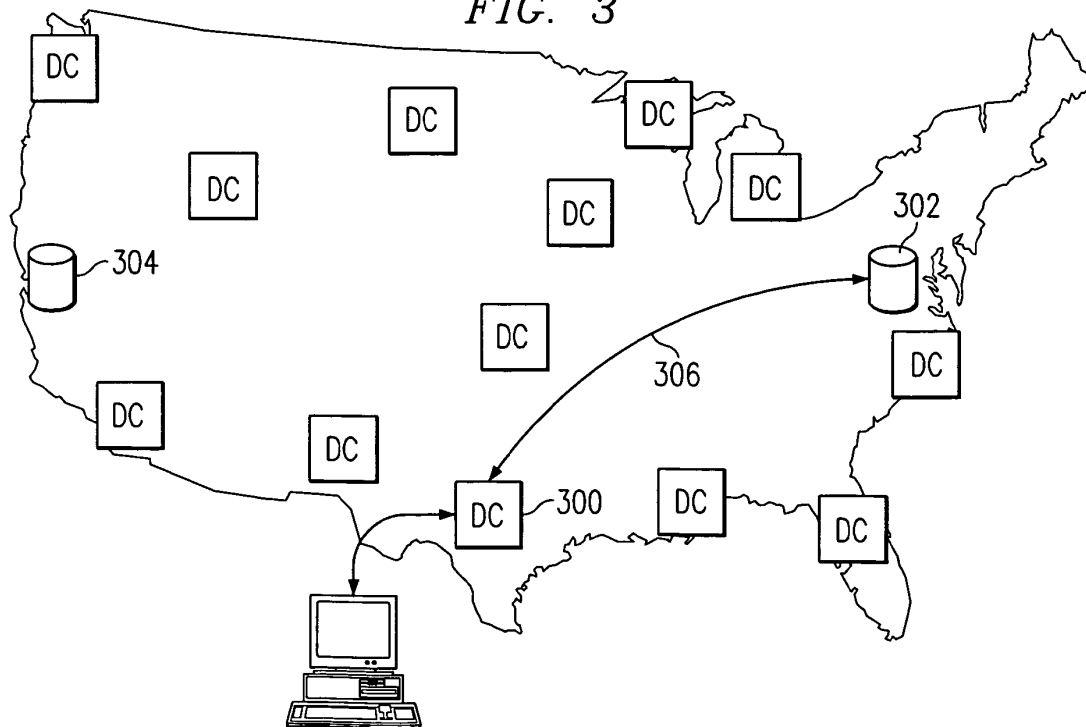


FIG. 3



3/4

FIG. 4

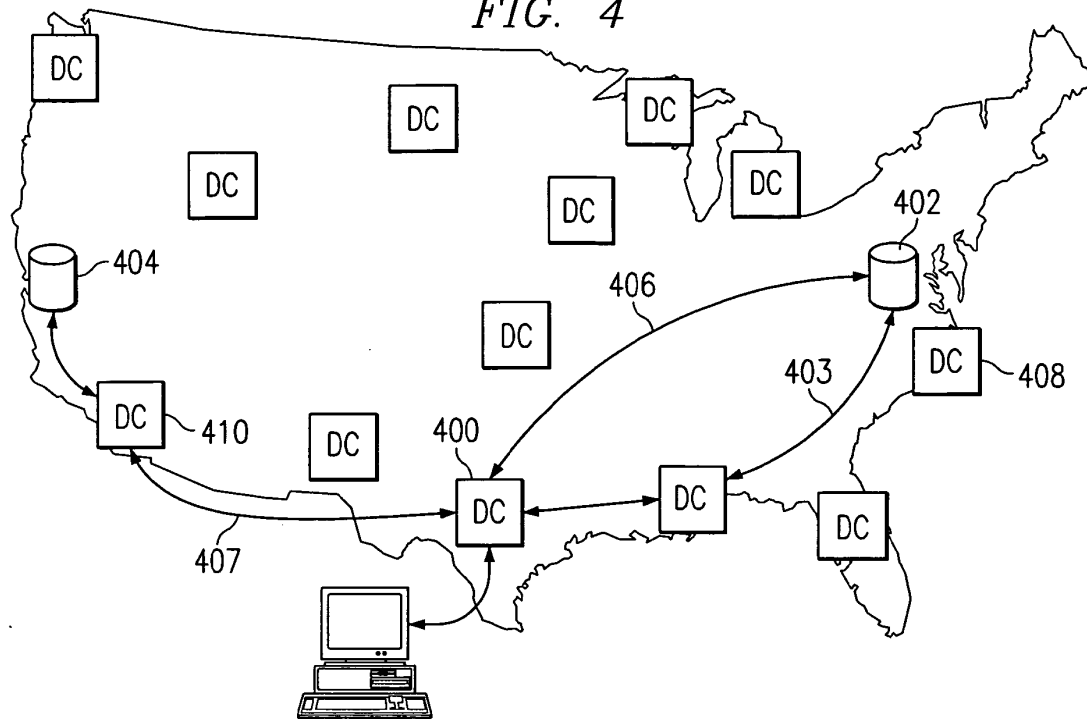
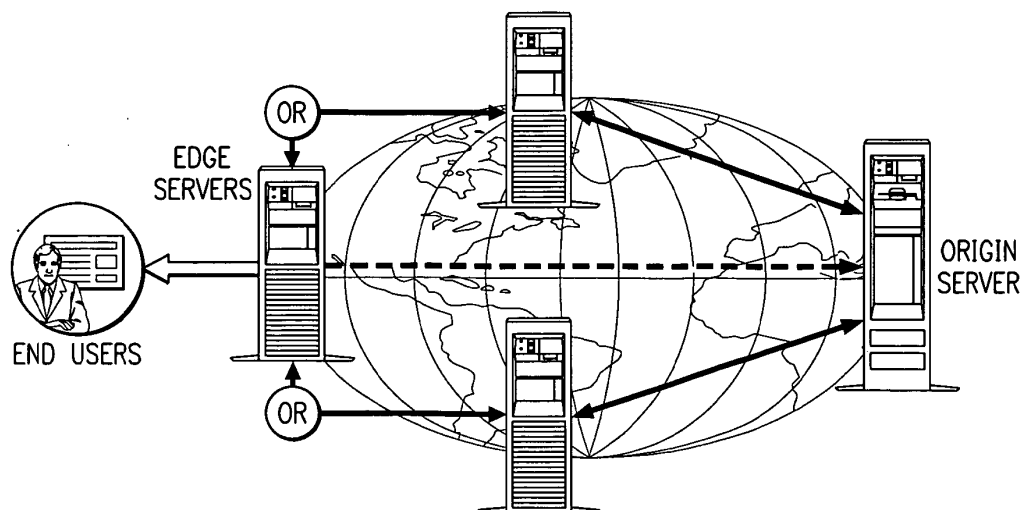
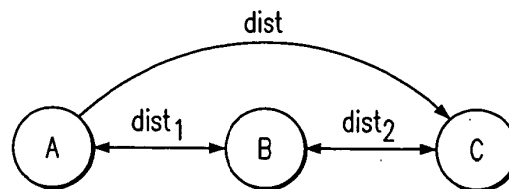
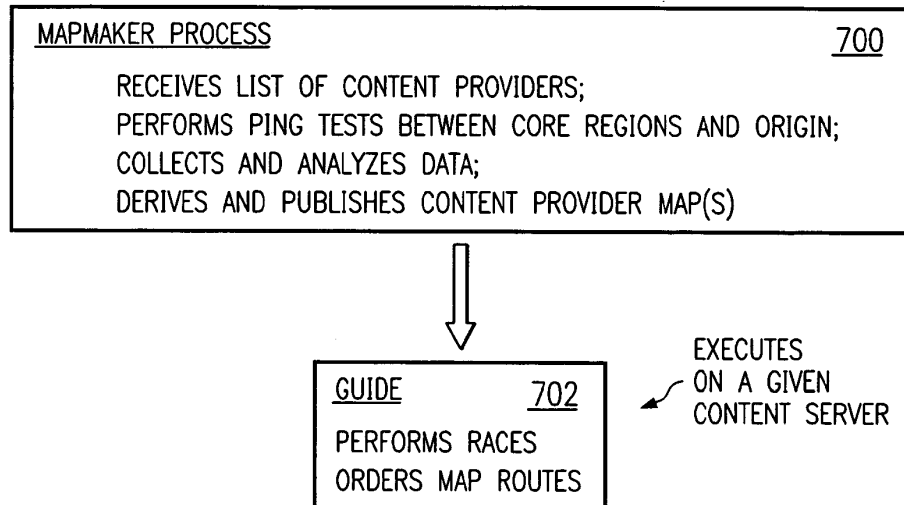
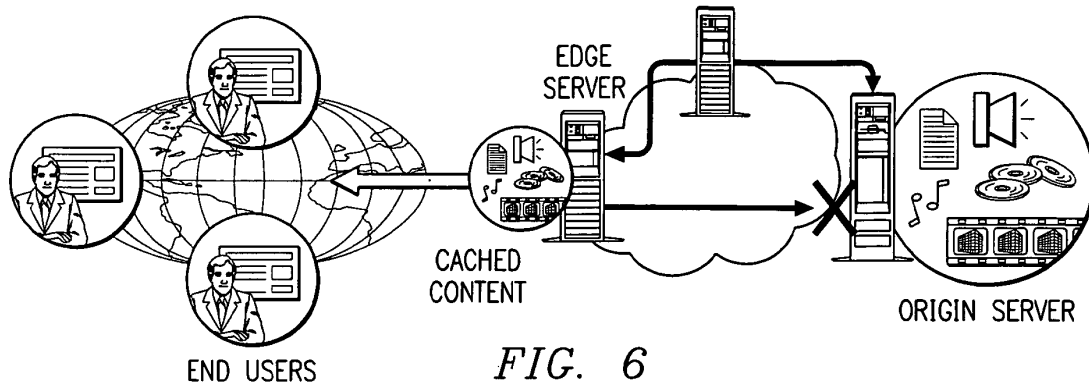


FIG. 5





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Atty. Docket No.  
12293:74

Patent  
Customer ID No. 26579

**DECLARATION AND POWER OF ATTORNEY FOR  
PATENT APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**OPTIMAL ROUTE SELECTION IN A CONTENT  
DELIVERY NETWORK**

the specification of which (check one):

- ☒ is attached hereto.
- ☐ was filed on \_\_\_\_\_;  
as Application Serial No. \_\_\_\_\_  
and which was amended on \_\_\_\_\_ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):

Priority Claimed

(Number)

(Country)

(Day/Month/Year)

\_\_\_ Yes \_\_\_ No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each

Atty. Docket No.  
12298:74

Patent  
Customer ID No. 28579

of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information material to the patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

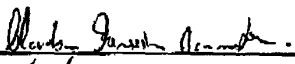
<u>60/273,241</u>	<u>01 Mar 2001</u>	<u>Pending</u>
(Application Serial #)	(Filing Date)	(Status)

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 willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

David H. Judson, Reg. No. 30,467  
Jack D. Stone Jr., Reg. No. 38,324

Send correspondence to: David H. Judson, Akamai Technologies, Inc., 500 Technology Square, Cambridge, Massachusetts 02139 and direct all telephone calls to Mr. Judson at 617/613-2663.

FULL NAME OF FIRST INVENTOR:	Claudson F. Bornstein
INVENTOR'S SIGNATURE:	<u></u>
DATE:	<u>2/28/2002</u>
RESIDENCE:	<u>812 Memorial Drive, Apt. 1709</u> <u>Cambridge, Massachusetts 02139-4630</u> <u>Middlesex County</u>
CITIZENSHIP:	<u>Brazil</u>

Patent  
Customer ID No. 26579

**Timothy K. Canfield**

2/28/2002

83 Reservoir Street  
Cambridge, Massachusetts 02138-6837  
Middlesex County  
US

**CITIZENSHIP:**

US

[illegible]

Atty. Docket No.  
12233:74

Patent  
Customer ID No. 26579

FULL NAME OF THIRD  
INVENTOR:  
INVENTOR'S SIGNATURE:  
DATE:  
RESIDENCE:

Gary L. Miller

Gary L. Miller  
March 1, 2002  
5520 Aylesboro Avenue  
Pittsburgh, Pennsylvania 15217-1124  
Allegheny County  
US

CITIZENSHIP:

2002 03 01 14:38 FAX 412 268 3579

-4-

2002

CMU COMP SCI

03/01/02 FRI 14:38 FAX 412 268 3579

**Patent**  
**Customer ID No. 26579**

**Satish B. Rao**

Natural B Rao

February 28, 2002

2421 Oregon Street  
Berkeley, California 94705-1118  
Alameda County  
US

**CITIZENSHIP:**

[illegible]

AKAM-074

PATENT

**SUBSTITUTE DECLARATION AND POWER OF ATTORNEY FOR  
PATENT APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**OPTIMAL ROUTE SELECTION IN A CONTENT DELIVERY NETWORK**

the specification of which (check one):

- ☐ is attached hereto.
- ☒ was filed on March 1, 2002;  
as Application Serial No. 10/087,033  
and which has been amended (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):			Priority Claimed	
(Number)	(Country)	(Day/Month/Year)	___ Yes	___ No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information material to the patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

**AKAM-074****PATENT**

(Application Serial #)

(Filing Date)

(Status)

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 willful false statements may jeopardize the validity of the application or any patent issued thereon.

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

David H. Judson, Reg. No. 30,467

Send correspondence to: David H. Judson, 15950 Dallas Parkway, Suite 225, Dallas, Texas 75248, and direct all telephone calls to Mr. Judson at 214/789-9118.

FULL NAME OF INVENTOR:

Ravi Sundaram

INVENTOR'S SIGNATURE:

*Ravi Sundaram*

DATE:

June 14, 2007

RESIDENCE:

111 FAVERWEATHER ST  
CAMBRIDGE, MA 02138

MAILING:

Same as above

CITIZENSHIP:

US



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

<b>Application Data Sheet 37 CFR 1.76</b>		<b>Attorney Docket Number</b>	AKAM-74C2
		<b>Application Number</b>	
<b>Title of Invention</b>	Optimal route selection in a content delivery network		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

## Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

## Applicant Information:

<b>Applicant 1</b>					<a href="#">Remove</a>
<b>Applicant Authority</b>		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Claudson	F.	Bornstein		
<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Cambridge	<b>State/Province</b>	MA	<b>Country of Residence i</b>	US
<b>Citizenship under 37 CFR 1.41(b) i</b>		BR			
<b>Mailing Address of Applicant:</b>					
<b>Address 1</b>		812 Memorial Drive, Apt. 1709			
<b>Address 2</b>					
<b>City</b>	Cambridge	<b>State/Province</b>	MA		
<b>Postal Code</b>	02139	<b>Country i</b>	US		
<b>Applicant 2</b>					<a href="#">Remove</a>
<b>Applicant Authority</b>		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Timothy	K.	Canfield		
<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Cambridge	<b>State/Province</b>	MA	<b>Country of Residence i</b>	US
<b>Citizenship under 37 CFR 1.41(b) i</b>		US			
<b>Mailing Address of Applicant:</b>					
<b>Address 1</b>		83 Reservoir Road			
<b>Address 2</b>					
<b>City</b>	Cambridge	<b>State/Province</b>	MA		
<b>Postal Code</b>	02138	<b>Country i</b>	US		
<b>Applicant 3</b>					<a href="#">Remove</a>
<b>Applicant Authority</b>		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Gary	L.	Miller		
<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Pittsburgh	<b>State/Province</b>	PA	<b>Country of Residence i</b>	US

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number		AKAM-74C2	
		Application Number			
Title of Invention	Optimal route selection in a content delivery network				
<b>Citizenship under 37 CFR 1.41(b) i</b>		US			
<b>Mailing Address of Applicant:</b>					
<b>Address 1</b>		5520 Aylesboro Avenue			
<b>Address 2</b>					
<b>City</b>	Pittsburgh		<b>State/Province</b>	PA	
<b>Postal Code</b>		15217	<b>Country<sup>i</sup></b>	US	
<b>Applicant 4</b>					<a href="#">Remove</a>
<b>Applicant Authority</b>		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
				<input type="radio"/> Party of Interest under 35 U.S.C. 118	
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Satish	B.	Rao		
<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Berkeley	<b>State/Province</b>	CA	<b>Country of Residence<sup>i</sup></b>	US
<b>Citizenship under 37 CFR 1.41(b) i</b>		US			
<b>Mailing Address of Applicant:</b>					
<b>Address 1</b>		2421 Oregon Street			
<b>Address 2</b>					
<b>City</b>	Berkeley		<b>State/Province</b>	CA	
<b>Postal Code</b>		94705	<b>Country<sup>i</sup></b>	US	
<b>Applicant 5</b>					<a href="#">Remove</a>
<b>Applicant Authority</b>		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
				<input type="radio"/> Party of Interest under 35 U.S.C. 118	
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Ravi		Sundaram		
<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Cambridge	<b>State/Province</b>	MA	<b>Country of Residence<sup>i</sup></b>	US
<b>Citizenship under 37 CFR 1.41(b) i</b>		US			
<b>Mailing Address of Applicant:</b>					
<b>Address 1</b>		111 Fayerweather Street			
<b>Address 2</b>					
<b>City</b>	Cambridge		<b>State/Province</b>	MA	
<b>Postal Code</b>		02138	<b>Country<sup>i</sup></b>	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					<a href="#">Add</a>

**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below.  
For further information see 37 CFR 1.33(a).

☐ An Address is being provided for the correspondence Information of this application.

**Customer Number** 26579

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	AKAM-74C2
		Application Number	
Title of Invention	Optimal route selection in a content delivery network		
Email Address	mail@davidjudson.com		<input type="button" value="Add Email"/> <input type="button" value="Remove Email"/>

**Application Information:**

<b>Title of the Invention</b>	Optimal route selection in a content delivery network		
<b>Attorney Docket Number</b>	AKAM-74C2	<b>Small Entity Status Claimed</b>	<input type="checkbox"/>
<b>Application Type</b>	Nonprovisional		
<b>Subject Matter</b>	Utility		
<b>Suggested Class (if any)</b>		<b>Sub Class (if any)</b>	
<b>Suggested Technology Center (if any)</b>			
<b>Total Number of Drawing Sheets (if any)</b>	4	<b>Suggested Figure for Publication (if any)</b>	5

**Publication Information:**

<input type="checkbox"/>	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/>	<b>Request Not to Publish.</b> I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application <b>has not and will not</b> be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

**Representative Information:**

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.			
Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	26579		

**Domestic Benefit/National Stage Information:**

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.					
Prior Application Status		Patented		<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
	Continuation of	11858261	2007-09-20	7929429	2011-04-19
Prior Application Status		Patented		<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
	Continuation of	10087033	2002-03-01	7274658	2007-09-25

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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	AKAM-74C2	
		Application Number		
Title of Invention	Optimal route selection in a content delivery network			
Prior Application Status	Expired	<a href="#">Remove</a>		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	
	non provisional of	60273241	2001-03-01	
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.				<a href="#">Add</a>

**Foreign Priority Information:**

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

<a href="#">Remove</a>			
Application Number	Country <sup>i</sup>	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			<input checked="" type="radio"/> Yes <input type="radio"/> No
Additional Foreign Priority Data may be generated within this form by selecting the <b>Add</b> button.			<a href="#">Add</a>

**Assignee Information:**

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

<b>Assignee 1</b>				<a href="#">Remove</a>
If the Assignee is an Organization check here. <input checked="" type="checkbox"/>				
Organization Name	Akamai Technologies, Inc.			
<b>Mailing Address Information:</b>				
Address 1	8 Cambridge Center			
Address 2				
City	Cambridge	State/Province	MA	
Country <sup>i</sup>	US	Postal Code	02142	
Phone Number		Fax Number		
Email Address				
Additional Assignee Data may be generated within this form by selecting the <b>Add</b> button.				<a href="#">Add</a>

**Signature:**

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	/David H. Judson/		Date (YYYY-MM-DD)	2011-04-19
First Name	David	Last Name	Judson	Registration Number 30467

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

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	AKAM-74C2
		Application Number	
Title of Invention	Optimal route selection in a content delivery network		

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		Optimal route selection in a content delivery network		
First Named Inventor/Applicant Name:		Claudson F. Bornstein		
Filer:		David Judson		
Attorney Docket Number:		AKAM-74C2		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	330	330
Utility Search Fee	1111	1	540	540
Utility Examination Fee	1311	1	220	220
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>1090</b>



Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	9897534
<b>Application Number:</b>	13088517
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	8610
<b>Title of Invention:</b>	Optimal route selection in a content delivery network
<b>First Named Inventor/Applicant Name:</b>	Claudson F. Bornstein
<b>Customer Number:</b>	26579
<b>Filer:</b>	David Judson
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	AKAM-74C2
<b>Receipt Date:</b>	18-APR-2011
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Continuation18April2011.pdf	135196 0c995834b895fac0d67a7efcbec4186354157598	yes	30
	<b>Multipart Description/PDF files in .zip description</b>				
	<b>Document Description</b>		<b>Start</b>	<b>End</b>	
	Specification		1	27	
	Claims		28	29	
	Abstract		30	30	
<b>Warnings:</b>					
<b>Information:</b>					
2	Drawings-only black and white line drawings	Dwgs.pdf	89382 ec9a2825e794127d177d661220d3c7d131a617d4	no	4
<b>Warnings:</b>					
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3	Oath or Declaration filed	OrigDecExec.pdf	139987 53eed2ac5b44ebfba697482e7682c0c544bae9	no	5
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4	Oath or Declaration filed	RaviSDecExec.pdf	67805 31fc0d5c81129c31890c9e49e22da329f8b70c27	no	2
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5	Application Data Sheet	ADS18April2011.pdf	1031880 0c666ad71b6aebf733fb14ebc34f1b4d008a520d	no	6
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6	Fee Worksheet (PTO-875)	fee-info.pdf	32610 4b418ea95bd1826ed90be65296976658f531d169	no	2
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