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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/131,806	12/01/2020	10855546	0023-0948	2681

44987 7590 11/11/2020
Harrity & Harrity, LLP
11350 Random Hills Road
Suite 600
Fairfax, VA 22030

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 98 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):

Dmitry A. SHOKAREV, Mountain View, CA;
Juniper Networks, Inc., Sunnyvale, CA;
Nayan S. Patel, Bedford, MA;
Alex Baban, San Jose, CA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

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.

"FEE ADDRESS" INDICATION FORM

Address to:
Mail Stop M Correspondence
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Fax to:
571-273-6500

- OR -

INSTRUCTIONS: The issue fee must have been paid for application(s) listed on this form. In addition, only an address represented by a Customer Number can be established as the fee address for maintenance fee purposes (hereafter, fee address). A fee address should be established when correspondence related to maintenance fees should be mailed to a different address than the correspondence address for the application. **When to check the first box below:** If you have a Customer Number to represent the fee address. **When to check the second box below:** If you have no Customer Number representing the desired fee address, in which case a completed Request for Customer Number (PTO/SB/125) must be attached to this form. For more information on Customer Numbers, see the Manual of Patent Examining Procedure (MPEP) § 403.

For the following listed application(s), please recognize as the "Fee Address" under the provisions of 37 CFR 1.363 the address associated with:



Customer Number:

204

OR



The attached Request for Customer Number (PTO/SB/125) form.

PATENT NUMBER (if known)	APPLICATION NUMBER
	16/131,806

Completed by (check one):



Applicant/Inventor

/Elaine P. Spector, Reg. No. 40,116/

Signature

Attorney or Agent of record 40,116
(Reg. No.)

Elaine P. Spector

Typed or printed name

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)571-432-0800

Requester's telephone number



Assignee recorded at Reel _____ Frame _____

November 2, 2020

Date

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 1.363. 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 5 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 COMPLETE D FORMS TO THIS ADDRESS. SEND TO: Mail Stop M Correspondence, 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)
Juniper Networks, Inc.)
Application No.: 16/131,806)
Filed: September 14, 2018)
For: SYSTEMS AND METHODS FOR)
NON-INTRUSIVE NETWORK)
PERFORMANCE MONITORING)

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

U.S. Patent and Trademark Office
Customer Window, Mail Stop Issue Fee
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

Further to the Notice of Allowance, dated August 5, 2020, Applicant submits the following remarks:

Remarks begin on page 2 of this paper.

REMARKS

Applicant notes, with appreciation, the Examiner's allowance of claims 1-20. Applicant submits the following comments regarding the Examiner's Reasons for Allowance stated on pages 10-11 of the Notice of Allowance.

In the Reasons for Allowance, the Examiner characterizes and identifies particular features of the independent claims, and characterizes the cited references. Applicant does not concede that all the features, identified by the Examiner, are necessary to distinguish over the cited references or that the Examiner's characterization of the features of the claims is accurate. Applicant also asserts that the claims may be patentable for other reasons. Applicant also does not concede that the cited references are accurately characterized or that any of the cited references are relevant to the features of the claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

HARRITY & HARRITY, LLP

By: /Elaine P. Spector, Reg. No. 40,116/
Elaine P. Spector
Reg. No. 40,116

11350 Random Hills Road
Suite 600
Fairfax, Virginia 22030
Telephone: (571) 432-0800
Facsimile: (571) 432-0808
CUSTOMER NUMBER: 44987

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

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

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

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

44987 7590 08/05/2020
Harrity & Harrity, LLP
11350 Random Hills Road
Suite 600
Fairfax, VA 22030

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/131,806	09/14/2018	Dmitry A. SHOKAREV	0023-0948	2681

TITLE OF INVENTION: SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	11/05/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
TOLCHINSKY, GREGORY P	2454	709-224000

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 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

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

1 Harrity & Harrity, LLP

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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

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

Juniper Networks, Inc.

Sunnyvale, CA

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

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies

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

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Elaine P. Spector, Reg. No. 40,116/

Date November 2, 2020

Typed or printed name Elaine P. Spector

Registration No. 40,116



ELECTRONIC PAYMENT RECEIPT

APPLICATION #
16/131,806

RECEIPT DATE / TIME
11/02/2020 12:47:42 PM ET

ATTORNEY DOCKET #
0023-0948

Title of Invention

SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 2681

FILED BY Rachel Allen

PATENT CENTER # 60102816

AUTHORIZED BY Elaine Spector

CUSTOMER # 44987

FILING DATE 09/14/2018

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Dmitry A. SHOKAREV

Payment Information

PAYMENT METHOD
CARD / 3070

PAYMENT TRANSACTION ID
E2020A2C49002175

PAYMENT AUTHORIZED BY
Rachel Allen

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1501	UTILITY ISSUE FEE	1000.00	1	1000.00
TOTAL AMOUNT:				\$1,000.00

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.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for 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

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
16/131,806

RECEIPT DATE / TIME
11/02/2020 12:47:42 PM ET

ATTORNEY DOCKET #
0023-0948

Title of Invention

SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING

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under 35 USC 111(a)

PATENT # -

CONFIRMATION # 2681

FILED BY Rachel Allen

PATENT CENTER # 60102816

FILING DATE 09/14/2018

CUSTOMER # 44987

FIRST NAMED INVENTOR Dmitry A. SHOKAREV

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Elaine Spector

Documents

TOTAL DOCUMENTS: 4

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
0023-0948_Fee_Address_11-02-20.pdf	2	Maintenance Fee Address Change	154 KB
0023-0948_IF_Trans_11-02-20.pdf	1	Issue Fee Payment (PTO-85B)	1182 KB
0023-0948_IF_Trans_Cover_11-02-20.pdf	1	Fee Worksheet (SB06)	72 KB
0023-0948_Comments_For_Allowance_11-02-20.pdf	2	Post Allowance Communication - Incoming	77 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
0023-0948_Fee_Address_11-02-20.pdf	F7BF717DD7FFD36F1DE72F0E57679B7790BBAD717867CE018 26A6DDF22E77BC159373156D7CBAC2AA0C2FA888833C81F02 104129A708B53770F9B02A43D741A8
0023-0948_IF_Trans_11-02-20.pdf	1C28297ACB5B8A9D9A0C75CE942FDD9B544C8D900A3C5AF6 37D41DD998FDC552EA8F001EE79AC79B4F00E3AA2B6F758C F048C5A79678F38761A7D001ECFA6E37
0023-0948_IF_Trans_Cover_11-02-20.pdf	2A00D3E05740548DA25D7880C27F95B1A5E75EA0C4A10EF5E B1EDBC14E03977060F02552D0C49F308C87D6B0E2BFF0BB4C 65847808DB338C1B805E6C40F840D4
0023-0948_Comments_For_Allowance_11-02-20.pdf	1D9C34F76805D5A30F120EA706F539FAC62359B4461CEBFCD 3C33ED5555018893C30FB38454115BEE31085FC0C7BB4FA203 9F7A9198E0158C8E91F9A3A7A5FC6

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.

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National Stage of an International Application under 35 U.S.C. 371

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)
Juniper Networks, Inc.)
Application No.: 16/131,806)
Filed: September 14, 2018)
For: SYSTEMS AND METHODS FOR)
NON-INTRUSIVE NETWORK)
PERFORMANCE MONITORING)

ISSUE FEE TRANSMITTAL COVER SHEET

U.S. Patent and Trademark Office
Customer Service Window, Mail Stop Issue Fee
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

The Commissioner is hereby authorized to charge any other appropriate fees that may be required regarding the attached Issue Fee Transmittal (Form PTOL-85) to Deposit Account No. 50-1070.

Respectfully submitted,

HARRITY & HARRITY, LLP

By: /Elaine P. Spector, Reg. No. 40,116/
Elaine P. Spector
Reg. No. 40,116

11350 Random Hills Road
Suite 600
Fairfax, Virginia 22030
(571) 432-0800
CUSTOMER NUMBER: 44987



UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

44987 7590 08/05/2020
Harrity & Harrity, LLP
11350 Random Hills Road
Suite 600
Fairfax, VA 22030

EXAMINER	
TOLCHINSKY, GREGORY P	
ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 08/05/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/131,806	09/14/2018	Dmitry A. SHOKAREV	0023-0948	2681

TITLE OF INVENTION: SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	11/05/2020

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 ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

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: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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.

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44987 7590 08/05/2020
Harrity & Harrity, LLP
11350 Random Hills Road
Suite 600
Fairfax, VA 22030

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

_____ (Typed or printed name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/131,806	09/14/2018	Dmitry A. SHOKAREV	0023-0948	2681

TITLE OF INVENTION: SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING

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nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	11/05/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
TOLCHINSKY, GREGORY P	2454	709-224000

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 03-09 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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). 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 ☐ Government4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

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

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29☐ Applicant asserting small entity status. See 37 CFR 1.27☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/131,806	09/14/2018	Dmitry A. SHOKAREV	0023-0948	2681
44987	7590	08/05/2020	EXAMINER	
Harrity & Harrity, LLP 11350 Random Hills Road Suite 600 Fairfax, VA 22030			TOLCHINSKY, GREGORY P	
			ART UNIT	PAPER NUMBER
			2454	

DATE MAILED: 08/05/2020

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

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

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

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B 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 30 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 enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 16/131,806	Applicant(s) SHOKAREV et al.	
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454	AIA (FITF) Status Yes

-- 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 the amended application filed on 05/18/2020.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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 1-20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

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. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892) 2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>03/11/2020</u> . 3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____. 4. ☒ Interview Summary (PTO-413), Paper No./Mail Date. <u>07/27/2020</u> .	5. ☒ Examiner's Amendment/Comment 6. ☒ Examiner's Statement of Reasons for Allowance 7. ☐ Other _____.
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/G.P.T./ Examiner, Art Unit 2454	/Brian Whipple/ Primary Examiner, Art Unit 2454
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Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 03/11/2020 is in compliance with the provisions of 37 C.F.R. § 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Examiner's Amendment

This communication is in response to the amended application filed on 05/18/2020.

An Examiner's Amendment to the record appears below. Authorization for Examiner to discuss the Examiner's Amendment with Applicant was given to Examiner by Primary Examiner Brian Whipple. Authorization for the Examiner's Amendment was given by Applicant's Representative, Steven Underwood (Reg. No. 47,205), on July 27, 2020; see attached interview summary form.

Should the changes and/or additions be unacceptable to Applicant, an amendment may be filed as provided by 37 C.F.R. § 1.312. To ensure consideration of such amendment, it must be submitted no later than the payment of the issue fee.

The application has been amended as follows:

1. (Currently Amended) A first network device, comprising:

one or more memories; and

one or more processors, to:

receive packets as part of a traffic flow of an internet protocol (IP) session;

select a packet that is part of the traffic flow based on a rule;

generate a packet replica of the packet that has been selected;

add, to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session;

modify a portion of the packet replica to include, in addition to the routing information, one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session, to create a modified packet that is different from the packet replica; and

provide the modified packet to one or more other network devices to cause a second network device, of the one or more other network devices, to:

perform a validation procedure to determine that the modified packet is unable to be validated based on the one or more values included in the modified packet,

generate or cause another device to generate the network performance indicators using the modified packet or a group of modified packets, and

provide or cause the other device to provide the network performance indicators to a particular device.

2. (Previously Presented) The first network device of claim 1, wherein a forwarding plane of the first network device is not modified when the portion of the packet replica is modified.

3. (Previously Presented) The first network device of claim 1, wherein the one or more processors, when providing the modified packet to the one or more other network devices, are to:

provide, to the one or more other network devices, the modified packet as part of the traffic flow of the IP session.

4. (Previously Presented) The first network device of claim 1, wherein the modified packet or the group of modified packets have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

5. (Original) The first network device of claim 1, wherein the rule is:
a first rule indicating to select particular packets after a threshold time period,
a second rule indicating to randomly select the particular packets,
a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier, or
a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.

6. (Original) The first network device of claim 1, wherein the traffic flow is supported by a label switching network; and
wherein the routing information includes segment routing operations, administration, and maintenance (OAM) information.

7. (Previously Presented) The first network device of claim 1, wherein the one or more processors, when modifying the portion of the packet replica to create the modified packet, are to:

set an IP header checksum value to a first incorrect value,
set a packet length value to a second incorrect value, or
set an IP header time to live (TTL) value to a third incorrect value.

8. (Currently Amended) A method, comprising:

receiving, by a first network device, packets as part of a traffic flow of an internet protocol (IP) session;

selecting, by the first network device, a packet that is part of the traffic flow;

generating, by the first network device, a packet replica of the packet that has been selected;

adding, by the first network device and to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session;

modifying, by the first network device, the packet replica, to create a modified packet that is different from the packet replica, to include, in addition to the routing information, one or more values that will cause the modified packet to fail to reach a destination device associated with the IP session; and

providing, by the first network device and as part of the traffic flow of the IP session, the modified packet to one or more other network devices to cause a second network device, of the one or more other network devices, to remove the modified packet

from the traffic flow of the IP session based on the modified packet including the one or more values that have been modified, and to perform one or more actions that cause the network performance indicators to be generated and provided to another device.

9. (Previously Presented) The method of claim 8, wherein a forwarding plane of the first network device is not modified when the packet replica is modified.

10. (Previously Presented) The method of claim 8, wherein the network performance indicators are generated based on the modified packet or a group of modified packets; and wherein the modified packet or the group of modified packets have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

11. (Original) The method of claim 8, wherein selecting the packet that is part of the traffic flow comprises:

selecting the packet based on at least one of:

- a first rule indicating to select particular packets after a threshold time period,
- a second rule indicating to randomly select the particular packets,
- a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier, or
- a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.

12. (Previously Presented) The method of claim 8, wherein the routing information includes at least one of:

session information for the IP session, or
packet information for the modified packet or a group of modified packets.

13. (Original) The method of claim 8, wherein adding the routing information comprises:

adding the routing information to the packet replica as an additional header of the packet replica or as part of a payload of the packet replica.

14. (Previously Presented) The method of claim 8, wherein modifying the packet replica comprises:

setting an IP header checksum value to a first incorrect value,
setting a packet length value to a second incorrect value, or
setting an IP header time to live value to a third incorrect value.

15. (Currently Amended) A non-transitory computer-readable medium storing instructions, the instructions comprising:

one or more instructions that, when executed by one or more processors of a network device, cause the one or more processors to:

receive, from another network device, a modified packet as part of a traffic flow of an internet protocol (IP) session, wherein the modified packet has been generated by

the other network device based on a packet replica of a packet selected from part of the traffic flow based on a rule;

wherein ~~the modified packet includes~~ routing information capable of being used to generate network performance indicators associated with the IP session has been added to the packet replica by the other network device;[[,]] and

wherein the modified packet has been generated,~~the modified packet has been modified,~~ by the other network device, by modifying the packet replica to include, in addition to the routing information, one or more values that will cause the modified packet to fail to reach a destination device associated with the IP session;

perform a validation procedure by processing the modified packet,

wherein the modified packet is to fail the validation procedure based on the one or more values included in the modified packet;

identify the routing information included in the modified packet based on the modified packet failing the validation procedure;

generate the network performance indicators using the modified packet or a group of modified packets that have been modified and received over time; and

provide the network performance indicators to a particular device.

16. (Previously Presented) The non-transitory computer-readable medium of claim 15, wherein a forwarding plane used to route the traffic flow is not modified when the one or more values of the modified packet are modified.

17. (Previously Presented) The non-transitory computer-readable medium of claim 15, wherein the modified packet or the group of modified packets have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

18. (Original) The non-transitory computer-readable medium of claim 15, wherein the traffic flow of the IP session is subject to a service-level agreement (SLA) that requires the network performance indicators to conform to a particular standard.

19. (Previously Presented) The non-transitory computer-readable medium of claim 15, wherein the one or more instructions, that cause the one or more processors to perform the validation procedure, cause the one or more processors to:

process the modified packet to determine that a header of the modified packet includes a first value that causes the modified packet to fail the validation procedure,

wherein the first value is:

an IP header checksum value,

a packet length value, or

an IP header time to live value.

20. (Previously Presented) The non-transitory computer-readable medium of claim 15, wherein the network performance indicators include at least one of:

a first network performance indicator to verify an order in which packets are received,

a second network performance indicator to identify packet loss,

- a third network performance indicator to identify packet delay,
- a fourth network performance indicator to identify latency, or
- a fifth network performance indicator to identify jitter.

Reasons for Allowance

After a thorough search and in view of the Examiner's Amendment above, claims 1-20 are allowed.

The following is the Examiner's Statement of Reasons for Allowance:

The prior art of record Chua (Pat. No. US 9,038,151 B1) teaches changing a path along which a data packet is forwarded based on detecting that the packet includes malicious data, by transmitting mirror copies of the packet to a collection device and transforming one or more values of headers of the packet; Chua column 28 lines, 7-32.

The prior art of record Ranjabar (Pub. No. US 2020/0021994 A1) teaches determining if there is a DDoS attack based on changed destinations in traffic sent over a network, Ranjabar ¶ [0081].

The prior art of record does not teach, suggest or render obvious, a network device

adding, by the first network device and to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session;

modifying, by the first network device, the packet replica, to create a modified packet that is different from the packet replica, to include, in addition to the routing information, one or more values that will cause the modified packet to fail to reach a destination device associated with the IP session; and

providing, by the first network device and as part of the traffic flow of the IP session, the modified packet to one or more other network devices to cause a second network device, of the one or more other network devices, to remove the modified packet from the traffic flow of the IP session based on the modified packet including the one or more values that have been modified, and to perform one or more actions that cause the network performance indicators to be generated and provided to another device,

as recited in independent claim 8 and similarly recited in independent claims 1 and 15, as supported by Applicant's Specification, and in combination with the remaining limitations in those claims.

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 submission should be clearly labeled "Comments on Statement of Reasons for Allowance".

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY P. TOLCHINSKY whose telephone number is (571) 270-0599. The examiner can normally be reached on Monday-Friday (7:30AM-5:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Umar Cheema can be reached on (571) 270-3037. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO

Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571 -272-1000.

Gregory P. Tolchinsky
/G.P.T./
Examiner, Art Unit 2454
07/30/2020

/Brian Whipple/
Primary Examiner, Art Unit 2454
7/30/2020

<i>Examiner-Initiated Interview Summary</i>	Application No. 16/131,806	Applicant(s) SHOKAREV et al.		
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454	AIA (First Inventor to File) Status Yes	Page 1 of 1

All participants (applicant, applicants representative, PTO personnel):

1. GREGORY P TOLCHINSKY (Examiner);
Telephonic

2. BRIAN WHIPPLE (Primary Examiner)

3. STEVEN UNDERWOOD (Attorney: Reg. No. 47,205); Telephonic

Date of Interview: 27 July 2020

Issues Discussed:

Proposed Amendments:
Applicant's Representative authorized the Examiner's Amendment.

/G.P.T./ Examiner, Art Unit 2454	/Brian Whipple/ Primary Examiner, Art Unit 2454
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Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04

Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

<i>Issue Classification</i> 	Application/Control No. 16/131,806	Applicant(s)/Patent Under Reexamination SHOKAREV et al.
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454

CPC						
Symbol					Type	Version
H04L	/	41	/	14	F	2013-01-01
H04L	/	45	/	50	I	2013-01-01
H04L	/	69	/	22	I	2013-01-01

CPC Combination Sets				
Symbol		Type	Set	Version
	/			

/GREGORY P TOLCHINSKY/ Examiner, Art Unit 2454 (Assistant Examiner)	29 July 2020 (Date)	Total Claims Allowed: 20	
/Brian Whipple/ Primary Examiner, Art Unit 2454 (Primary Examiner)	30 July 2020 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 4

Issue Classification 	Application/Control No. 16/131,806	Applicant(s)/Patent Under Reexamination SHOKAREV et al.
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454

INTERNATIONAL CLASSIFICATION			
CLAIMED			
G06F	/	15	/ 173
NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
709	224

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

/GREGORY P TOLCHINSKY/ Examiner, Art Unit 2454 (Assistant Examiner)	29 July 2020 (Date)	Total Claims Allowed: 20	
/Brian Whipple/ Primary Examiner, Art Unit 2454 (Primary Examiner)	30 July 2020 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 4

Issue Classification 	Application/Control No. 16/131,806	Applicant(s)/Patent Under Reexamination SHOKAREV et al.
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	10	19	19										
2	2	11	11	20	20										
3	3	12	12												
4	4	13	13												
5	5	14	14												
6	6	15	15												
7	7	16	16												
8	8	17	17												
9	9	18	18												

/GREGORY P TOLCHINSKY/ Examiner, Art Unit 2454 (Assistant Examiner)	29 July 2020 (Date)	Total Claims Allowed: 20	
/Brian Whipple/ Primary Examiner, Art Unit 2454 (Primary Examiner)	30 July 2020 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 4

<i>Search Notes</i> 	Application/Control No. 16/131,806	Applicant(s)/Patent Under Reexamination SHOKAREV et al.
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454

CPC - Searched*		
Symbol	Date	Examiner
H04L43/12,1425,062,04,0888 H04L63/1425	02/12/2020	gt

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
NPL search (see attachment)	01/16/2020	gt
EAST search (see attachment)	01/16/2020	gt
Double Patenting search (EAST, PE2E)	02/12/2020	gt
Updated NPL search (see attachment)	07/30/2020	gt
Updated EAST search (see attachment)	07/30/2020	gt

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	Interference search	07/30/2020	gt

/G.P.T./ Examiner, Art Unit 2454	/Brian Whipple/ Primary Examiner, Art Unit 2454
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	("20090154361" "20180075106" "20180091387").PN.	US-PGPUB; USPAT	OR	ON	2020/07/30 01:32
L2	2,303	(decrement\$3) near5 TTL	US-PGPUB; USPAT	OR	ON	2020/07/30 01:35
L3	98	(decrement\$3) near5 TTL same (test\$3 simulat\$3)	US-PGPUB; USPAT	OR	ON	2020/07/30 01:35
L4	102	(decrement\$3 modify\$3) near5 TTL same (test\$3 simulat\$3)	US-PGPUB; USPAT	OR	ON	2020/07/30 01:35
L5	904	(inject\$3) near5 (packet stream flow TCP IP) same (test\$3) same (metric performance KPI "key performance indicators")	US-PGPUB; USPAT	OR	ON	2020/07/30 01:36
L6	257	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/07/30 01:36
L7	4,751	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3 log\$4) same (((network performance) with indicator) or (KPI "key performance indicator")) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/07/30 01:36
L8	2,428	(test\$3 simulat\$3) same (record\$3 monitor\$3 log\$4) same (((network performance) with indicator) or (KPI "key performance indicator")) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/07/30 01:37
S1	231,184	(inject\$3) near5 (packet stream flow TCP IP)	US-PGPUB; USPAT	OR	ON	2020/01/16 12:37
S2	878	(inject\$3) near5 (packet stream flow TCP IP) same (test\$3) same (metric performance KPI "key performance indicators")	US-PGPUB; USPAT	OR	ON	2020/01/16 12:41
S3	1,071	(inject\$3) near5 (packet stream flow TCP IP) same (test\$3) same (metric performance KPI "key performance indicators" latency bandwidth congestion)	US-PGPUB; USPAT	OR	ON	2020/01/16 12:41
S4	174	(inject\$3) near5 (packet stream flow TCP IP) same session same (test\$3)	US-PGPUB; USPAT	OR	ON	2020/01/16 12:48

S5	108	(inject\$3) near5 (packet stream flow TCP IP) same session same (stop\$4 prevent\$3 drop\$5)	US-PGPUB; USPAT	OR	ON	2020/01/16 13:15
S6	105	(inject\$3) near5 (packet stream flow TCP IP) same session same (stop\$4 prevent\$3 drop\$5) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/01/16 13:47
S7	20	(re\$direct\$3 re\$1rout\$3) with (duplicat\$3 replicat\$3 copy\$3 clon\$3) with (packet flow) same (test\$3 simulat\$3 prob\$3)	US-PGPUB; USPAT	OR	ON	2020/01/16 15:58
S8	11	(re\$direct\$3 re\$1rout\$3) with (duplicat\$3 replicat\$3 copy\$3 clon\$3) with (packet flow) same (test\$3 simulat\$3 prob\$3) same (metric performance KPI "key performance indicators" latency bandwidth congestion)	US-PGPUB; USPAT	OR	ON	2020/01/16 15:58
S9	11	(re\$direct\$3 re\$1rout\$3) with (duplicat\$3 replicat\$3 copy\$3 clon\$3) with (packet flow) same (test\$3 simulat\$3 prob\$3) same (metric performance KPI "key performance indicators" latency bandwidth congestion) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/01/16 15:59
S10	286	(network near5 performance same monitor\$3) and (packet near5 (copy\$3 or duplicat\$3 or replicat\$3 or replicat\$3 or clon\$3)) and (re\$direct\$3 near5 destination)	US-PGPUB; USPAT	OR	ON	2020/01/16 16:00
S11	25	(network near5 performance same monitor\$3) and (packet near5 (copy\$3 or duplicat\$3 or replicat\$3 or replicat\$3 or clon\$3)) and (re\$direct\$3 near5 destination) same (flow traffic)	US-PGPUB; USPAT	OR	ON	2020/02/03 14:58
S12	25	(network near5 performance same monitor\$3) and (packet near5 (copy\$3 or duplicat\$3 or replicat\$3 or clon\$3)) and (re\$direct\$3 near5 destination) same (flow traffic)	US-PGPUB; USPAT	OR	ON	2020/02/03 14:58
S13	25	(network near5 performance same monitor\$3) and (packet near5 (copy\$3 or duplicat\$3 or replicat\$3 or replicat\$3 or clon\$3)) and (re\$direct\$3 near5 destination) same (flow traffic) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 15:03
S14	19	(network near5 performance with (idicat\$5 monitor\$3)) same2 (forward\$3 routing\$3 re\$1rout\$5 re\$1direct\$3)	US-PGPUB; USPAT	OR	ON	2020/02/03 15:14

		near5 (SDN "software defined network") near controller and @ad<"20180914"				
S15	20	(network near5 performance with (idicat\$5 monitor\$3)) same2 (forward\$3 routing\$3 re\$1rout\$5 re\$1direct\$3) near5 (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 15:14
S16	0	(network near5 performance with (idicat\$5 monitor\$3)) same2 (re\$1rout\$5 re\$1direct\$3) near5 (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 15:14
S17	1,162	(record\$3 monitor\$3) same (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:24
S18	496	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:24
S19	297	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) with (packet flow traffic) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:25
S20	63	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) with (packet flow traffic) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and (network near5 performance same monitor\$3) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:26
S21	0	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) with (packet flow traffic) with (modify\$3 alter\$3) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and (network near5 performance same monitor\$3) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:27
S22	3	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) with (packet flow traffic) with (modify\$3 alter\$3) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:27
S23	660	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) near3 (server node apparatus) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:29

S26	1	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) near3 indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:31
S27	3	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:32
S28	23	(record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) near3 indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:32
S31	0	(drop\$4) near7 packet same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:33
S32	0	validat\$3 same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:37
S33	0	(malicious) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:39
S34	0	(malicious attack) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:39
S35	47	(malicious attack) same (record\$3 monitor\$3) near3 (server node apparatus) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:39

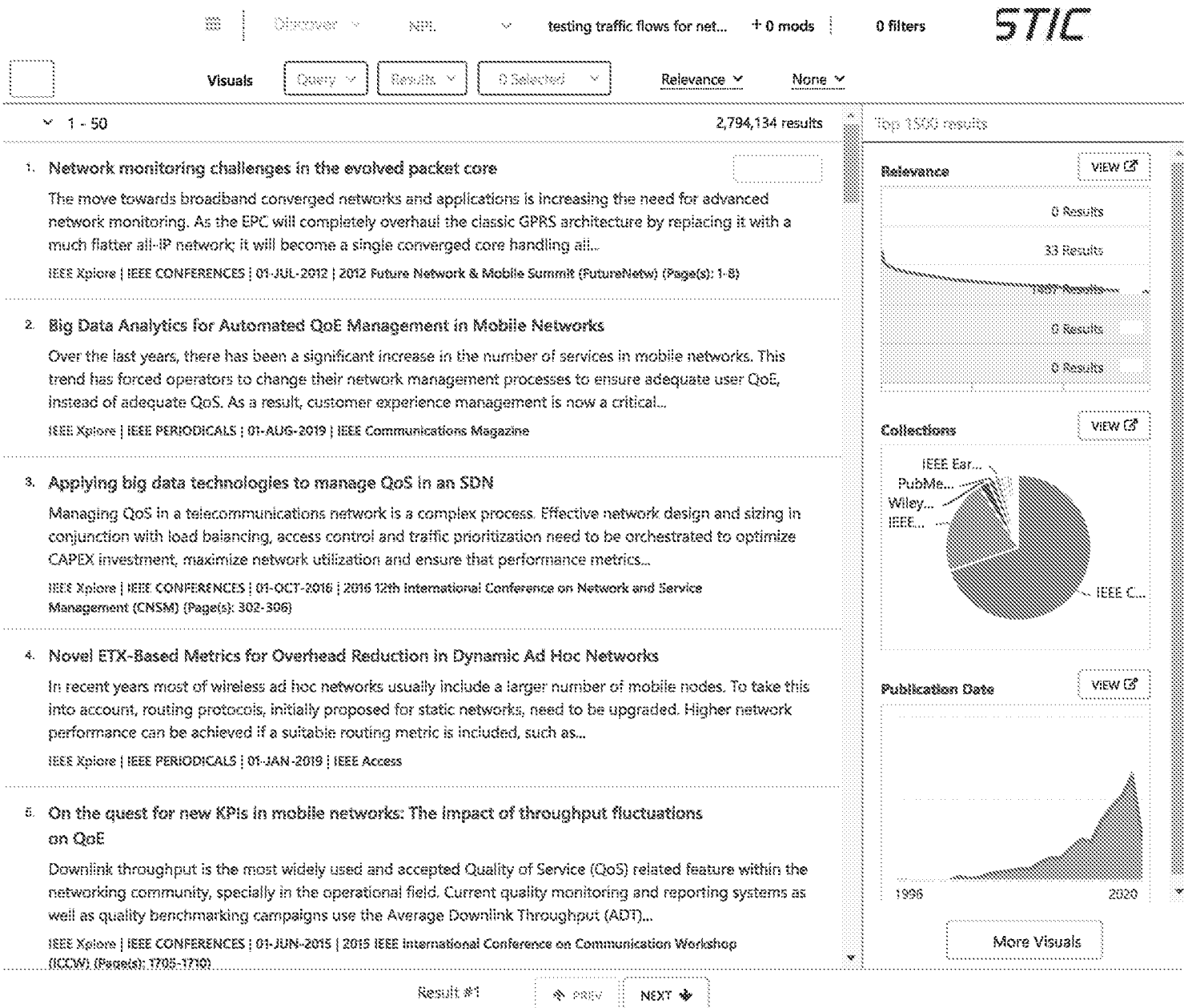
S36	2	OAM same "segment routing operations" same administration	US-PGPUB; USPAT	OR	ON	2020/02/04 16:32
S37	0	SDN same (decrement\$3) near5 TTL same fail\$3	US-PGPUB; USPAT	OR	ON	2020/02/04 19:32
S38	8	SDN same (decrement\$3) near5 TTL	US-PGPUB; USPAT	OR	ON	2020/02/04 19:33
S39	0	enforc\$3 near5 SLA with SDN and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/07 16:52
S40	0	enforc\$3 with SLA with SDN and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/07 16:58
S41	0	enforc\$3 with SLA same SDN and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/07 16:58
S42	24	enforc\$3 with SLA and SDN and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/07 16:58
S43	214	(replicat\$3 mirror\$3) near3 packets with (monitor\$3 record\$3 analysis) near3 (node apparatus device server) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/12 21:43
S44	18,501	(H04L43/12,1425,062,04,0888 H04L63/1425).cpc.	US-PGPUB; USPAT	OR	ON	2020/02/12 21:48
S45	90	((("SHOKAREV") near3 ("Dmitry"))) OR ((("PATEL") near3 ("Nayan"))) OR ((("BABAN") near3 ("Alex"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2020/02/12 21:49
S47	10	S45 and replica\$5 with packets	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2020/02/12 21:50

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L9	0	(packet with replica with modif\$3 with fail\$3).clm.	USPAT	OR	ON	2020/07/30 01:37
L10	0	(packet with validat\$4 with modif\$3 with fail\$3).clm.	USPAT	OR	ON	2020/07/30 01:37
L11	0	(packet with validat\$4 with modif\$4 with fail\$3).clm.	USPAT	OR	ON	2020/07/30 01:38
L12	0	(packet with replica with modif\$4 with fail\$3).clm.	USPAT	OR	ON	2020/07/30 01:38

7/30/2020 1:39:44 AM

C:\Users\gtolchinsky\Documents\EAST\Workspaces\16131806.wsp



INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16131806	
	Filing Date		2018-09-14	
	First Named Inventor	SHOKAREV; Dmitry A.		
	Art Unit	2454		
	Examiner Name	TOLCHINSKY, GREGORY P		
	Attorney Docket Number	0023-0948		

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	None				

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/G.P.T./	1	20090154361		2009-06-18	DUNNING; John A.	
/G.P.T./	2	20180075106		2018-03-15	HAVER; Joe. et al.	
/G.P.T./	3	20180091387		2018-03-29	LEVI; Lion. et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	None						☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16131806
	Filing Date		2018-09-14
	First Named Inventor	SHOKAREV; Dmitry A.	
	Art Unit	2454	
	Examiner Name	TOLCHINSKY, GREGORY P	
	Attorney Docket Number	0023-0948	

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
/G.P.T./	1	Extended European Search Report for Application No. EP19197201.7, mailed on January 20, 2020, 14 pages.	☐

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature	/GREGORY P TOLCHINSKY/	Date Considered	07/30/2020
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.P.T./

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	16131806
Filing Date	2018-09-14
First Named Inventor	SHOKAREV; Dmitry A.
Art Unit	2454
Examiner Name	TOLCHINSKY, GREGORY P
Attorney Docket Number	0023-0948

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Paul M. Gurzo, Reg. No. 67,478/	Date (YYYY-MM-DD)	2020-03-11
Name/Print	Paul M. Gurzo	Registration Number	67,478

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

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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.
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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.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/131,806	09/14/2018	Dmitry A. SHOKAREV	0023-0948	2681
44987	7590	06/04/2020	EXAMINER	
Harrity & Harrity, LLP 11350 Random hills road Suite 600 Fairfax, VA 22030			TOLCHINSKY, GREGORY P	
			ART UNIT	PAPER NUMBER
			2454	
			NOTIFICATION DATE	DELIVERY MODE
			06/04/2020	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):

docket@harrityllp.com
mpick@harrityllp.com
ptomail@harrityllp.com

<i>Applicant-Initiated Interview Summary</i>	Application No. 16/131,806	Applicant(s) SHOKAREV et al.		
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454	AIA (First Inventor to File) Status Yes	Page 1 of 1

All participants (applicant, applicants representative, PTO personnel):

1. GREGORY P TOLCHINSKY (Examiner);
Telephonic

2. STEVEN UNDERWOOD (Attorney: Reg. No. 47,205); Telephonic

Date of Interview: 28 April 2020

Issues Discussed:

Other:
Applicant's Representative and Examiner discussed the application, however, no determination was made as to the allowability of the claims.

/G.P.T./ Examiner, Art Unit 2454	/Brian Whipple/ Primary Examiner, Art Unit 2454
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Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04

Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/131,806	Filing Date 09/14/2018	☐ To be Mailed
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ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	x \$100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	x \$460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 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).			
☐ 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	

APPLICATION AS AMENDED - PART II

	(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	05/18/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	x \$100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	x \$460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x \$0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x \$0 =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.						LIE	
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/JEFFERY L OLSEN/	
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	)	
	)	
Dmitry A. Shokarev	)	
	)	
Application No.: 16/131,806	)	
	)	
Filed: September 14, 2018	)	Confirmation No.: 2681
	)	
For: SYSTEMS AND METHODS FOR	)	
NON-INTRUSIVE NETWORK	)	
PERFORMANCE MONITORING	)	

RESPONSE

In response to the non-final Office Action dated February 20, 2020, Applicant submits this response.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A first network device, comprising:
one or more memories; and
one or more processors, to:
receive packets as part of a traffic flow of an internet protocol (IP) session;
select a packet that is part of the traffic flow based on a rule;
generate a packet replica of the packet that has been selected;
add, to the packet replica, routing information that is capable of being used to
generate network performance indicators associated with the IP session;
modify a portion of the packet replica to include one or more values that will
cause the packet replica to fail to reach a destination device associated with the IP
session, to create a modified packet that is different from the packet replica; and
provide the modified packet ~~replica~~ to one or more other network devices to cause
a second network device, of the one or more other network devices, to:
perform a validation procedure to determine that the modified packet
~~replica~~ is unable to be validated based on the one or more values included in the
modified packet ~~replica~~,
generate or cause another device to generate the network performance
indicators using the modified packet ~~replica~~ or a group of modified packet
~~packets~~ ~~replicas that have been modified~~, and

provide or cause the other device to provide the network performance indicators to a particular device.

2. (Currently Amended) The first network device of claim 1, wherein a forwarding plane of the first network device is not modified when ~~modifying~~ the portion of the packet replica is modified.

3. (Currently Amended) The first network device of claim 1, wherein the one or more processors, when providing the modified packet ~~replica~~ to the one or more other network devices, are to:

provide, to the one or more other network devices, the modified packet ~~replica~~ as part of the traffic flow of the IP session.

4. (Currently Amended) The first network device of claim 1, wherein the modified packet ~~replica~~ or the group of modified packet ~~packets~~ ~~replicas~~ have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

5. (Original) The first network device of claim 1, wherein the rule is:
a first rule indicating to select particular packets after a threshold time period,
a second rule indicating to randomly select the particular packets,
a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier, or

a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.

6. (Original) The first network device of claim 1, wherein the traffic flow is supported by a label switching network; and

wherein the routing information includes segment routing operations, administration, and maintenance (OAM) information.

7. (Currently Amended) The first network device of claim 1, wherein the one or more processors, when modifying the portion of the packet replica to create the modified packet, are to:

set an IP header checksum value to a first incorrect value,

set a packet length value to a second incorrect value, or

set an IP header time to live (TTL) value to a third incorrect value.

8. (Currently Amended) A method, comprising:

receiving, by a first network device, packets as part of a traffic flow of an internet protocol (IP) session;

selecting, by the first network device, a packet that is part of the traffic flow;

generating, by the first network device, a packet replica of the packet that has been selected;

adding, by the first network device and to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session;

modifying, by the first network device, the packet replica, to create a modified packet that is different from the packet replica, to include one or more values that will cause the modified packet replica to fail to reach a destination device associated with the IP session; and

providing, by the first network device and as part of the traffic flow of the IP session, the modified packet replica to one or more other network devices to cause a second network device, of the one or more other network devices, to remove the modified packet replica from the traffic flow of the IP session based on the modified packet replica including the one or more values that have been modified, and to perform one or more actions that cause the network performance indicators to be generated and provided to another device.

9. (Currently Amended) The method of claim 8, wherein a forwarding plane of the first network device is not modified when ~~modifying the portion of the packet replica is~~ modified.

10. (Currently Amended) The method of claim 8, wherein the network performance indicators are generated based on the modified packet replica or a group of modified packets~~packet replicas~~; and

wherein the modified packet replica or the group of modified packets packet replicas have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

11. (Original) The method of claim 8, wherein selecting the packet that is part of the traffic flow comprises:

selecting the packet based on at least one of:

- a first rule indicating to select particular packets after a threshold time period,
- a second rule indicating to randomly select the particular packets,
- a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier, or
- a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.

12. (Currently Amended) The method of claim 8, wherein the routing information includes at least one of:

- session information for the IP session, or
- packet ~~replica~~ information for the modified packet replica or ~~the~~ a group of modified packets packet replicas.

13. (Original) The method of claim 8, wherein adding the routing information comprises:

adding the routing information to the packet replica as an additional header of the packet replica or as part of a payload of the packet replica.

14. (Currently Amended) The method of claim 8, wherein modifying the packet replica comprises:

setting an IP header checksum value to a first incorrect value,
setting a packet length value to a second incorrect value, or
setting an IP header time to live (~~TTL~~) value to a third incorrect value.

15. (Currently Amended) A non-transitory computer-readable medium storing instructions, the instructions comprising:

one or more instructions that, when executed by one or more processors of a network device, cause the one or more processors to:

receive, from another network device, a modified packet replica as part of a traffic flow of an internet protocol (IP) session,

wherein the modified packet replica includes routing information capable of being used to generate network performance indicators associated with the IP session, and

wherein the modified packet replica has been modified to include one or more values that will cause the modified packet replica to fail to reach a destination device associated with the IP session;
perform a validation procedure by processing the modified packet replica,

wherein the modified packet replica is to fail the validation procedure based on the one or more values included in the modified packet replica;
identify the routing information included in the modified packet replica based on the modified packet replica failing the validation procedure;
generate the network performance indicators using the modified packet replica or a group of modified packets packet replicas that have been modified and received over time; and
provide the network performance indicators to a particular device.

16. (Currently Amended) The non-transitory computer-readable medium of claim 15, wherein a forwarding plane used to route the traffic flow is not modified when the one or more values of the modified packet replica are modified.

17. (Currently Amended) The non-transitory computer-readable medium of claim 15, wherein the modified packet replica or the group of modified packets packet replicas have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

18. (Original) The non-transitory computer-readable medium of claim 15, wherein the traffic flow of the IP session is subject to a service-level agreement (SLA) that requires the network performance indicators to conform to a particular standard.

19. (Currently Amended) The non-transitory computer-readable medium of claim 15, wherein the one or more instructions, that cause the one or more processors to perform the validation procedure, cause the one or more processors to:

process the modified packet replica to determine that a header of the modified packet replica includes a first value that causes the modified packet replica to fail the validation procedure,

wherein the first value is:

an IP header checksum value,
a packet length value, or
an IP header time to live (~~TTL~~) value.

20. (Currently Amended) The non-transitory computer-readable medium of claim 15, wherein the network performance indicators include at least one of:

a first network performance indicator to verify an order in which packets are received,
a second network performance indicator to identify packet loss, ~~or~~
a third network performance indicator to identify packet delay,
a fourth network performance indicator to identify latency, or
a fifth network performance indicator to identify jitter.

REMARKS

Applicant addresses below the issues raised by the Office Action.

Statement Regarding Substance of Interview

Applicant submits that an interview occurred on April 28, 2020, with Applicant's representative, Steven Underwood, and Examiner Tolchinsky. Applicant appreciates the courtesies extended during the interview. During the interview, Applicant's representative discussed the claims, the rejections, the applied references, and proposed claim amendments. Examiner Tolchinsky subsequently agreed that the proposed amendments, substantially included in this amendment, overcome the applied references. Examiner Tolchinsky is respectfully requested to call Applicant's representative to resolve any remaining issues if the application is not in condition for allowance.

Rejection under 35 U.S.C. § 102(a)(1) based on CHUA

Claims 8-13 stand rejected under 35 U.S.C. § 102(a)(1) as allegedly being anticipated by CHUA.

For at least the reasons presented in the interview and without acquiescing in the Examiner's rejection, the cited sections of the applied reference do not disclose at least the features recited in claim 8, as amended. Therefore, independent claim 8, and the claims that depend thereon, are patentable over the applied reference.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 8-13 under 35 U.S.C. § 102(a)(1) based on CHUA.

Rejection under 35 U.S.C. § 103 based on CHUA and RANJABAR

Claims 1-5, 15-17, and 20 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over CHUA and RANJABAR.

For at least the reasons presented in the interview and without acquiescing in the Examiner's rejection, the cited sections of the applied references, whether taken alone or in any reasonable combination, do not disclose at least the features recited in claim 1, as amended. Independent claim 15, as amended, recite similar features. Therefore, independent claims 1 and 15, and the claims that depend thereon, are patentable over the cited sections of the applied references, whether taken alone or in any reasonable combination.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 1-5, 15-17, and 20 under 35 U.S.C. § 103 based on CHUA and RANJABAR.

Rejections of Dependent Claims under 35 U.S.C. § 103

Claims 6 and 7 depend from independent claim 1, claim 14 depends from independent claim 8, and claims 18 and 19 depend from independent claim 15. Therefore, claims 6-7, 14, and 18-19 are patentable for at least the reasons set forth above with respect to claims 1, 8, and 15.

Conclusion

In view of the foregoing remarks, Applicant respectfully requests timely allowance of the pending claims.

Applicant's silence as to assertions in the Office Action or certain requirements that may be applicable to such assertions (e.g., whether a reference constitutes prior art, reasons to modify

a reference and/or combine references, assertions as to dependent claims, and/or the like) is not a concession by Applicant that such assertions are accurate or that such requirements have been met, and Applicant reserves the right to dispute such assertions/requirements in the future.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

HARRITY & HARRITY, LLP

By: /Steven Underwood, Reg. No. 47,205/
Steven Underwood, Reg. No. 47,205
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APPLICATION #
16/131,806

RECEIPT DATE / TIME
05/18/2020 11:27:40 AM ET

ATTORNEY DOCKET #
0023-0948

Title of Invention

SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 2681

FILED BY Jazmine Hitt

PATENT CENTER # 60023247

FILING DATE 09/14/2018

CUSTOMER # 44987

FIRST NAMED INVENTOR Dmitry SHOKAREV

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Steven Underwood

Documents

TOTAL DOCUMENTS: 3

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
0023-0948_Response_05-18-20.pdf		12	-	53 KB
0023-0948_Response_05-18-20-A....pdf	(1-1)	1	Amendment/Req. Reconsideration-After Non-Final Reject	16 KB
0023-0948_Response_05-18-20-CLM.pdf	(2-9)	8	Claims	37 KB
0023-0948_Response_05-18-20-REM.pdf	(10-12)	3	Applicant Arguments/Remarks Made in an Amendment	28 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
0023-0948_Response_05-18-20.pdf	1747360A80D4B9133F48B74F36E40D5435C2B3D7E5F7B4F259 24032801D359F98B053AF552F425DA223E694A2C4C0E5DFDA A5018FC701C97433713B9F76C59C6
0023-0948_Response_05-18-20-A....pdf	14588D72D79F55A9B2809B4E4AD25EA6FEAFF619991D9CD0A EBAC49DDC7A56A3EECB037DB3A60E040E59E2E2EF623478B BBCFCB167044CD2B49F812E76033F78
0023-0948_Response_05-18-20-CLM.pdf	291259793A65EE6F852B9F4491879E98CE9AEAEA7BD795D83 0060A911B43A30D4A45750289BF17A244D886DB0DBEB34DE9 62C72B7BFCA4144B9DBF997AC22269
0023-0948_Response_05-18-20-REM.pdf	B98BD5C6908B450213CAE6811EB8C7ADA6E2A0870BC2CD70 AC43146F8A0C610B3A6EE45899549E58DF322C753C45F0918A EB73E7C228D73189ED6B092D1561C5

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/131,806	09/14/2018	Dmitry A. SHOKAREV	0023-0948

CONFIRMATION NO. 2681

PUBLICATION NOTICE



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44987
Harrity & Harrity, LLP
11350 Random hills road
Suite 600
Fairfax, VA 22030

Title:SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING

Publication No.US-2020-0092174-A1

Publication Date:03/19/2020

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	Filing Date		2018-09-14	
	First Named Inventor	SHOKAREV; Dmitry A.		
	Art Unit	2454		
	Examiner Name	TOLCHINSKY, GREGORY P		
	Attorney Docket Number	0023-0948		

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	None				

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20090154361		2009-06-18	DUNNING; John A.	
	2	20180075106		2018-03-15	HAVER; Joe. et al.	
	3	20180091387		2018-03-29	LEVI; Lion. et al.	

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	1	None						☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16131806
	Filing Date		2018-09-14
	First Named Inventor	SHOKAREV; Dmitry A.	
	Art Unit	2454	
	Examiner Name	TOLCHINSKY, GREGORY P	
	Attorney Docket Number	0023-0948	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	Extended European Search Report for Application No. EP19197201.7, mailed on January 20, 2020, 14 pages.	☐

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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	16131806
Filing Date	2018-09-14
First Named Inventor	SHOKAREV; Dmitry A.
Art Unit	2454
Examiner Name	TOLCHINSKY, GREGORY P
Attorney Docket Number	0023-0948

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Paul M. Gurzo, Reg. No. 67,478/	Date (YYYY-MM-DD)	2020-03-11
Name/Print	Paul M. Gurzo	Registration Number	67,478

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EFS ID:	38801493
Application Number:	16131806
International Application Number:	
Confirmation Number:	2681
Title of Invention:	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING
First Named Inventor/Applicant Name:	Dmitry A. SHOKAREV
Customer Number:	44987
Filer:	Paul Michael Gurzo/Jazmine Hitt
Filer Authorized By:	Paul Michael Gurzo
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	EESR_EP19197201_20Jan20_EFS.PDF	631555 1020e08d29363c46a78e8ed5f35004ff46b3f79e	no	14

Warnings:

Juniper Networks, Inc. v. Orckit Corporation, IPR2024-00895

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Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	0023-0948_IDS_03-11-20.pdf	125391	no	4
			bcf7ecf4b89a767e82615638efde8c289102d187		
Warnings:					
Information:					
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Total Files Size (in bytes):				756946	
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/131,806	09/14/2018	Dmitry A. SHOKAREV	0023-0948	2681
44987	7590	02/20/2020	EXAMINER	
Harrity & Harrity, LLP 11350 Random hills road Suite 600 Fairfax, VA 22030			TOLCHINSKY, GREGORY P	
			ART UNIT	PAPER NUMBER
			2454	
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			02/20/2020	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):

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mpick@harrityllp.com
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Office Action Summary	Application No. 16/131,806	Applicant(s) SHOKAREV et al.	
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454	AIA (FITF) Status Yes

-- 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 MONTHS 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 09/14/2018.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.

2a) ☐ This action is **FINAL**.

2b) ☒ This action is non-final.

3) ☐ 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.

4) ☐ 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*

5) ☒ Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) ____ is/are withdrawn from consideration.

6) ☐ Claim(s) ____ is/are allowed.

7) ☒ Claim(s) 1-20 is/are rejected.

8) ☐ Claim(s) ____ is/are objected to.

9) ☐ Claim(s) ____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

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

11) ☒ The drawing(s) filed on 09/14/2018 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).

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).

Certified copies:

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)).

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

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

3) ☐ Interview Summary (PTO-413)

Paper No(s)/Mail Date ____.

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)

4) ☐ Other: ____.

Paper No(s)/Mail Date 09/14/2018.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

This communication is in response to the application filed on 09/14/2018.

Claims 1-20 are pending.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 09/14/2018 is in compliance with the provisions of 37 C.F.R. § 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections – Prior Art

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

Claim Rejections - 35 U.S.C. § 102

(a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

Claims 8-13 are rejected under 35 U.S.C. § 102(a)(1) as being anticipated by Chua (Pat. No. US 9,038,151 B1).

Regarding claim 8, Chua teaches a method, comprising: receiving, by a first network device, packets as part of a traffic flow of an internet protocol (IP) session (**Fig.**

1, & Chua column 28, 7-32, packets of a packet flow are received by a first network device to be forwarded; see also column 5, lines 50-53, traffic flows from client device, through network and service devices, to a server device); selecting, by the first network device, a packet that is part of the traffic flow and generating, by the first network device, a packet replica of the packet that has been selected **(Chua column 28, 7-32, copies of the packet or the packets themselves [packet replicas] are generated to be sent to a second device);** adding, by the first network device and to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session **(Chua column 28, lines 7-32, header of a packet is transformed to route the ‘mirror copies’ or the packets themselves to a second device which will perform additional analysis);** modifying, by the first network device, the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session **(Chua column 28, 7-32, ‘mirror copies’ of the packets or the packets themselves are generated to be sent to a service device instead of a destination);** and providing, by the first network device and as part of the traffic flow of the IP session, the packet replica to one or more other network devices **(Chua column 28, 7-32, ‘mirror copies’ of the packets or the packets themselves are generated to be sent to a second device instead of a destination)** to cause a second network device, of the one or more other network devices, to remove the packet replica from the traffic flow of the IP session based on the packet replica including the one or more values that have been modified **(Chua column 28, 7-32, packets can be forwarded to collection device for further analysis instead of a destination which removes the packet**

replica from the traffic flow), and to perform one or more actions that cause the network performance indicators to be generated and provided to another device **(Chua column 28, lines 33-43, SDN controller receives service related data from the service devices; see also column 28, lines 21-29, packets are forwarded to another service device for further analysis and therefore the service related data is the output of the analysis which are network performance indicators; see also column 15, lines 64-67, “In addition, SDN controller 112 may be configured to direct specific packet flows (or direct duplicate versions of packets in a flow) to network recording devices or to network analysis devices,” and column 16, lines 1-44, “a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics”)**.

Regarding claim 9, Chua teaches the method of claim 8. Chua furthermore teaches wherein a forwarding plane of the first network device is not modified when modifying the portion of the packet replica **(Chua column 28, lines 26-32, packets can be forwarded by transforming the header values or by encapsulating with a particular header)**.

Regarding claim 10, Chua teaches the method of claim 8. Chua furthermore teaches wherein the network performance indicators are generated based on the packet replica or a group of packet replicas **(Chua column 28, lines 33-43, SDN controller receives service related data from the service devices; see also column 28, lines**

21-29, packets are forwarded to another service device for further analysis and therefore the service related data is the output of the analysis which are network performance indicators; see also column 15, lines 64-67, “In addition, SDN controller 112 may be configured to direct specific packet flows (or direct duplicate versions of packets in a flow) to network recording devices or to network analysis devices,” and column 16, lines 1-44, “a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics”); and wherein the packet replica or the group of packet replicas have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session (**Chua column 28, 7-32, packets can be forwarded without modifying the IP addresses by, for example, encapsulating the IP packet with a particular header).**

Regarding claim 11, Chua teaches the method of claim 8. Chua furthermore teaches selecting a packet based on at least one of; a first rule indicating to select particular packets after a threshold time period, a second rule indicating to randomly select the particular packets, a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier (**Chua column 14, lines 32-51, packets that cannot be trusted based on endpoint identifier are monitored**), or a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.

Regarding claim 12, Chua teaches the method of claim 8. Chua furthermore teaches wherein the routing information includes at least one of: session information for the IP session, or packet replica information for the packet replica or the group of packet replicas **(Chua column 28, lines 7-32, header of a packet is transformed to route the 'mirror copies' or the packets themselves to a second device which will perform additional analysis).**

Regarding claim 13, Chua teaches the method of claim 8. Chua furthermore teaches wherein adding the routing information comprises: adding the routing information to the packet replica as an additional header of the packet replica or as part of a payload of the packet replica **(Chua column 28, lines 26-32, packets can be forwarded by transforming the header values or by encapsulating with a particular header).**

Claim Rejections - 35 U.S.C. § 103

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

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-5, 15-17 and 20 are rejected under 35 U.S.C. § 103 as being unpatentable over Chua (Pat. No. US 9,038,151 B1) in view of Ranjabar (Pub. No. US 2020/0021994).

Regarding claim 1, Chua teaches a first network device, comprising: one or more memories (**Chua column 32, lines 21-34, memory is utilized here**); and one or more processors (**Chua column 31, lines 60-64, processor is utilized here**), to: receive packets as part of a traffic flow of an internet protocol (IP) session (**Fig. 1, & Chua column 28, 7-32, packets of a packet flow are received by a first network device to be forwarded; see also column 5, lines 50-53, traffic flows from client device, through network and service devices, to a server device**); select a packet that is part of the traffic flow based on a rule and generate a packet replica of the packet that has been selected (**Chua column 28, 7-32, in response to “an indication that packets of a packet from include malicious data” [rule], copies of the packet or the packets themselves [packet replicas] are generated to be sent to a second device that is not a destination**); add, to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session (**Chua column 28, lines 7-32, header of a packet is transformed to route**

the ‘mirror copies’ or the packets themselves to a second device which will perform additional analysis); modify a portion of the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session **(Fig. 1 & Chua column 28, 7-32, ‘mirror copies’ of the packets or the packets themselves are generated to be sent to a second device instead of a destination);** and provide the packet replica to one or more other network devices **(Fig. 1 & Chua column 28, 7-32, ‘mirror copies’ of the packets or the packets themselves are generated to be sent to a second device instead of a destination)** to cause a second network device, of the one or more other network devices, to: generate or cause another device to generate the network performance indicators using the packet replica or a group of packet replicas that have been modified, and provide or cause the other device to provide the network performance indicators to a particular device **(Chua column 28, lines 33-43, SDN controller receives service related data from the service devices; see also column 28, lines 21-29, packets are forwarded to another service device for further analysis and therefore the service related data is the output of the analysis which are network performance indicators; see also column 15, lines 64-67, “In addition, SDN controller 112 may be configured to direct specific packet flows (or direct duplicate versions of packets in a flow) to network recording devices or to network analysis devices,” and column 16, lines 1-44, “a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics”).**

Chua does not explicitly teach perform a validation procedure to determine that the packet replica is unable to be validated based on the one or more values included in the packet replica.

However, Ranjabar teaches perform a validation procedure to determine that the packet replica is unable to be validated based on the one or more values included in the packet replica (**Ranjabar Fig. 3, steps 3:6 and ¶ [0079] & [0081], a validation procedure is performed by the DDoS detector 200 to determine whether the packets are part of DDoS attack based on changes in destinations; see also ¶ [0061], packet is unable to be validated (implied DDoS attack) because of a destination address value in the packet replica (packet used in the DDoS attack)), generate or cause another device to generate the network performance indicators using the packet replica or a group of packet replicas that have been modified (**Although Chua teaches this limitation Ranjabar also teaches it; Ranjabar Fig. 3, step 3:7 and ¶¶ [0079] & [0081], based on the request from the SDN controller in step 3:6 the AOF 202 generates network indicators/statistics for transmission to the DDoS detector*), and provide or cause the other device to provide the network performance indicators to a particular device (**Although Chua teaches this limitation Ranjabar also teaches it; Ranjabar Fig. 3 and ¶¶ [0079] & [0081], based on the request from the SDN controller in step 3:6 the AOF generates indicators to be sent to the DDoS detector*).**

It would have been obvious to a person of ordinary skill in the art, before the effective filing date of the claimed invention, to combine the teachings of Chua and Ranjabar to teach performing validation of a packet replica at a second device because

it is merely combining prior art elements (validation of mirror/replica packets) according to known methods (validating at another device or function) to yield predictable results. *MPEP 2143 (I)*. Furthermore, it is beneficial to validate packets at a device because it allows the system to stop a DDoS attack, Ranjabar ¶ [0064].

Regarding claim 2, Chua and Ranjabar teach the first network device of claim 1. Chua furthermore teaches wherein a forwarding plane of the first device is not modified when modifying the portion of the packet replica **(Chua column 28, lines 26-32, packets can be forwarded by transforming the header values or by encapsulating with a particular header)**.

Regarding claim 3, Chua and Ranjabar teach the first network device of claim 1. Chua furthermore teaches provide, to the one or more other network devices, the packet replica as part of the traffic flow of the IP session **(Chua column 28, 24-29, ‘mirror copies’ of packets of a packet flow are generated to be sent to a second device instead of a destination)**.

Regarding claim 4, Chua and Ranjabar teach the first network device of claim 1. Chua furthermore teaches wherein the packet replica or the group of packet replicas have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session **(Chua column 28, 7-32, packets can be forwarded without modifying the IP addresses by, for example, encapsulating the IP packet with a particular header)**.

Regarding claim 5, Chua and Ranjabar teach the first network device of claim 1. Chua furthermore teaches wherein the rule is: a first rule indicating to select particular packets after a threshold time period, a second rule indicating to randomly select the particular packets, a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier (**Chua column 14, lines 32-51, packets that cannot be trusted based on endpoint identifier are monitored**), or a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.

Regarding claim 15, Chua teaches non-transitory computer-readable medium storing instructions, the instructions comprising: one or more instructions that, when executed by one or more processors of a network device, cause the one or more processors to: receive, from another network device, a packet replica as part of a traffic flow of an internet protocol (IP) session (**Fig. 1, & Chua column 28, 7-32, 'mirror copies' of the packets or the packets themselves are forwarded by a first network**), wherein the packet replica includes routing information capable of being used to generate network performance indicators associated with the IP session (**Chua column 28, lines 7-32, header of a packet is transformed to route the 'mirror copies' or the packets themselves to a second device which will perform additional analysis**), and wherein the packet replica has been modified to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session (**Fig. 1 & Chua column 28, 7-32, 'mirror copies' of the**

packets or the packets themselves are generated to be sent to a second device instead of a destination); generate the network performance indicators using the packet replica or a group of packet replicas that have been modified and received over time and provide the network performance indicators to a particular device (Chua column 28, lines 33-43, SDN controller receives service related data from the service devices; see also column 28, lines 21-29, packets are forwarded to another service device for further analysis and therefore the service related data is the output of the analysis which are network performance indicators; see also column 15, lines 64-67, “In addition, SDN controller 112 may be configured to direct specific packet flows (or direct duplicate versions of packets in a flow) to network recording devices or to network analysis devices,” and column 16, lines 1-44, “a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics”).

Chua does not explicitly teach perform a validation procedure by processing the packet replica, wherein the packet replica is to fail the validation procedure based on the one or more values included in the packet replica; identify the routing information included in the packet replica based on the packet replica failing the validation procedure.

However, Ranjabar teaches perform a validation procedure by processing the packet replica, wherein the packet replica is to fail the validation procedure based on the one or more values included in the packet replica **(Ranjabar Fig. 3 and ¶ [0079] & [0081], a validation procedure is performed by the DDoS detector 200 to**

determine whether the packets are part of DDoS attack based on changes in destinations; see also ¶ [0061], packet is unable to be validated (implied DDoS attack) because of a destination address value in the packet replica (packet used in the DDoS attack)); identify the routing information included in the packet replica based on the packet replica failing the validation procedure (Ranjabar ¶ [0085], after the SDN controller receives notification of a validation failure it may drop the packet or reroute and therefore identifies the routing information included in the packet replica).

It would have been obvious to a person of ordinary skill in the art, before the effective filing date of the claimed invention, to combine the teachings of Chua and Ranjabar to teach performing validation of a packet replica at a second device because it is merely combining prior art elements (validation of mirror/replica packets) according to known methods (validating at another device or function) to yield predictable results. *MPEP 2143 (I)*. Furthermore, it is beneficial to validate packets at a device because it allows the system to stop a DDoS attack, Ranjabar ¶ [0064].

Chua and Ranjabar teach all the limitations of claims 16-17 as asserted above with regard to claims 2 and 4.

Regarding claim 20, Chua and Ranjabar teach the non-transitory computer-readable medium of claim 15. Chua furthermore teaches wherein the network performance indicators include at least one of: a first network performance indicator to verify an order in which packets are received, a second network performance indicator

to identify packet loss, or a third network performance indicator to identify packet delay **(Chua column 15, lines 64-67, “In addition, SDN controller 112 may be configured to direct specific packet flows (or direct duplicate versions of packets in a flow) to network recording devices or to network analysis devices,” and column 16, lines 36-44, “a network performance device may monitor various performance metrics, such as latency, jitter, packet loss, or the like, and provide feedback data to SDN controller 112 based on these metrics”).**

Claim 6 is rejected under 35 U.S.C. 103 as being unpatentable over Chua (Pat. No. US 9,038,151 B1) in view of Ranjabar (Pub. No. US 2020/0021994) and further in view of Nainar (Pub. No. US 2015/0381444 A1).

Regarding claim 6, Chua and Ranjabar teach the first network device of claim 1. Chua furthermore teaches wherein the traffic flow is supported by a label switching network **(Chua column 14, lines 12-20, MPLS taught here; see also column 25, lines 42-46).**

Chua and Ranjabar do not explicitly teach including segment routing operations, administration, and maintenance (OAM) information.

However, Nainar teaches wherein the routing information includes segment routing operations, administration, and maintenance (OAM) information **(Nainar ¶ [0008], “generating a path validation packet, the path validation packet comprising a plurality of segment identifiers for use in segment routing and an**

operations, administration, and management (OAM) segment identifier for use in path validation”).

It would have been obvious to a person of ordinary skill in the art, before the effective filing date of the claimed invention, to combine the teachings of Chua, Ranjabar and Nainar to teach wherein the routing information includes segment routing operations, administration, and maintenance (OAM) information because it is merely combining prior art elements according to known methods to yield predictable results. *MPEP 2143 (I)*. Furthermore, it is beneficial to do this because it allows for data plane validation without the need for control plane intervention; Nainar ¶ [0013].

Claims 7 and 19 are rejected under 35 U.S.C. § 103 as being unpatentable over Chua (Pat. No. US 9,038,151 B1) in view of Ranjabar (Pub. No. US 2020/0021994) and further in view of Robertson (Pub. No. US 2017/0093911 A1).

Regarding claim 7, Chua and Ranjabar teach the first network device of claim 1.

Chua and Ranjabar do not explicitly teach set an IP header checksum value to a first incorrect value, set a packet length value to a second incorrect value, or set an IP header time to live (TTL) value to a third incorrect value.

However, Robertson teaches wherein the one or more processors, when modifying the portion of the packet replica, are to: set an IP header checksum value to a first incorrect value, set a packet length value to a second incorrect value, or set an IP header time to live (TTL) value to a third incorrect value (**Robertson ¶ [0048], TTL**

value is decremented based on a simulated TTL router and therefore is set an incorrect value).

It would have been obvious to a person of ordinary skill in the art, before the effective filing date of the claimed invention, to combine the teachings of Chua, Ranjabar and Robertson to teach decreasing the TTL value based on simulated network nodes because it allows “to present a more realistic network view (since all traditional networks have these elements) and allow a larger number of distinct views to be create.” Furthermore, this is merely combining prior art elements according to known methods to yield predictable results. *MPEP 2143 (I)*.

Regarding claim 19, Chua and Ranjabar teach the non-transitory computer-readable medium of claim 15.

Chua and Ranjabar do not explicitly teach process the packet replica to determine that a header of the packet replica includes a first value that causes the packet replica to fail the validation procedure, wherein the first value is: an IP header checksum value, a packet length value, or an IP header time to live (TTL) value.

However, Robertson teaches process the packet replica to determine that a header of the packet replica includes a first value that causes the packet replica to fail the validation procedure, wherein the first value is: an IP header checksum value, a packet length value, or an IP header time to live (TTL) value (**Robertson ¶ [0048], TTL value is decremented based on a simulated TTL router and when it is 0 will fail to be validated**).

It would have been obvious to a person of ordinary skill in the art, before the effective filing date of the claimed invention, to combine the teachings of Chua, Ranjabar and Robertson to teach failing to validate based on a TTL value because this is merely combining prior art elements according to known methods to yield predictable results. *MPEP 2143 (I)*.

Claims 14 is rejected under 35 U.S.C. § 103 as being unpatentable over Chua (Pat. No. US 9,038,151 B1) in view of Robertson (Pub. No. US 2017/0093911 A1).

Regarding claim 14, Chua teaches the method of claim 8.

Chua does not explicitly teach set an IP header checksum value to a first incorrect value, set a packet length value to a second incorrect value, or set an IP header time to live (TTL) value to a third incorrect value.

However, Robertson teaches set an IP header checksum value to a first incorrect value, set a packet length value to a second incorrect value, or set an IP header time to live (TTL) value to a third incorrect value (**Robertson ¶ [0048], TTL value is decremented based on a simulated TTL router and therefore is set an incorrect value**).

It would have been obvious to a person of ordinary skill in the art, before the effective filing date of the claimed invention, to combine the teachings of Chua, Ranjabar and Robertson to teach decreasing the TTL value based on simulated network nodes because it allows “to present a more realistic network view (since all traditional networks have these elements) and allow a larger number of distinct views to

be created.” Furthermore, this is merely combining prior art elements according to known methods to yield predictable results. *MPEP 2143 (I)*.

Claims 18 is rejected under 35 U.S.C. 103 as being unpatentable over Chua (Pat. No. US 9,038,151 B1) in view of Ranjabar (Pub. No. US 2020/0021994) and further in view of Herdrich (Pub. No. US 2017/0094377 A1).

Regarding claim 18, Chua and Ranjabar teach the non-transitory computer readable medium of claim 15.

Chua and Ranjabar do not explicitly teach wherein the traffic flow of the IP session is subject to a service-level agreement (SLA) that requires the network performance indicators to conform to a particular standard.

However, Herdrich teaches wherein the traffic flow of the IP session is subject to a service-level agreement (SLA) that requires the network performance indicators to conform to a particular standard (**Herdrich ¶ [0026], “Devices in accordance with various embodiments can calculate or generate SLA metrics. For example, some devices will check that SLA is within acceptable limits, or enforce SLA violations”**).

It would have been obvious to a person of ordinary skill in the art, before the effective filing date of the claimed invention, to combine the teachings of Chua, Ranjabar and Herdrich to teach enforcing an SLA, because it is merely combining prior art elements (obtaining network metrics and enforcing an SLA) according to known methods to yield predictable results. *MPEP 2143 (I)*.

Conclusion

The following prior art made of record and not relied upon is considered pertinent to Applicant's disclosure:

Nachum (Pub. No. US 2015/0319049 A1) teaches "taps are implemented at specific points in the network to access the data traffic and pass the data (whether the original data packets or the replicated copies thereof) to the monitoring tools;" Nachum ¶ [0004].

Mihaly (Pub. No. US 2020/0037209 A1) teaches "mirroring the signaling packets to the further server;" Mihaly ¶ [0073].

Monshizadeh (Pub. No. US 2019/0215305 A1) teaches "the mirrored packet is forwarded for analysis to a corresponding DaaS node. The DaaS node analyses and decides whether the traffic is malicious traffic or normal;" Monshizadeh ¶ [0038].

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY P TOLCHINSKY whose telephone number is (571)270-0599. The examiner can normally be reached on m-f (9:30-6:30PM).

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Umar Cheema can be reached on 571-270-3037. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/G.P.T./
Examiner, Art Unit 2454
02/05/2020

/UMAR CHEEMA/
Supervisory Patent Examiner, Art Unit 2454

<i>Notice of References Cited</i>	Application/Control No. 16/131,806		Applicant(s)/Patent Under Reexamination SHOKAREV et al.	
	Examiner GREGORY P TOLCHINSKY		Art Unit 2454	Page 1 of 1

U.S. PATENT DOCUMENTS						
*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-9038151-B1	05-2015	Chua; Roy Liang	H04L45/02	709/223
*	B	US-20170094377-A1	03-2017	Herdrich; Andrew J.	H04L43/10	1/1
*	C	US-20130227117-A1	08-2013	MELOCHE; Jean	H04L43/10	709/224
*	D	US-20200037209-A1	01-2020	Mihaly; Attila	H04L67/1021	1/1
*	E	US-20190215305-A1	07-2019	MONSHIZADEH; Mehrnoosh	H04L63/0236	1/1
*	F	US-20150319049-A1	11-2015	Nachum; Youval	H04L41/14	370/422
*	G	US-20150381444-A1	12-2015	Nainar; Nagendra Kumar	H04L43/0811	370/241.1
*	H	US-20200021994-A1	01-2020	RANJBAR; Alireza	H04W12/1204	1/1
*	I	US-20170093911-A1	03-2017	ROBERTSON; Seth	H04L63/1491	1/1
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS						
*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC 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.

<i>Search Notes</i> 	Application/Control No. 16/131,806	Applicant(s)/Patent Under Reexamination SHOKAREV et al.
	Examiner GREGORY P TOLCHINSKY	Art Unit 2454

CPC - Searched*		
Symbol	Date	Examiner
H04L43/12,1425,062,04,0888 H04L63/1425	02/12/2020	gt

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
NPL search (see attachment)	01/16/2020	gt
EAST search (see attachment)	01/16/2020	gt
Double Patenting search (EAST, PE2E)	02/12/2020	gt

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/G.P.T./ Examiner, Art Unit 2454	
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INFORMATION DISCLOSURE CITATION PTO-1449		CUSTOMER NUMBER 44987		ATTORNEY'S DKT No. 0023-0948		APPLICATION No. Unassigned 16131806	
				APPLICANT(S) Juniper Networks, Inc.			
				FILING DATE September 14, 2018		GROUP Unassigned 2454	
U.S. PATENT DOCUMENTS							
EXAMINER'S INITIALS	PATENT NO.	DATE	NAME	CLASS	SUBCLASS	FILING DATE	
FOREIGN PATENT DOCUMENTS							
EXAMINER'S INITIALS	PATENT NO.	DATE	COUNTRY	CLASS	SUBCLASS	Translation	
						Yes	No
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)							
/G.P.T./	F. Brockners et al., "Data Fields for In-situ OAM", https://tools.ietf.org/pdf/draft-brockners-inband-oam-data-07.pdf , July 2, 2017, 29 pages.						
EXAMINER				DATE CONSIDERED			
/GREGORY P TOLCHINSKY/				02/04/2020			

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant(s).

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.P.T./

Bibliographic Data

Application No: 16/131,806

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged:

/GREGORY P
TOLCHINSKY/

Examiner's Signature

Initials

Title:

SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK
PERFORMANCE MONITORING

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
09/14/2018	709	2454	0023-0948
RULE			

APPLICANTS

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Nayan S. Patel Bedford, MA, UNITED STATES

Alex Baban San Jose, CA, UNITED STATES

CONTINUING DATA

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

10/03/2018

STATE OR COUNTRY

UNITED STATES

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11350 Random hills road
Suite 600
Fairfax, VA 22030
UNITED STATES

FILING FEE RECEIVED

\$1,720

EAST Search History

EAST Search History (Prior Art)

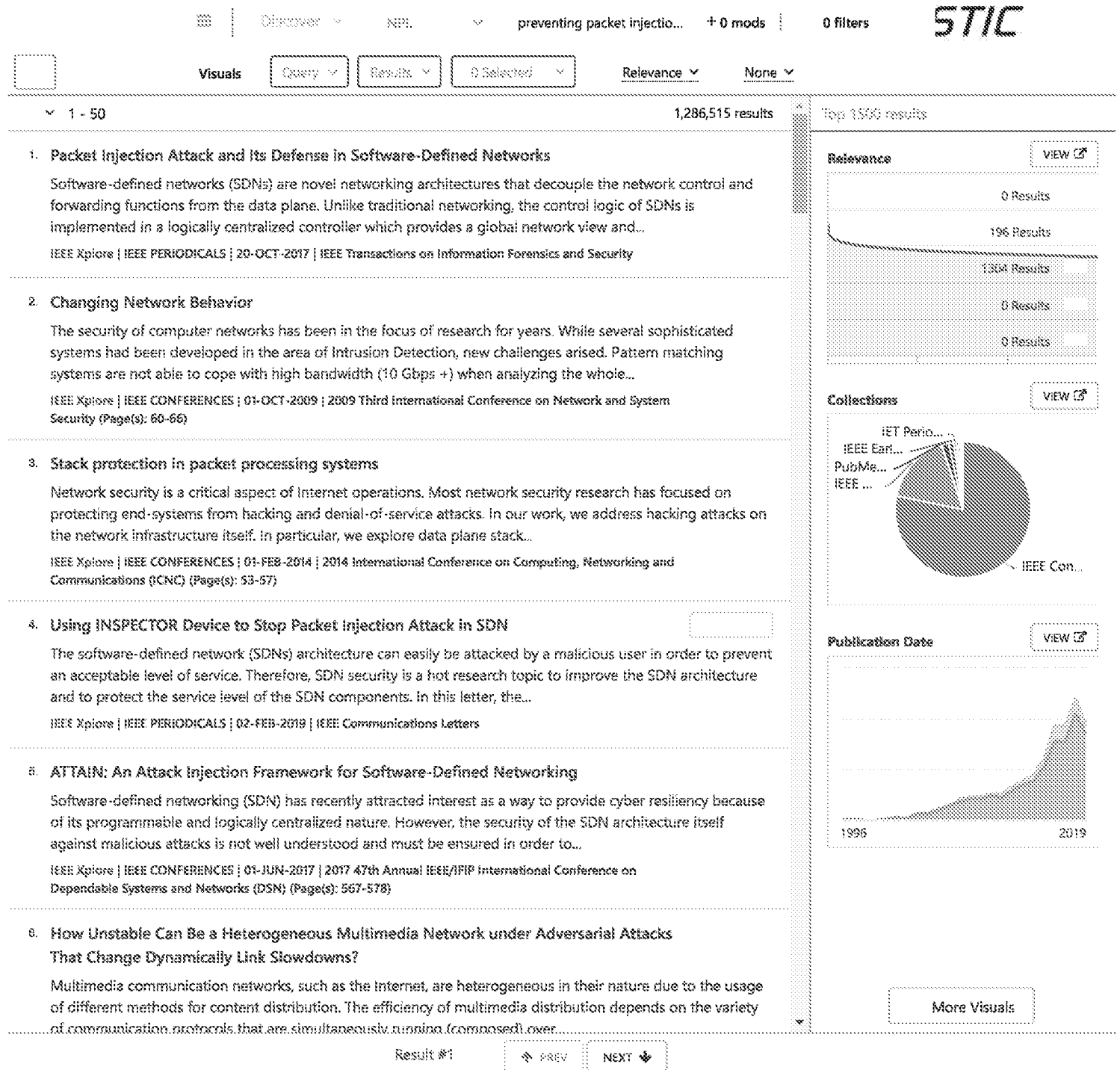
Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	231184	(inject\$3) near5 (packet stream flow TCP IP)	US-PGPUB; USPAT	OR	ON	2020/01/16 12:37
S2	878	(inject\$3) near5 (packet stream flow TCP IP) same (test\$3) same (metric performance KPI "key performance indicators")	US-PGPUB; USPAT	OR	ON	2020/01/16 12:41
S3	1071	(inject\$3) near5 (packet stream flow TCP IP) same (test\$3) same (metric performance KPI "key performance indicators" latency bandwidth congestion)	US-PGPUB; USPAT	OR	ON	2020/01/16 12:41
S4	174	(inject\$3) near5 (packet stream flow TCP IP) same session same (test\$3)	US-PGPUB; USPAT	OR	ON	2020/01/16 12:48
S5	108	(inject\$3) near5 (packet stream flow TCP IP) same session same (stop\$4 prevent\$3 drop\$5)	US-PGPUB; USPAT	OR	ON	2020/01/16 13:15
S6	105	(inject\$3) near5 (packet stream flow TCP IP) same session same (stop\$4 prevent\$3 drop\$5) and @ad< "20180914"	US-PGPUB; USPAT	OR	ON	2020/01/16 13:47
S7	20	(re\$1direct\$3 re\$1rout\$3) with (duplicat\$3 replicat\$3 copy\$3 clon\$3) with (packet flow) same (test\$3 simulat\$3 prob\$3)	US-PGPUB; USPAT	OR	ON	2020/01/16 15:58
S8	11	(re\$1direct\$3 re\$1rout\$3) with (duplicat\$3 replicat\$3 copy\$3 clon\$3) with (packet flow) same (test\$3 simulat\$3 prob\$3) same (metric performance KPI "key performance indicators" latency bandwidth congestion)	US-PGPUB; USPAT	OR	ON	2020/01/16 15:58
S9	11	(re\$1direct\$3 re\$1rout\$3) with (duplicat\$3 replicat\$3 copy\$3 clon\$3) with (packet flow) same (test\$3 simulat\$3 prob\$3) same (metric performance KPI "key performance indicators" latency bandwidth congestion) and @ad< "20180914"	US-PGPUB; USPAT	OR	ON	2020/01/16 15:59
S10	286	(network near5 performance same monitor\$3) and (packet near5 (copy\$3 or duplicat\$3 or replicat\$3 or replicat\$3 or clon\$3)) and (re\$direct\$3 near5 destination)	US-PGPUB; USPAT	OR	ON	2020/01/16 16:00
S11	25	(network near5 performance same monitor\$3) and (packet near5 (copy\$3 or duplicat\$3 or replicat\$3 or replicat\$3 or clon\$3)) and (re\$direct\$3 near5 destination) same (flow traffic)	US-PGPUB; USPAT	OR	ON	2020/02/03 14:58
S12	25	(network near5 performance same	US-PGPUB;	OR	ON	2020/02/03

		monitor\$3) and (packet near5 (copy\$3 or duplicat\$3 or replicat\$3 or clon\$3)) and (re\$direct\$3 near5 destination) same (flow traffic)	USPAT			14:58
S13	25	(network near5 performance same monitor\$3) and (packet near5 (copy\$3 or duplicat\$3 or replicat\$3 or replicat\$3 or clon\$3)) and (re\$direct\$3 near5 destination) same (flow traffic) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 15:03
S14	19	(network near5 performance with (idicat\$5 monitor\$3)) same2 (forward\$3 routing\$3 re\$1rout\$5 re\$1direct\$3) near5 (SDN "software defined network") near controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 15:14
S15	20	(network near5 performance with (idicat\$5 monitor\$3)) same2 (forward\$3 routing\$3 re\$1rout\$5 re\$1direct\$3) near5 (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 15:14
S16	0	(network near5 performance with (idicat\$5 monitor\$3)) same2 (re\$1rout\$5 re\$1direct\$3) near5 (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 15:14
S17	1162	(record\$3 monitor\$3) same (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:24
S18	496	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:24
S19	297	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) with (packet flow traffic) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:25
S20	63	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) with (packet flow traffic) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and (network near5 performance same monitor\$3) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:26
S21	0	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) with (packet flow traffic) with (modify\$3 alter\$3) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and (network near5 performance same monitor\$3) and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:27
S22	3	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) with (packet flow traffic) with (modify\$3 alter\$3) same (record\$3 monitor\$3) same (SDN "software defined network") near3 controller and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 16:27
S23	660	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) near3 (server node apparatus) and (SDN	US-PGPUB; USPAT	OR	ON	2020/02/03 20:29

		"software defined network") and @ad<"20180914"				
S26	1	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) near3 indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:31
S27	3	(rout\$3 direct\$3 re\$1direct\$3 re\$1rout\$3) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:32
S28	23	(record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) near3 indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:32
S31	0	(drop\$4) near7 packet same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:33
S32	0	validat\$3 same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:37
S33	0	(malicious) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:39
S34	0	(malicious attack) same (record\$3 monitor\$3) near3 (server node apparatus) same (((network performance) with indicator) or (KPI "key performance indicator")) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:39
S35	47	(malicious attack) same (record\$3 monitor\$3) near3 (server node apparatus) and (SDN "software defined network") and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/03 20:39
S36	2	OAM same "segment routing operations" same administration	US-PGPUB; USPAT	OR	ON	2020/02/04 16:32
S37	0	SDN same (decrement\$3) near5 TTL same fail\$3	US-PGPUB; USPAT	OR	ON	2020/02/04 19:32
S38	8	SDN same (decrement\$3) near5 TTL	US-PGPUB; USPAT	OR	ON	2020/02/04 19:33
S39	0	enforc\$3 near5 SLA with SDN and @ad<"20180914"	US-PGPUB; USPAT	OR	ON	2020/02/07 16:52

S40	0	enforc\$3 with SLA with SDN and @ad< "20180914"	US-PGPUB; USPAT	OR	ON	2020/02/07 16:58
S41	0	enforc\$3 with SLA same SDN and @ad< "20180914"	US-PGPUB; USPAT	OR	ON	2020/02/07 16:58
S42	24	enforc\$3 with SLA and SDN and @ad< "20180914"	US-PGPUB; USPAT	OR	ON	2020/02/07 16:58
S43	214	(replicat\$3 mirror\$3) near3 packets with (monitor\$3 record\$3 analysis) near3 (node apparatus device server) and @ad< "20180914"	US-PGPUB; USPAT	OR	ON	2020/02/12 21:43
S44	18501	(H04L43/12,1425,062,04,0888 H04L63/1425).cpc.	US-PGPUB; USPAT	OR	ON	2020/02/12 21:48
S45	90	((("SHOKAREV") near3 ("Dmitry")) OR ((("PATEL") near3 ("Nayan")) OR ((("BABAN") near3 ("Alex")))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2020/02/12 21:49
S47	10	S45 and replica\$5 with packets	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2020/02/12 21:50

2/ 13/ 2020 12:04:13 AM
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/131,806				
APPLICATION AS FILED - PART I										
(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	300			
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	660			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760			
TOTAL CLAIMS (37 CFR 1.16(j))	20	minus 20 = *			OR	x 100 =	0.00			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *				x 460 =	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 \$310 (\$155 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			
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	1720			
APPLICATION AS AMENDED - PART II										
(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	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
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	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						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 found in the appropriate box in column 1.										



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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
16/131,806	09/14/2018	2447	1720	0023-0948	20	3

CONFIRMATION NO. 2681

FILING RECEIPT



0000000102802732

44987
Harrity & Harrity, LLP
11350 Random hills road
Suite 600
Fairfax, VA 22030

Date Mailed: 10/05/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Dmitry A. SHOKAREV, Mountain View, CA;
Nayan S. Patel, Bedford, MA;
Alex Baban, San Jose, CA;

Applicant(s)

Juniper Networks, Inc., Sunnyvale, CA;

Power of Attorney: The patent practitioners associated with Customer Number 44987

Domestic Applications for which benefit is claimed - None.

A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/03/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/131,806**

Projected Publication Date: 03/19/2020

Non-Publication Request: No

Early Publication Request: No

Title

SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING

Preliminary Class

709

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE
MONITORING

BACKGROUND

[0001] Packet switching is a method of grouping data which is transmitted over a digital network into packets which are made of a header and a payload. Data in the header may be used by network devices to direct packets to destinations where the payload may be used as part of a service.

SUMMARY

[0002] According to some possible implementations, a first network device may include one or more memories and one or more processors, to: select a packet that is part of the traffic flow based on a rule. The one or more processors may generate a packet replica of the packet that has been selected. The one or more processors may add, to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session. The one or more processors may modify a portion of the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session. The one or more processors may provide the packet replica to one or more other network devices to cause a second network device, of the one or more other network devices, to perform a validation procedure to determine that the packet replica is unable to be validated based on the one or more values included in the packet replica, generate or cause another device to generate the network performance indicators using the packet replica or a

group of packet replicas that have been modified, and provide or cause the other device to provide the network performance indicators to a particular device.

[0003] According to some possible implementations, a method may include receiving, by a first network device, packets as part of a traffic flow of an internet protocol (IP) session. The method may include selecting, by the first network device, a packet that is part of the traffic flow. The method may include generating, by the first network device, a packet replica of the packet that has been selected. The method may include adding, by the first network device and to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session. The method may include modifying, by the first network device, the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session. The method may include providing, by the first network device and as part of the traffic flow of the IP session, the packet replica to one or more other network devices to cause a second network device, of the one or more other network devices, to remove the packet replica from the traffic flow of the IP session based on the packet replica including the one or more values that have been modified, and to perform one or more actions that cause the network performance indicators to be generated and provided to another device.

[0004] According to some possible implementations, a non-transitory computer-readable medium may store instructions that include one or more instructions that, when executed by one or more processors of a network device, cause the one or more processors to receive, from another network device, a packet replica as part of a traffic flow of an internet protocol (IP) session. The packet replica may include routing information capable of being used to generate network performance indicators associated with the IP session. The packet replica may have

been modified to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session. The one or more instructions may cause the one or more processors to perform a validation procedure by processing the packet replica. The packet replica may fail the validation procedure based on the one or more values included in the packet replica. The one or more instructions may cause the one or more processors to identify the routing information included in the packet replica based on the packet replica failing the validation procedure. The one or more instructions may cause the one or more processors to generate the network performance indicators using the packet replica or a group of packet replicas that have been modified and received over time. The one or more instructions may cause the one or more processors to provide the network performance indicators to a particular device.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0005] Figs. 1A-1C are diagrams of an example implementation described herein.
- [0006] Fig. 2 is a diagram of an example environment in which systems and/or methods, described herein, may be implemented.
- [0007] Fig. 3 is a diagram of example components of one or more devices of Fig. 2.
- [0008] Figs. 4-6 are flow charts of an example process for non-intrusive monitoring of network performance of a group of network devices used to support traffic flow of an internet protocol (IP) session.

DETAILED DESCRIPTION

[0009] The following detailed description of example implementations refers to the accompanying drawings. The same reference numbers in different drawings may identify the same or similar elements.

[0010] A packet switched network may include network devices (e.g., switches, routers, and/or the like) that may send and/or receive packets as part of traffic flow of a session (e.g., an internet protocol (IP) session) for a service. In some cases, network congestion may cause the network devices to drop packets or to delay packet transmission of the packets. Additionally, paths through the packet switched network may change because of hardware failures and/or software failures associated with the network devices.

[0011] When a service is offered over the packet switched network, key performance metrics (referred to herein as network performance indicators) may be agreed upon between a network service provider and a customer. For example, a service-level agreement (SLA) between the network service provider and the customer may include stipulations that certain network performance indicators are to be monitored and/or satisfied (e.g., network devices may need to adhere to threshold levels of performance to be in compliance with terms of the SLA).

[0012] In some cases, to test the network performance indicators, the network service provider may configure the network devices to generate and transmit synthetic probe packets throughout the packet switched network and may process the synthetic probe packets to determine the network performance indicators.

[0013] However, the synthetic probe packets may be an ineffective solution for testing network performance indicators because the synthetic probe packets may display different forwarding behavior than packets of actual traffic flow of the IP session. For example, the

synthetic probe packets may have different IP addresses than the packets of the actual traffic flow of the IP session (e.g., a different source IP address, a different destination IP address, etc.), may be a different packet size (e.g., in bytes) than the packets of the actual traffic flow of the IP session, may take different paths through the packet switched network than the packets of the actual traffic flow of the IP session, and/or the like. Other solutions may rely on changes to a forwarding plane of one or more network devices used to route the actual traffic flow of the IP session (e.g., by adding additional headers to the packets that are part of the actual traffic flow of the IP session). These solutions may be disruptive and difficult to implement in existing packet switched networks.

[0014] Some implementations described herein provide a first network device to generate packet replicas of packets that are part of a traffic flow of an IP session, and to intelligently modify the packet replicas such that a second network device will be able to use the packet replicas to generate network performance indicators associated with the IP session. For example, the first network device may receive packets as part of the traffic flow of the IP session, and may select a packet for further processing. The packet selected by may be part of a group of packets that are selected for further processing. In this case, the first network device may generate a packet replica of the packet, and may add, to the packet replica, routing information (e.g., segment routing operations, administration, and maintenance (OAM) information) that may be used to generate the network performance indicators.

[0015] Additionally, the first network device may modify the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session (e.g., by modifying a value in a header of the packet replica, such that the second network device is unable to validate the packet replica as a result of the modification).

Furthermore, the first network device may provide the packet replica to one or more other network devices (e.g., downstream network devices) as part of the traffic flow of the IP session.

[0016] Furthermore, the packet replica may be provided to the second network device, which may perform a validation procedure on the packet replica and determine that the packet replica is unable to be validated. The packet replica may fail the validation procedure based on the modifications made to the packet replica by the first network device. This may cause the second network device to remove the packet replica from the traffic flow of the IP session.

Additionally, the second network device may generate the network performance indicators using the packet replica (or a group of packet replicas that have been received over time) and may provide the network performance indicators to a network performance management platform that may be tasked with providing proof of compliance to various terms of an SLA.

[0017] In this way, the first network device and/or the second network device efficiently and effectively orchestrate accurate monitoring and reporting of network performance associated with the IP session. For example, by creating packet replicas that include the same IP address information as packets that are part of the traffic flow of the IP session, the first network device improves accuracy of the network performance indicators by enabling the packet replicas to exhibit the same forwarding behavior as the packets that are part of the traffic flow of the IP session. Additionally, using packet replicas to determine network performance indicators conserves resources (e.g., processing resources, network resources, and/or the like) relative to a solution that requires modifying a forwarding plane of one or more network devices. For example, using the packet replicas to determine the network performance indicators may conserve resources that might be expended modifying a forwarding plane configuration,

resources spent processing new headers that are added to every packet that would be part of traffic flow of an IP session, and/or the like.

[0018] Figs. 1A-1C are diagrams of an example implementation 100 described herein. For example, example implementation 100 may include a first session end-point for an internet protocol (IP) session (shown as Session End-Point A), a second session end-point for the IP session (shown as Session End-Point B), a group of network devices that are part of a network that is to be used to route traffic flow of the IP session and generate and/or report network performance indicators associated with the IP session, and one or more devices that may receive the network performance indicators (shown as a Network Performance Management Platform and a User Device). The group of network devices may include a first edge device (e.g., shown as Edge Device (ED) 1), core network devices (e.g., shown as Core Network Device (CND) 1 through CND N), and a second edge device (e.g., shown as ED 2). While not shown, in other cases, customer equipment may serve as intermediary devices between session end-points and edge devices of the network, and may assist in routing the traffic flow of the IP session.

[0019] As shown in Fig. 1A, and by reference number 105, packets that are part of the traffic flow of the IP session may be routed between the first session end-point and the second session end-point via the network. The packets that are part of the IP session may be IP version 4 (IPv4) packets, IP version 6 (IPv6) packets, and/or the like.

[0020] The network may be a packet switched network, and the group of network devices that are part of the network may route the traffic flow using a tunneling technique, such as a generic routing encapsulation (GRE) technique, a multiprotocol label switching (MPLS) technique (e.g., an MPLS technique using user datagram protocol (UDP), an MPLS technique using GRE, and/or the like), a virtual extensible local area network (VXLAN) technique (e.g.,

using the generic protocol extension (GPE)), a generic network virtualization encapsulation (GENEVE) technique, and/or the like. Additionally, while the group of network devices described herein may be said to be routing layer 3 (L3) traffic, it is to be understood that this is provided by way of example. In practice, the group of network devices may be used to route layer 2 (L2) traffic or other types of traffic.

[0021] As shown by reference number 110, the first edge device may select a packet that is part of the traffic flow for further processing. For example, the first edge device may select the packet to be used to generate a packet replica, which may be then used by one or more other devices to determine the network performance indicators associated with the IP session, as described further herein. Additionally, while Fig. 1A shows selection of a single packet, the first edge device may periodically select packets over time, such that a sampling of packets is collected and able to be used to generate a set of packet replicas.

[0022] In some implementations, the first edge device may select the packet based on a rule. The rule may include a first rule indicating to periodically select packets after a threshold time period (e.g., by selecting a first packet received after the threshold time period passes), a second rule indicating to randomly select packets (e.g., by randomly selecting a time until a next incoming packet is to be selected, by randomly selecting a number that indicates a number of incoming packets that are to be received before a packet is selected, and/or the like), a third rule indicating to select packets that include a particular IP address and/or identifier (e.g., a port identifier, a protocol identifier, and/or the like), a fourth rule indicating to select packets based on a routing or forwarding path of the packets, and/or the like.

[0023] To provide a few examples, assume that over time (e.g., several seconds, minutes, hours, etc.), a thousand packets are sent to the first edge device as part of the traffic flow of the

IP session. In this example, if the first edge device is configured with the first rule, the first edge device may select a packet after a threshold time period passes (e.g., a millisecond, a second, etc.). As another example, assume the first edge device is configured with the second rule indicating to randomly select packets. In this example, the first edge device may use a random number generator to generate a random number (e.g., five) which may dictate the next packet that is selected (e.g., the first edge device may wait five seconds and select the next packet received, the first edge device may select a fifth incoming packet, and/or the like). In this way, the first edge device conserves processing resources and/or network resources relative to selecting and generating packet replicas of every packet that is part of the traffic flow of the IP session.

[0024] As shown by reference number 115, the first edge device may generate a packet replica of the packet. For example, the first edge device may generate a packet replica of the packet that has identical values and/or properties as the packet. To provide a few examples, an IP address used for the packet may be the same IP address used for the packet replica, the packet and the replica packet may be the same size or length, the payload of the packet and the packet replica may include the same data, and/or the like.

[0025] In this way, as the traffic flow of the IP session is being routed through the network, the first edge device is able to select packets that are part of the traffic flow, and to generate packet replicas of the selected packets for further processing, as described further herein.

[0026] As shown in Fig. 1B, and by reference number 120, the first edge device may add routing information to the packet replica. For example, the first edge device may add routing information (e.g., routing operations, administration, and maintenance (OAM) information) to a payload of the packet replica (e.g., by overriding the payload which is a copy of the payload of

the original packet). Additionally, or alternatively, the first edge device may add a new header (e.g., a transport header) to the packet replica and may include the routing information in the new header.

[0027] The routing information may include any information that may be available to the first edge device and that may be used by other network devices for determining network performance indicators (e.g., latency, jitter, packet loss, and/or the like). For example, the routing information may include session information for the IP session, packet replica information for packet replicas sent through the network as part of the IP session, and/or the like.

[0028] The session information may include a session identifier of the IP session, a start time for the session, a total time the session has been active, a customer identifier associated with the IP session, and/or the like. The packet replica information may include a packet sequence identifier for a packet replica (e.g., which may be used to determine a sequence in which packet replicas are sent or received), a packet time stamp (e.g., indicating a time a packet replica is sent or received by a network device, one or more interface identifiers (e.g., indicating an interface a packet replica is sent from or received at), a path identifier that identifies a path used to route or forward the packet replica within the network (e.g., by identifying particular network devices or components of network devices that the packet replica traveled through), and/or the like.

[0029] As shown by reference number 125, the first edge device may modify the packet replica. For example, the first edge device may modify a header of the packet replica to include one or more values that will cause the packet replica to fail to reach the second session end-point (e.g., Session End-Point B). In this case, the second edge device (e.g., Edge Device 2) may be configured to attempt to validate all packets that are part of the traffic flow of the IP session, and

may be able unable to validate the packet replica based on the one or more values that are modified in the header, as described further herein.

[0030] In some implementations, the first edge device may modify a checksum value in the header of the packet replica. For example, if the packet replica is an IPv4 packet, the first edge device may set an IPv4 header checksum value to an incorrect value that may cause a checksum validation error when the packet replica is processed by the second edge device.

[0031] Additionally, or alternatively, the first edge device may modify a packet length value in the header of the packet replica. For example, the first edge device may set a packet length value to an incorrect value that does not match an actual length of the packet replica. This may cause a packet length validation error when the packet replica is processed by the second edge device.

[0032] Additionally, or alternatively, the first edge device may modify a time to live (TTL) value in the header of the packet replica. For example, the first edge device may set a TTL value to a particular value (e.g., 0, 1, etc.) that may trigger a validation error when the packet replica is processed by second edge device.

[0033] As shown by reference number 130, the first edge device may provide the packet replica to a first core network device as part of the traffic flow of the IP session. For example, the first edge device may use a forwarding plane for determining how to route the traffic flow of the IP session (e.g., which may indicate that a next hop is the first core network device). This may cause the packet replica to be routed through the network, to the second edge device, using a path that is also used by the packets that are part of the traffic flow of the IP session.

[0034] As shown by reference number 135, the second edge device may remove the packet replica from the traffic flow of the IP session. For example, the second edge device may remove

the packet replica from the traffic flow of the IP session based on determining that the packet replica does not conform to one or more requirements of a validation procedure. In this case, the second edge device may perform a validation procedure on the packet replica, and the packet replica may fail the validation procedure based on the modifications that were made to the header of the packet replica.

[0035] As an example, assume the first edge device modified a checksum value in the header of the packet replica. In this example, the second edge device may perform a checksum validation procedure by comparing the checksum value to a configured checksum value. If the checksum value and the configured checksum value do not match, the second edge device may generate a validation error, increment an error counter, and/or the like, which may cause the second edge device to remove the packet replica from the traffic flow of the IP session.

[0036] As another example, assume the first edge device modified a packet length value in the header of the packet replica. In this example, the second edge device may perform a packet length validation procedure that involves processing the packet replica to generate a value identifying an actual packet length, and comparing the value identifying the actual packet length to the packet length value included in the header. If the value identifying the actual packet length does not match the packet length value in the header, the second edge device may generate a validation error, increment an error counter, and/or the like, which may cause the second edge device to remove the packet replica from the traffic flow of the IP session.

[0037] As another example, assume the first edge device modified a TTL value in the header of the packet replica. In this example, the second edge device may perform a TTL validation procedure that involves processing the packet replica to determine that the TTL value satisfies an error threshold (e.g., a value of 0, a value of 0 or 1, etc.). If the TTL value satisfies the error

threshold, the first edge device may generate a validation error, increment an error counter, perform a protocol-specific action (e.g., send a message, such as an internet control message protocol (ICMP) TTL expiry message, to a source device), and/or the like. This may cause the second edge device to remove the packet replica from the traffic flow of the IP session.

[0038] As shown by reference number 140, the second edge device may identify the routing information included in the packet replica. For example, the second edge device may identify the routing information after removing the packet replica from the traffic flow, after the packet replica fails the validation procedure, and/or the like. In this case, the second edge device may be configured to identify values that are not typically included in the packets that are part of the traffic flow of the IP session. As such, the second edge device may identify the routing information by processing the new header of the packet replica or the payload of the packet replica. This may allow the second edge device to use the routing information to generate or cause another device to generate the network performance indicators, as described further herein.

[0039] By adding the routing information to the packet replica, the first network device ensures that the packet replica includes information that will be needed to monitor network performance. Furthermore, by modifying one or more values of the packet replica, the first edge device ensures that the second network device will detect and remove the packet replica from the traffic flow of the IP session, thereby preventing the packet replica from interfering with the IP session by reaching the second session end-point.

[0040] As shown in Fig. 1C, the second edge device, or the network performance management platform, may be configured to determine the network performance indicators. For example, and as shown by reference number 145-1, the second edge device may determine the network performance indicators (e.g., latency, jitter, packet loss, packet delay, and/or the like) by

processing the routing information of the packet replica or a group of packet replicas that are identified over a particular time period.

[0041] In some implementations, the second edge device may determine latency for the packet replica or the group of packet replicas. For example, the second edge device may determine latency for the packet replica from a first network device to a second network device (e.g., from the first edge device to the first core network device, from the first edge device to the second edge device, and/or the like). In this case, the second edge device may determine the latency by calculating a time needed for the packet replica to be provided from the first network device to the second network device. In some cases, the second edge device may send the packet replica (or the group of packet replicas) back to the second network device, such that latency may be measured by considering a round trip time (RTT) of the packet replica (or the group of packet replicas).

[0042] Additionally, or alternatively, the second edge device may determine jitter for the packet replica or the group of packet replicas. For example, the second edge device may determine jitter for the group of packet replicas as the group of packet replicas travel from a first network device to a second network device. In this case, the second edge device may determine jitter by calculating a variance in the latency of the group of packet replicas.

[0043] Additionally, or alternatively, the second edge device may determine packet loss or packet delay for the packet replica or the group of packet replicas. For example, if the routing information for each packet replica indicates a packet sequence number, the second edge device may determine packet loss by identifying whether packet replicas are missing (e.g., based on the group of packet replicas including some, but not all, of the packet sequence numbers). A similar technique may be implemented to determine packet delay.

[0044] As shown by reference number 150-1, the second edge device may provide the network performance indicators to the network performance management platform. For example, the second edge device may use a communication interface (e.g., an application programming interface (API) or another type of interface) to provide the network performance indicators to the network performance management platform. As shown by reference number 155-1, the network performance management platform may store the network performance indicators.

[0045] As shown by reference number 160-1, the second edge device may provide the network performance to the user device. For example, the second edge device may use a communication interface (e.g., an application programming interface (API) or another type of interface) to provide the network performance indicators to the user device. The user device may be a device of an organization providing network services, a device of an organization using the network services, and/or the like.

[0046] As shown by reference number 165-1, a user interface of the user device may display the network performance indicators. This may allow users to identify network performance indicators, to verify whether the traffic flow of the IP session is in conformance with a service-level agreement (SLA) (which may specify certain threshold performance metrics that are to be satisfied), and/or the like.

[0047] In some implementations, assume the network performance management platform is configured to determine the network performance indicators. In this case, and as shown by reference number 145-2, the second edge device may provide, to the network performance management platform, the routing information for the packet replica or for a group of packet replicas. As an example, the second edge device may be configured to provide the routing

information for packet replicas as soon as the routing information is identified. As another example, the second edge device may be configured to periodically provide routing information for a group of packet replicas that have been identified over time.

[0048] As shown by reference number 150-2, the network performance management platform may determine the network performance indicators. For example, the network performance management platform may determine latency, jitter, packet loss, packet delay, and/or the like, in a manner described above.

[0049] As shown by reference number 155-2, the network performance management platform may provide the network performance to the user device. For example, the network performance management platform may use the communication interface to provide the network performance indicators to the user device. As shown by reference number 165-2, the user interface of the user device may display the network performance indicators.

[0050] In some implementations, the second edge device and/or the network performance management platform may perform one or more actions associated with assisting in reporting and/or improving network performance. For example, the second edge device and/or the network performance management platform may be configured to automatically generate and provide, to a device associated with the network service provider and/or a device associated with the customer, a notification indicating that one or more terms of a service-level agreement (SLA) are not presently satisfied. In some cases, the notification may be generated and provided based on a network performance indicator satisfying a threshold level of performance (e.g., a level associated with poor performance, a level that allows the network service provider to fix a performance problem prior to breaching the SLA, and/or the like).

[0051] Additionally, or alternatively, the second edge device and/or the network performance management platform may be configured to generate instructions to repair an error (e.g., a hardware error, a software error, etc.) that is affecting network performance and/or to automatically repair the error. For example, the second edge device may use the routing information to identify an error that is likely to be a cause of poor network performance. In this case, the second edge device may be configured with rules that associate particular errors with particular actions, and may reference the rules to determine a particular action to perform or to recommend that another device perform.

[0052] In this way, the first network device and/or the second network device efficiently and effectively orchestrate accurate monitoring and reporting of network performance. For example, by creating packet replicas that include the same IP address information as packets that are part of the traffic flow of the IP session, the first network device improves accuracy of the network performance indicators by enabling the packet replicas to exhibit the same forwarding behavior as the packets that are part of the traffic flow of the IP session.

[0053] As indicated above, Figs. 1A-1C are provided merely as an example. Other examples are possible and may differ from what was described with regard to Figs. 1A-1C. For example, there may be additional devices and/or networks, fewer devices and/or networks, different devices and/or networks, or differently arranged devices and/or networks than those shown in Figs. 1A-1C. Furthermore, two or more devices shown in Figs. 1A-1C may be implemented within a single device, or a single device shown in Figs. 1A-1C may be implemented as multiple, distributed devices. Additionally, or alternatively, a set of devices (e.g., one or more devices) of example implementations 100 may perform one or more functions described as being performed by another set of devices of example implementations 100.

[0054] Fig. 2 is a diagram of an example environment 200 in which systems and/or methods, described herein, may be implemented. As shown in Fig. 2, environment 200 may include one or more peer devices 210, a group of network devices 220 (shown as Network Device 220-1 through Network Device 220-N), a network performance management platform 230, and/or a network 250. Devices of environment 200 may interconnect via wired connections, wireless connections, or a combination of wired and wireless connections.

[0055] Peer device 210 includes one or more devices capable of receiving and/or providing network traffic. For example, peer device 210 may include a traffic transfer device, such as a router, a gateway, a switch, a firewall, a hub, a bridge, a reverse proxy, a server (e.g., a proxy server, a server executing a virtual machine, etc.), a security device, an intrusion detection device, a load balancer, or a similar type of device. Additionally, or alternatively, peer device 210 may include an endpoint device that is a source or a destination for network traffic. For example, peer device 210 may include a computer or a similar type of device. Peer device 210 may receive network traffic from and/or may provide network traffic to other peer devices 210 via network 250 (e.g., by routing packets using network device(s) 220 as an intermediary). In some implementations, peer device 210 may provide traffic flow of an internet protocol (IP) session to network device 220 (e.g., an edge device in a network, a core network device, and/or the like).

[0056] Network device 220 includes one or more devices capable of receiving, processing, storing, routing, and/or providing traffic (e.g., a packet, a packet replica, other information or metadata, and/or the like) in a manner described herein. For example, network device 220 may include a router, such as a label switching router (LSR), a label edge router (LER), an ingress router, an egress router, a provider router (e.g., a provider edge router, a provider core router,

etc.), a virtual router, and/or the like. Additionally, or alternatively, network device 220 may include a gateway, a switch, a firewall, a hub, a bridge, a reverse proxy, a server (e.g., a proxy server, a cloud server, a data center server, etc.), a load balancer, and/or a similar device. In some implementations, network device 220 may be a physical device implemented within a housing, such as a chassis.

[0057] In some implementations, network device 220 may be a virtual device implemented by one or more computer devices of a cloud computing environment or a data center. In some implementations, a group of network devices 220 may include a first network device 220, one or more core network devices 220, a second network device 220, and/or the like. In some implementations, network device 220 may route the traffic flow using a tunneling technique, such as a generic routing encapsulation (GRE) technique, a multiprotocol label switching (MPLS) technique (e.g., an MPLS technique using user datagram protocol (UDP), an MPLS technique using GRE, and/or the like), a virtual extensible local area network (VXLAN) technique (e.g., using the generic protocol extension (GPE)), a generic network virtualization encapsulation (GENEVE) technique, and/or the like.

[0058] Network performance management platform 230 includes one or more devices capable of receiving, storing, processing, generating, and/or providing information associated with network performance indicators. For example, network performance management platform 230 may include a server device (e.g., a host server, a web server, an application server, etc.), a data center device, or a similar device.

[0059] In some implementations, as shown, network performance management platform 230 may be hosted in cloud computing environment 240. Notably, while implementations described herein describe network performance management platform 230 as being hosted in cloud

computing environment 240, in some implementations, network performance management platform 230 may not be cloud-based (i.e., may be implemented outside of a cloud computing environment) or may be partially cloud-based.

[0060] Cloud computing environment 240 includes an environment that hosts network performance management platform 230. Cloud computing environment 240 may provide computation, software, data access, storage, etc. services that do not require end-user knowledge of a physical location and configuration of system(s) and/or device(s) that hosts network performance management platform 230. As shown, cloud computing environment 240 may include a group of computing resources 235 (referred to collectively as “computing resources 235” and individually as “computing resource 235”).

[0061] Computing resource 235 includes one or more personal computers, workstation computers, server devices, or another type of computation and/or communication device. In some implementations, computing resource 235 may host network performance management platform 230. The cloud resources may include compute instances executing in computing resource 235, storage devices provided in computing resource 235, data transfer devices provided by computing resource 235, and/or the like. In some implementations, computing resource 235 may communicate with other computing resources 235 via wired connections, wireless connections, or a combination of wired and wireless connections.

[0062] As further shown in Fig. 2, computing resource 235 may include a group of cloud resources, such as one or more applications (“APPs”) 235-1, one or more virtual machines (“VMs”) 235-2, virtualized storage (“VSs”) 235-3, one or more hypervisors (“HYPs”) 235-4, and/or the like.

[0063] Application 235-1 may include one or more software applications that may be provided to or accessed by another device described herein. Application 235-1 may eliminate a need to install and execute the software applications on these devices. For example, application 235-1 may include software associated with network performance management platform 230 and/or any other software capable of being provided via cloud computing environment 240. In some implementations, one application 235-1 may send/receive information to/from one or more other applications 235-1, via virtual machine 235-2.

[0064] Virtual machine 235-2 may include a software implementation of a machine (e.g., a computer) that executes programs like a physical machine. Virtual machine 235-2 may be either a system virtual machine or a process virtual machine, depending upon use and degree of correspondence to any real machine by virtual machine 235-2. A system virtual machine may provide a complete system platform that supports execution of a complete operating system (“OS”). A process virtual machine may execute a single program and may support a single process. In some implementations, virtual machine 235-2 may execute on behalf of another device, and may manage infrastructure of cloud computing environment 240, such as data management, synchronization, or long-duration data transfers.

[0065] Virtualized storage 235-3 may include one or more storage systems and/or one or more devices that use virtualization techniques within the storage systems or devices of computing resource 235. In some implementations, within the context of a storage system, types of virtualizations may include block virtualization and file virtualization. Block virtualization may refer to abstraction (or separation) of logical storage from physical storage so that the storage system may be accessed without regard to physical storage or heterogeneous structure. The separation may permit administrators of the storage system flexibility in how the

administrators manage storage for end users. File virtualization may eliminate dependencies between data accessed at a file level and a location where files are physically stored. This may enable optimization of storage use, server consolidation, and/or performance of non-disruptive file migrations.

[0066] Hypervisor 235-4 may provide hardware virtualization techniques that allow multiple operating systems (e.g., "guest operating systems") to execute concurrently on a host computer, such as computing resource 235. Hypervisor 235-4 may present a virtual operating platform to the guest operating systems and may manage the execution of the guest operating systems. Multiple instances of a variety of operating systems may share virtualized hardware resources.

[0067] Network 250 includes one or more wired and/or wireless networks. For example, network 250 may include a packet switched network, a cellular network (e.g., a fifth generation (5G) network, a fourth generation (4G) network, such as a long-term evolution (LTE) network, a third generation (3G) network, a code division multiple access (CDMA) network, a public land mobile network (PLMN), a local area network (LAN), a wide area network (WAN), a metropolitan area network (MAN), a telephone network (e.g., the Public Switched Telephone Network (PSTN)), a private network, an ad hoc network, an intranet, the Internet, a fiber optic-based network, a cloud computing network, or the like, and/or a combination of these or other types of networks.

[0068] The number and arrangement of devices and networks shown in Fig. 2 are provided as an example. In practice, there may be additional devices and/or networks, fewer devices and/or networks, different devices and/or networks, or differently arranged devices and/or networks than those shown in Fig. 2. Furthermore, two or more devices shown in Fig. 2 may be implemented within a single device, or a single device shown in Fig. 2 may be implemented as

multiple, distributed devices. Additionally, or alternatively, a set of devices (e.g., one or more devices) of environment 200 may perform one or more functions described as being performed by another set of devices of environment 200.

[0069] Fig. 3 is a diagram of example components of a device 300. Device 300 may correspond to peer device 210 and/or network device 220. In some implementations, peer device 210 and/or network device 220 may include one or more devices 300 and/or one or more components of device 300. As shown in Fig. 3, device 300 may include one or more input components 305-1 through 305-B ($B \geq 1$) (hereinafter referred to collectively as input components 305, and individually as input component 305), a switching component 310, one or more output components 315-1 through 315-C ($C \geq 1$) (hereinafter referred to collectively as output components 315, and individually as output component 315), and a controller 320.

[0070] Input component 305 may be points of attachment for physical links and may be points of entry for incoming traffic, such as packets. Input component 305 may process incoming traffic, such as by performing data link layer encapsulation or decapsulation. In some implementations, input component 305 may send and/or receive packets. In some implementations, input component 305 may include an input line card that includes one or more packet processing components (e.g., in the form of integrated circuits), such as one or more interface cards (IFCs), packet forwarding components, line card controller components, input ports, processors, memories, and/or input queues. In some implementations, device 300 may include one or more input components 305.

[0071] Switching component 310 may interconnect input components 305 with output components 315. In some implementations, switching component 310 may be implemented via one or more crossbars, via busses, and/or with shared memories. The shared memories may act

as temporary buffers to store packets from input components 305 before the packets are eventually scheduled for delivery to output components 315. In some implementations, switching component 310 may enable input components 305, output components 315, and/or controller 320 to communicate.

[0072] Output component 315 may store packets and may schedule packets for transmission on output physical links. Output component 315 may support data link layer encapsulation or decapsulation, and/or a variety of higher-level protocols. In some implementations, output component 315 may send packets and/or receive packets. In some implementations, output component 315 may include an output line card that includes one or more packet processing components (e.g., in the form of integrated circuits), such as one or more IFCs, packet forwarding components, line card controller components, output ports, processors, memories, and/or output queues. In some implementations, device 300 may include one or more output components 315. In some implementations, input component 305 and output component 315 may be implemented by the same set of components (e.g., and input/output component may be a combination of input component 305 and output component 315).

[0073] Controller 320 includes a processor in the form of a central processing unit (CPU), a graphics processing unit (GPU), an accelerated processing unit (APU), a microprocessor, a microcontroller, a digital signal processor (DSP), a field-programmable gate array (FPGA), an application-specific integrated circuit (ASIC), and/or another type of processor. The processor is implemented in hardware, firmware, or a combination of software and hardware. In some implementations, controller 320 may include one or more processors that can be programmed to perform a function.

[0074] In some implementations, controller 320 may include a random access memory (RAM), a read only memory (ROM), and/or another type of dynamic or static storage device (e.g., a flash memory, a magnetic memory, an optical memory, etc.) that stores information and/or instructions for use by controller 320.

[0075] In some implementations, controller 320 may communicate with other devices, networks, and/or systems connected to device 300 to exchange information regarding network topology. Controller 320 may create routing tables based on the network topology information, create forwarding tables based on the routing tables, and forward the forwarding tables to input components 305 and/or output components 315. Input components 305 and/or output components 315 may use the forwarding tables to perform route lookups for incoming and/or outgoing packets. In some cases, controller 320 may create a session table based on information determined while initializing a link fault detection (e.g., BFD) session, and may forward the session table to input components 305 and/or output components 315.

[0076] Controller 320 may perform one or more processes described herein. Controller 320 may perform these processes in response to executing software instructions stored by a non-transitory computer-readable medium. A computer-readable medium is defined herein as a non-transitory memory device. A memory device includes memory space within a single physical storage device or memory space spread across multiple physical storage devices.

[0077] Software instructions may be read into a memory and/or storage component associated with controller 320 from another computer-readable medium or from another device via a communication interface. When executed, software instructions stored in a memory and/or storage component associated with controller 320 may cause controller 320 to perform one or more processes described herein. Additionally, or alternatively, hardwired circuitry may be used

in place of or in combination with software instructions to perform one or more processes described herein. Thus, implementations described herein are not limited to any specific combination of hardware circuitry and software.

[0078] The number and arrangement of components shown in Fig. 3 are provided as an example. In practice, device 300 may include additional components, fewer components, different components, or differently arranged components than those shown in Fig. 3. Additionally, or alternatively, a set of components (e.g., one or more components) of device 300 may perform one or more functions described as being performed by another set of components of device 300.

[0079] The number and arrangement of components shown in Fig. 3 are provided as an example. In practice, device 300 may include additional components, fewer components, different components, or differently arranged components than those shown in Fig. 3. Additionally, or alternatively, a set of components (e.g., one or more components) of device 300 may perform one or more functions described as being performed by another set of components of device 300.

[0080] Fig. 4 is a flow chart of an example process 400 for non-intrusive monitoring of network performance of a group of network devices used to support traffic flow of an internet protocol (IP) session. In some implementations, one or more process blocks of Fig. 4 may be performed by a first network device (e.g., network device 220). In some implementations, one or more process blocks of Fig. 4 may be performed by another device or a group of devices separate from or including the first network device, such as a peer device (e.g., peer device 210), one or more other network devices 220, such as a second network device, a network performance

management platform (e.g., network performance management platform 230), a computing resource (e.g., computing resource 235), and/or the like.

[0081] As shown in Fig. 4, process 400 may include receiving packets as part of a traffic flow of an internet protocol (IP) session (block 410). For example, the first network device (e.g., using input component 305, switching component 310, controller 320, and/or the like) may receive packets as part of a traffic flow of an internet protocol (IP) session, as described above with regard to Figs. 1A-1C.

[0082] As further shown in Fig. 4, process 400 may include selecting a packet that is part of the traffic flow based on a rule (block 420). For example, the first network device (e.g., using input component 305, switching component 310, controller 320, and/or the like) may select a packet that is part of the traffic flow based on a rule, as described above with regard to Figs. 1A-1C.

[0083] As further shown in Fig. 4, process 400 may include generating a packet replica of the packet that has been selected (block 430). For example, the first network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may generate a packet replica of the packet that has been selected, as described above with regard to Figs. 1A-1C.

[0084] As further shown in Fig. 4, process 400 may include adding, to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session (block 440). For example, the first network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may add, to the packet replica, routing information that is capable of being used to generate network

performance indicators associated with the IP session, as described above with regard to Figs. 1A-1C.

[0085] As further shown in Fig. 4, process 400 may include modifying a portion of the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session (block 450). For example, the first network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may modify a portion of the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session, as described above with regard to Figs. 1A-1C.

[0086] As further shown in Fig. 4, process 400 may include providing the packet replica to one or more other network devices to cause a second network device, of the one or more other network devices, to: perform a validation procedure to determine that the packet replica is unable to be validated based on the one or more values included in the packet replica, generate or cause another device to generate the network performance indicators using the packet replica, and provide or cause the other device to provide the network performance indicators to a particular device (e.g., (block 460). For example, the first network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may provide the packet replica to one or more other network devices to cause a second network device, of the one or more other network devices, to perform a validation procedure to determine that the packet replica is unable to be validated based on the one or more values included in the packet replica, generate or cause another device to generate the network performance indicators using the packet replica, and provide or cause the other device to provide the network performance indicators to a particular device, as described below and as described above with regard to Figs. 1A-1C.

[0087] Process 400 may include additional implementations, such as any single implementation or any combination of implementations described below and/or in connection with one or more other processes described elsewhere herein.

[0088] In some implementations, a forwarding plane of the first network device may not be modified when modifying the portion of the packet replica. In some implementations, when providing the packet replica to the one or more other network devices, the first network device may provide, to the one or more other network devices, the packet replica as part of the traffic flow of the IP session.

[0089] In some implementations, the packet replica or the group of packet replicas may have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session. In some implementations, the rule may be a first rule indicating to randomly select particular packets after a threshold time period, a second rule indicating to select the particular packets based on the particular packets including a particular IP address or protocol identifier, or a third rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.

[0090] In some implementations, the traffic flow may be supported by a label switching network, and the routing information may include segment routing operations, administration, and maintenance (OAM) information. In some implementations, when modifying the portion of the packet replica, the first network device may set an IP header checksum value to a first incorrect value, set a packet length value to a second incorrect value, or set an IP header time to live (TTL) value to a third incorrect value.

[0091] Although Fig. 4 shows example blocks of process 400, in some implementations, process 400 may include additional blocks, fewer blocks, different blocks, or differently

arranged blocks than those depicted in Fig. 4. Additionally, or alternatively, two or more of the blocks of process 400 may be performed in parallel.

[0092] Fig. 5 is a flow chart of an example process 500 for non-intrusive monitoring of network performance of a group of network devices used to support traffic flow of an internet protocol (IP) session. In some implementations, one or more process blocks of Fig. 5 may be performed by a first network device (e.g., network device 220). In some implementations, one or more process blocks of Fig. 5 may be performed by another device or a group of devices separate from or including the first network device, such as a peer device (e.g., peer device 210), a network performance management platform (e.g., network performance management platform 230), a computing resource (e.g., computing resource 235), and/or the like.

[0093] As shown in Fig. 5, process 500 may include receiving packets as part of a traffic flow of an internet protocol (IP) session (block 510). For example, the first network device (e.g., using input component 305, switching component 310, controller 320, and/or the like) may receive packets as part of a traffic flow of an internet protocol (IP) session, as described above with regard to Figs. 1A-1C.

[0094] As further shown in Fig. 5, process 500 may include selecting a packet that is part of the traffic flow (block 520). For example, the first network device (e.g., using input component 305, switching component 310, controller 320, and/or the like) may select a packet that is part of the traffic flow, as described above with regard to Figs. 1A-1C.

[0095] As further shown in Fig. 5, process 500 may include generating a packet replica of the packet that has been selected (block 530). For example, the first network device (e.g., using switching component 310, controller 320, and/or the like) may generate a packet replica of the packet that has been selected, as described above with regard to Figs. 1A-1C.

[0096] As further shown in Fig. 5, process 500 may include adding, to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session (block 540). For example, the first network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may add, to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session, as described above with regard to Figs. 1A-1C.

[0097] As further shown in Fig. 5, process 500 may include modifying the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session (block 550). For example, the first network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may modify the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session, as described above with regard to Figs. 1A-1C.

[0098] As further shown in Fig. 5, process 500 may include providing, as part of the traffic flow of the IP session, the packet replica to one or more other network devices to cause a second network device, of the one or more other network devices, to remove the packet replica from the traffic flow of the IP session based on the packet replica including the one or more values that have been modified, and to perform one or more actions that cause the network performance indicators to be generated and provided to another device (block 560). For example, the first network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may provide, as part of the traffic flow of the IP session, the packet replica to one or more other network devices to cause a second network device, of the one or more other

network devices, to remove the packet replica from the traffic flow of the IP session based on the packet replica including the one or more values that have been modified, and to perform one or more actions that cause the network performance indicators to be generated and provided to another device, as described above with regard to Figs. 1A-1C.

[0099] Process 500 may include additional implementations, such as any single implementation or any combination of implementations described below and/or in connection with one or more other processes described elsewhere herein.

[00100] In some implementations, a forwarding plane of the first network device may not be modified when modifying the portion of the packet replica. In some implementations, the network performance indicators may be generated based on the packet replica or a group of packet replicas, and the packet replica or the group of packet replicas may have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

[00101] In some implementations, the first network device may select the packet based on at least one of: a first rule indicating to select particular packets after a threshold time period, a second rule indicating to randomly select the particular packets, a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier, or a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets. In some implementations, the routing information may include at least one of: session information for the IP session or packet replica information for the packet replica or the group of packet replicas.

[00102] In some implementations, adding the routing information may include adding the routing information to the packet replica as an additional header of the packet replica or as part

of a payload of the packet replica. In some implementations, modifying the packet replica may include setting an IP header checksum value to a first incorrect value, setting a packet length value to a second incorrect value, or setting an IP header time to live (TTL) value to a third incorrect value.

[00103] Although Fig. 5 shows example blocks of process 500, in some implementations, process 500 may include additional blocks, fewer blocks, different blocks, or differently arranged blocks than those depicted in Fig. 5. Additionally, or alternatively, two or more of the blocks of process 500 may be performed in parallel.

[00104] Fig. 6 is a flow chart of an example process 600 for non-intrusive monitoring of network performance of a group of network devices used to support traffic flow of an internet protocol (IP) session. In some implementations, one or more process blocks of Fig. 6 may be performed by a network device (e.g., network device 220). In some implementations, one or more process blocks of Fig. 6 may be performed by another device or a group of devices separate from or including the network device, such as a peer device (e.g., peer device 210), another network device (e.g., a different network device 220), a network performance management platform (e.g., network performance management platform 230), a computing resource (e.g., computing resource 235), and/or the like.

[00105] As shown in Fig. 6, process 600 may include receiving, from another network device, a packet replica as part of a traffic flow of an internet protocol (IP) session, wherein the packet replica includes routing information capable of being used to generate network performance indicators associated with the IP session, and wherein the packet replica has been modified to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session (block 610). For example, the network device (e.g., using input

component 305, switching component 310, controller 320, and/or the like) may receive, from another network device, a packet replica as part of a traffic flow of an IP session, as described above with regard to Figs. 1A-1C. In some implementations, the packet replica may include routing information capable of being used to generate network performance indicators associated with the IP session, and the packet replica may have been modified to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session.

[00106] As further shown in Fig. 6, process 600 may include performing a validation procedure by processing the packet replica, wherein the packet replica is to fail the validation procedure based on the one or more values included in the packet replica (block 620). For example, the network device (e.g., using input component 305, switching component 310, controller 320, and/or the like) may perform a validation procedure by processing the packet replica, as described above with regard to Figs. 1A-1C. In some implementations, the packet replica may fail the validation procedure based on the one or more values included in the packet replica.

[00107] As further shown in Fig. 6, process 600 may include identifying the routing information included in the packet replica based on the packet replica failing the validation procedure (block 630). For example, the network device (e.g., using input component 305, switching component 310, controller 320, and/or the like) may identify the routing information included in the packet replica based on the packet replica failing the validation procedure, as described above with regard to Figs. 1A-1C.

[00108] As further shown in Fig. 6, process 600 may include generating the network performance indicators using the packet replica or a group of packet replicas that have been

modified and received over time (block 640). For example, the network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may generate the network performance indicators using the packet replica or a group of packet replicas that have been modified and received over time, as described above with regard to Figs. 1A-1C.

[00109] As further shown in Fig. 6, process 600 may include providing the network performance indicators to a particular device (block 650). For example, the network device (e.g., using switching component 310, output component 315, controller 320, and/or the like) may provide the network performance indicators to a particular device, as described above with regard to Figs. 1A-1C.

[00110] Process 600 may include additional implementations, such as any single implementation or any combination of implementations described below and/or in connection with one or more other processes described elsewhere herein.

[00111] In some implementations, a forwarding plane used to route the traffic flow may not be modified when the one or more values of the packet replica are modified. In some implementations, the packet replica or the group of packet replicas may have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session. In some implementations, the traffic flow of the IP session may be subject to a service-level agreement (SLA) that requires the network performance indicators to conform to a particular standard.

[00112] In some implementations, when performing the validation procedure, the network device may process the packet replica to determine that a header of the packet replica includes a first value that causes the packet replica to fail the validation procedure, where the first value is an IP header checksum value, a packet length value, or an IP header time to live (TTL) value. In

some implementations, the network performance indicators may include at least one of: a first network performance indicator to verify an order in which packets are received, a second network performance indicator to identify packet loss, or a third network performance indicator to identify packet delay.

[00113] Although Fig. 6 shows example blocks of process 600, in some implementations, process 600 may include additional blocks, fewer blocks, different blocks, or differently arranged blocks than those depicted in Fig. 6. Additionally, or alternatively, two or more of the blocks of process 600 may be performed in parallel.

[00114] The foregoing disclosure provides illustration and description, but is not intended to be exhaustive or to limit the implementations to the precise form disclosed. Modifications and variations are possible in light of the above disclosure or may be acquired from practice of the implementations.

[00115] As used herein, the term traffic flow may include a set of packets. A packet may refer to a communication structure for communicating information, such as a protocol data unit (PDU), a network packet, a datagram, a segment, a message, a block, a cell, a frame, a subframe, a slot, a symbol, a portion of any of the above, and/or another type of formatted or unformatted unit of data capable of being transmitted via a network.

[00116] As used herein, the term component is intended to be broadly construed as hardware, firmware, and/or a combination of hardware and software.

[00117] Some implementations are described herein in connection with thresholds. As used herein, satisfying a threshold may refer to a value being greater than the threshold, more than the threshold, higher than the threshold, greater than or equal to the threshold, less than the

threshold, fewer than the threshold, lower than the threshold, less than or equal to the threshold, equal to the threshold, etc.

[00118] It will be apparent that systems and/or methods, described herein, may be implemented in different forms of hardware, firmware, or a combination of hardware and software. The actual specialized control hardware or software code used to implement these systems and/or methods is not limiting of the implementations. Thus, the operation and behavior of the systems and/or methods were described herein without reference to specific software code—it being understood that software and hardware can be designed to implement the systems and/or methods based on the description herein.

[00119] Even though particular combinations of features are recited in the claims and/or disclosed in the specification, these combinations are not intended to limit the disclosure of possible implementations. In fact, many of these features may be combined in ways not specifically recited in the claims and/or disclosed in the specification. Although each dependent claim listed below may directly depend on only one claim, the disclosure of possible implementations includes each dependent claim in combination with every other claim in the claim set.

[00120] No element, act, or instruction used herein should be construed as critical or essential unless explicitly described as such. Also, as used herein, the articles “a” and “an” are intended to include one or more items, and may be used interchangeably with “one or more.” Furthermore, as used herein, the term “set” is intended to include one or more items (e.g., related items, unrelated items, a combination of related and unrelated items, etc.), and may be used interchangeably with “one or more.” Where only one item is intended, the term “one” or similar language is used. Also, as used herein, the terms “has,” “have,” “having,” or the like are

intended to be open-ended terms. Further, the phrase “based on” is intended to mean “based, at least in part, on” unless explicitly stated otherwise.

WHAT IS CLAIMED IS:

1. A first network device, comprising:
one or more memories; and
one or more processors, to:
receive packets as part of a traffic flow of an internet protocol (IP) session;
select a packet that is part of the traffic flow based on a rule;
generate a packet replica of the packet that has been selected;
add, to the packet replica, routing information that is capable of being used to
generate network performance indicators associated with the IP session;
modify a portion of the packet replica to include one or more values that will
cause the packet replica to fail to reach a destination device associated with the IP
session; and
provide the packet replica to one or more other network devices to cause a second
network device, of the one or more other network devices, to:
perform a validation procedure to determine that the packet replica is
unable to be validated based on the one or more values included in the packet
replica,
generate or cause another device to generate the network performance
indicators using the packet replica or a group of packet replicas that have been
modified, and
provide or cause the other device to provide the network performance
indicators to a particular device.

2. The first network device of claim 1, wherein a forwarding plane of the first network device is not modified when modifying the portion of the packet replica.
3. The first network device of claim 1, wherein the one or more processors, when providing the packet replica to the one or more other network devices, are to:

provide, to the one or more other network devices, the packet replica as part of the traffic flow of the IP session.
4. The first network device of claim 1, wherein the packet replica or the group of packet replicas have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.
5. The first network device of claim 1, wherein the rule is:

a first rule indicating to select particular packets after a threshold time period,

a second rule indicating to randomly select the particular packets,

a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier, or

a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.
6. The first network device of claim 1, wherein the traffic flow is supported by a label switching network; and

wherein the routing information includes segment routing operations, administration, and maintenance (OAM) information.

7. The first network device of claim 1, wherein the one or more processors, when modifying the portion of the packet replica, are to:

set an IP header checksum value to a first incorrect value,
set a packet length value to a second incorrect value, or
set an IP header time to live (TTL) value to a third incorrect value.

8. A method, comprising:

receiving, by a first network device, packets as part of a traffic flow of an internet protocol (IP) session;

selecting, by the first network device, a packet that is part of the traffic flow;
generating, by the first network device, a packet replica of the packet that has been selected;

adding, by the first network device and to the packet replica, routing information that is capable of being used to generate network performance indicators associated with the IP session;

modifying, by the first network device, the packet replica to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session; and

providing, by the first network device and as part of the traffic flow of the IP session, the packet replica to one or more other network devices to cause a second

network device, of the one or more other network devices, to remove the packet replica from the traffic flow of the IP session based on the packet replica including the one or more values that have been modified, and to perform one or more actions that cause the network performance indicators to be generated and provided to another device.

9. The method of claim 8, wherein a forwarding plane of the first network device is not modified when modifying the portion of the packet replica.

10. The method of claim 8, wherein the network performance indicators are generated based on the packet replica or a group of packet replicas; and

wherein the packet replica or the group of packet replicas have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

11. The method of claim 8, wherein selecting the packet that is part of the traffic flow comprises:

selecting the packet based on at least one of:

a first rule indicating to select particular packets after a threshold time period,

a second rule indicating to randomly select the particular packets,

a third rule indicating to select the particular packets based on the particular packets including a particular IP address or identifier, or

a fourth rule indicating to select the particular packets based on a routing or forwarding path of the particular packets.

12. The method of claim 8, wherein the routing information includes at least one of:
session information for the IP session, or
packet replica information for the packet replica or the group of packet replicas.
13. The method of claim 8, wherein adding the routing information comprises:
adding the routing information to the packet replica as an additional header of the packet replica or as part of a payload of the packet replica.
14. The method of claim 8, wherein modifying the packet replica comprises:
setting an IP header checksum value to a first incorrect value,
setting a packet length value to a second incorrect value, or
setting an IP header time to live (TTL) value to a third incorrect value.
15. A non-transitory computer-readable medium storing instructions, the instructions comprising:
one or more instructions that, when executed by one or more processors of a network device, cause the one or more processors to:
receive, from another network device, a packet replica as part of a traffic flow of an internet protocol (IP) session,
wherein the packet replica includes routing information capable of being used to generate network performance indicators associated with the IP session,
and

wherein the packet replica has been modified to include one or more values that will cause the packet replica to fail to reach a destination device associated with the IP session;
perform a validation procedure by processing the packet replica,

wherein the packet replica is to fail the validation procedure based on the one or more values included in the packet replica;

identify the routing information included in the packet replica based on the packet replica failing the validation procedure;

generate the network performance indicators using the packet replica or a group of packet replicas that have been modified and received over time; and

provide the network performance indicators to a particular device.

16. The non-transitory computer-readable medium of claim 15, wherein a forwarding plane used to route the traffic flow is not modified when the one or more values of the packet replica are modified.

17. The non-transitory computer-readable medium of claim 15, wherein the packet replica or the group of packet replicas have IP address information that matches the IP address information of the packets that are part of the traffic flow of the IP session.

18. The non-transitory computer-readable medium of claim 15, wherein the traffic flow of the IP session is subject to a service-level agreement (SLA) that requires the network performance indicators to conform to a particular standard.

19. The non-transitory computer-readable medium of claim 15, wherein the one or more instructions, that cause the one or more processors to perform the validation procedure, cause the one or more processors to:

process the packet replica to determine that a header of the packet replica includes a first value that causes the packet replica to fail the validation procedure,

wherein the first value is:

an IP header checksum value,

a packet length value, or

an IP header time to live (TTL) value.

20. The non-transitory computer-readable medium of claim 15, wherein the network performance indicators include at least one of:

a first network performance indicator to verify an order in which packets are received,

a second network performance indicator to identify packet loss, or

a third network performance indicator to identify packet delay.

ABSTRACT

A first network device may receive packets as part of a traffic flow of an internet protocol session, select a packet based on a rule, and add, to a packet replica of the selected packet, routing information capable of being used to generate performance indicators associated with the IP session. The first network device may modify a portion of the packet replica to include values that will cause the packet replica to fail to reach a destination device associated with the IP session, and provide the packet replica to other network devices to cause a second network device to perform a validation procedure to determine that the packet replica is unable to be validated based on the values, to generate the performance indicators using the packet replica or a group of packet replicas that have been modified, and to provide the performance indicators to a particular device.

100 →

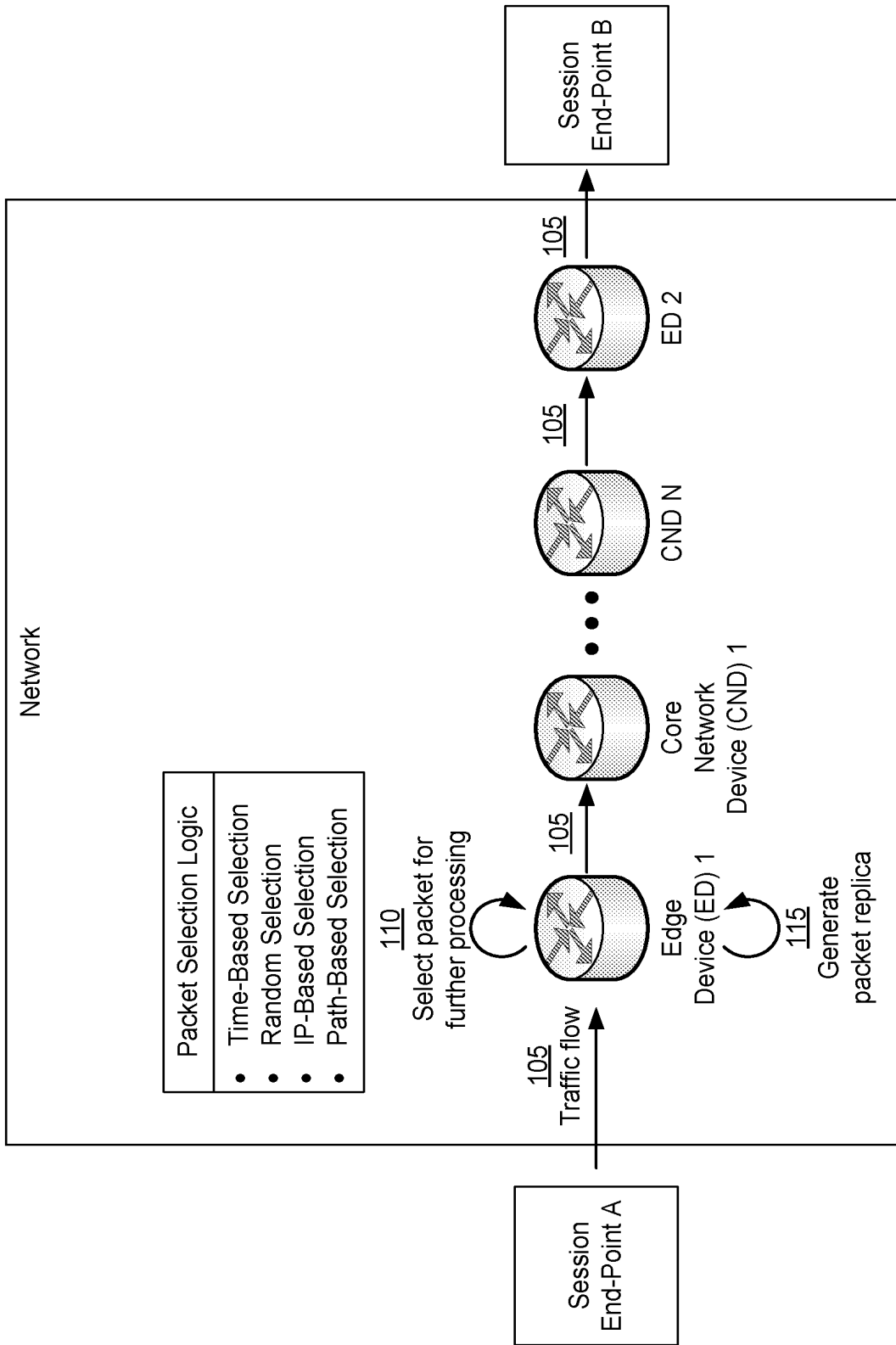


FIG. 1A

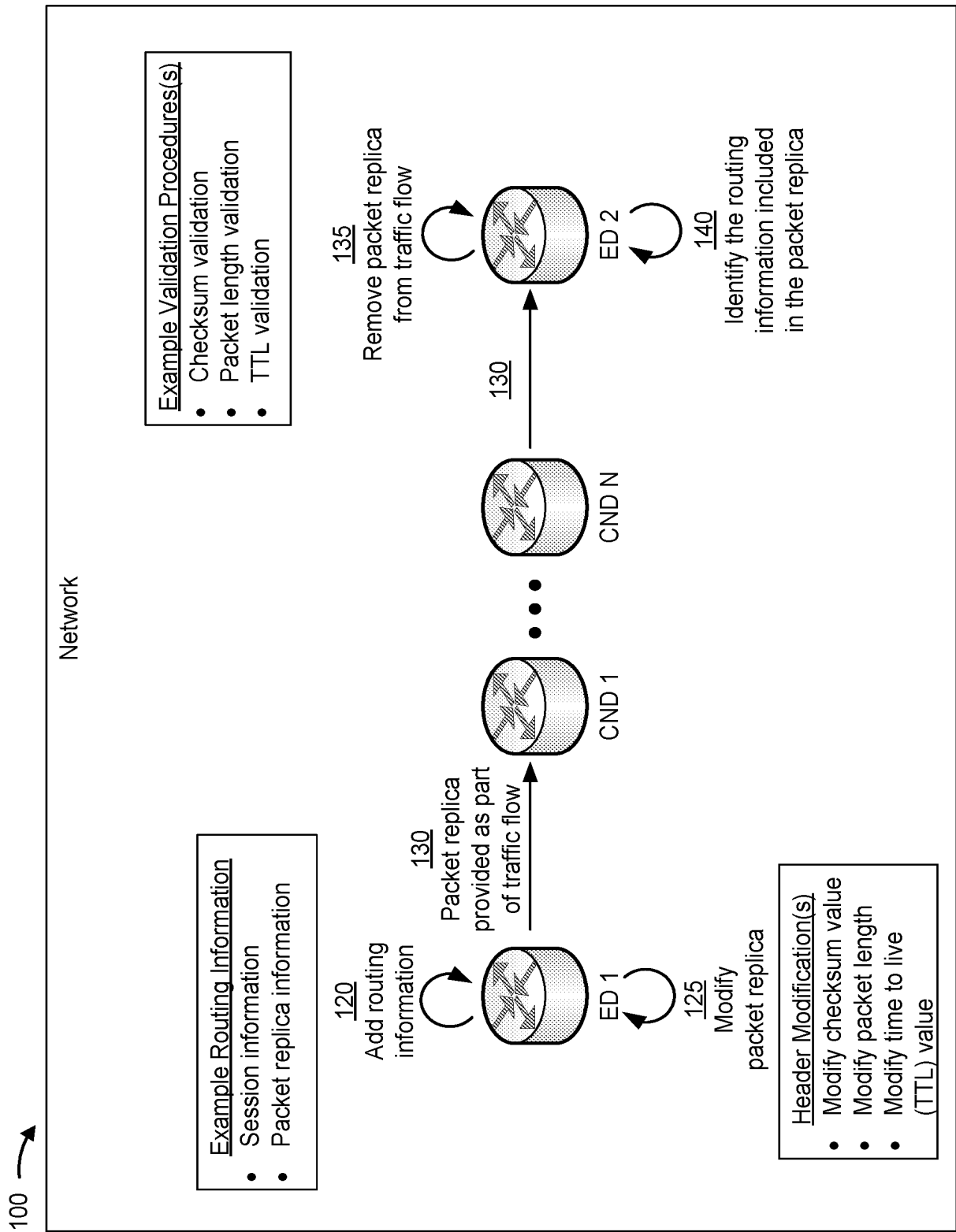


FIG. 1B

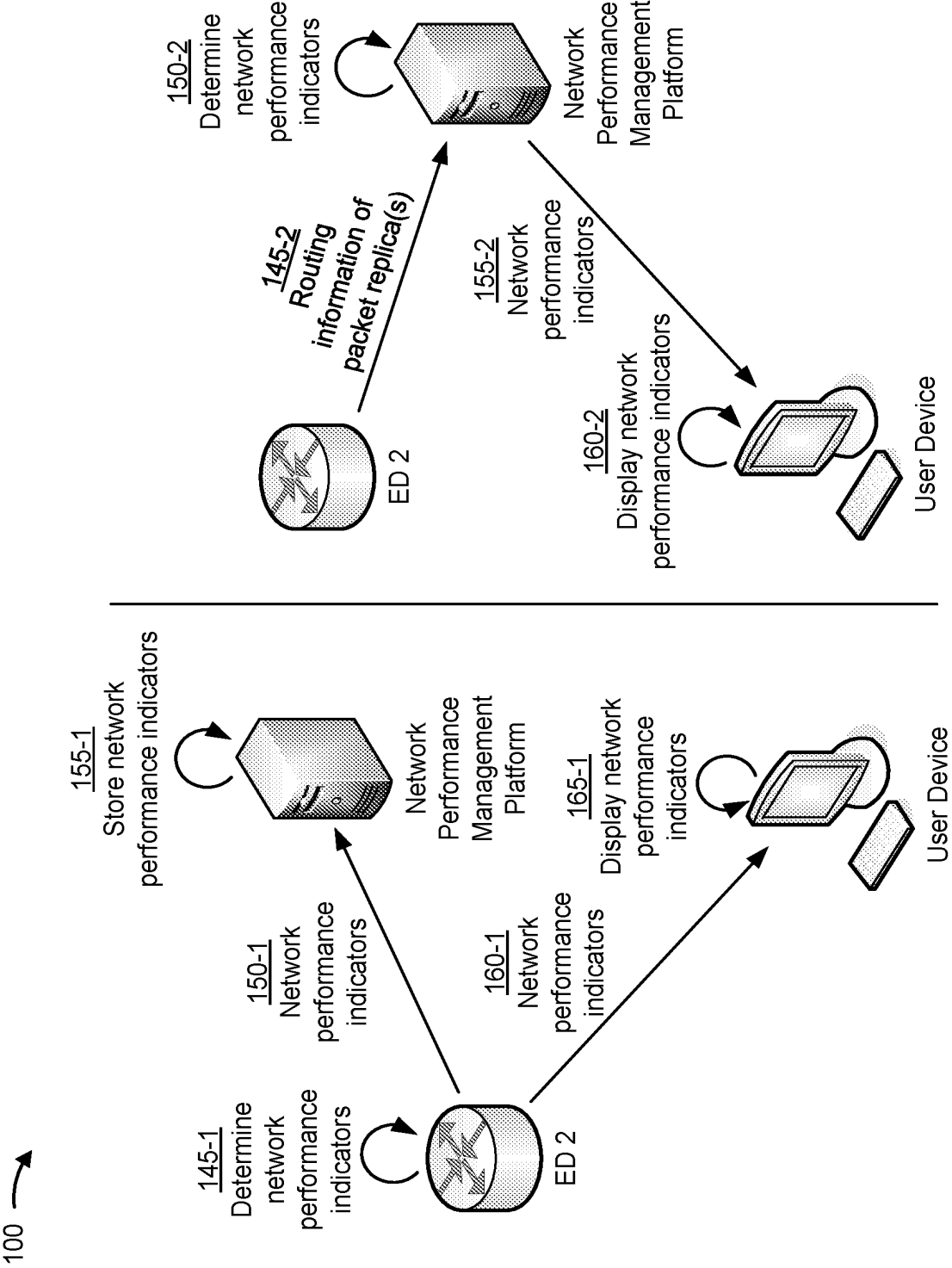


FIG. 1C

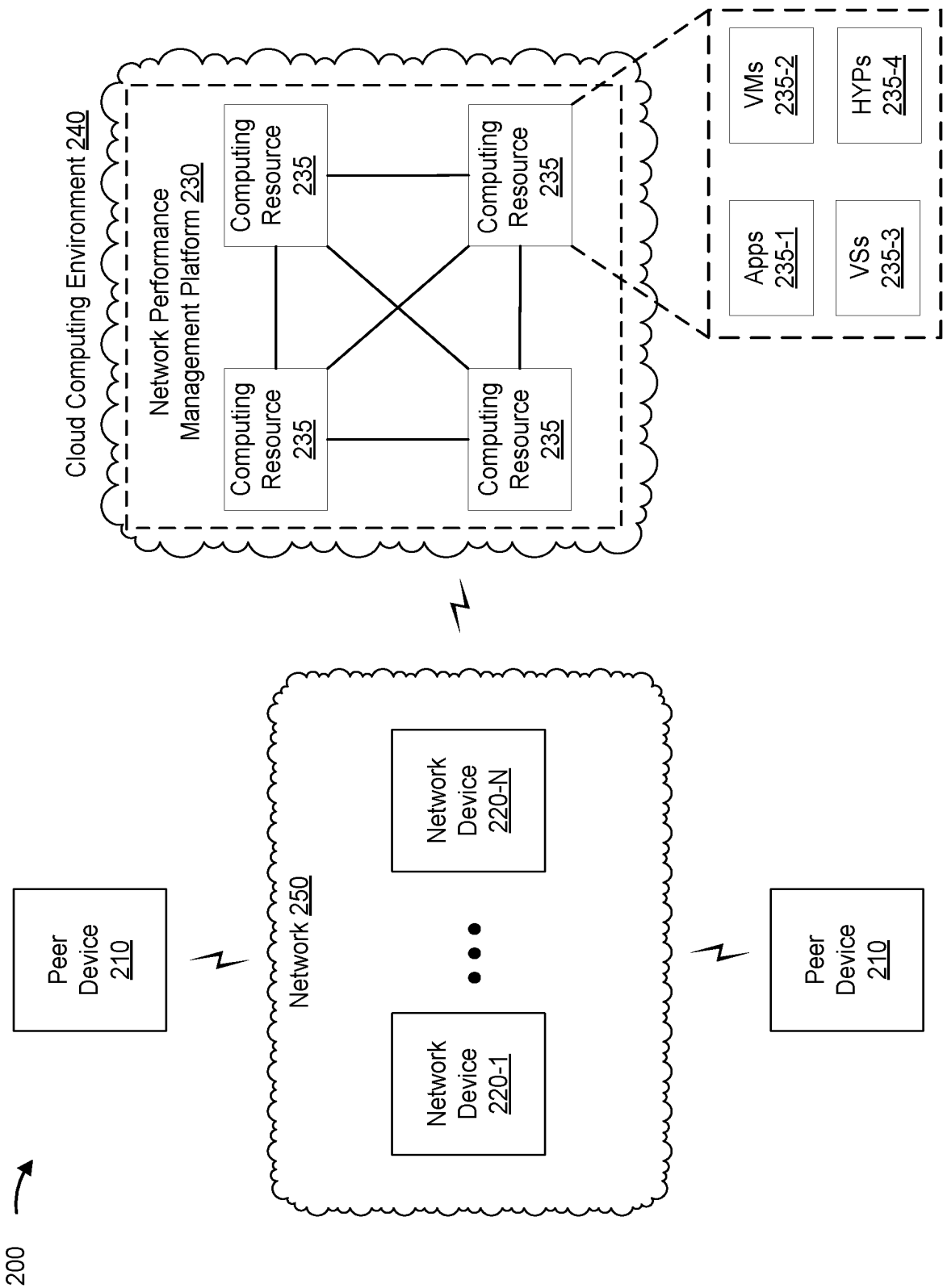


FIG. 2

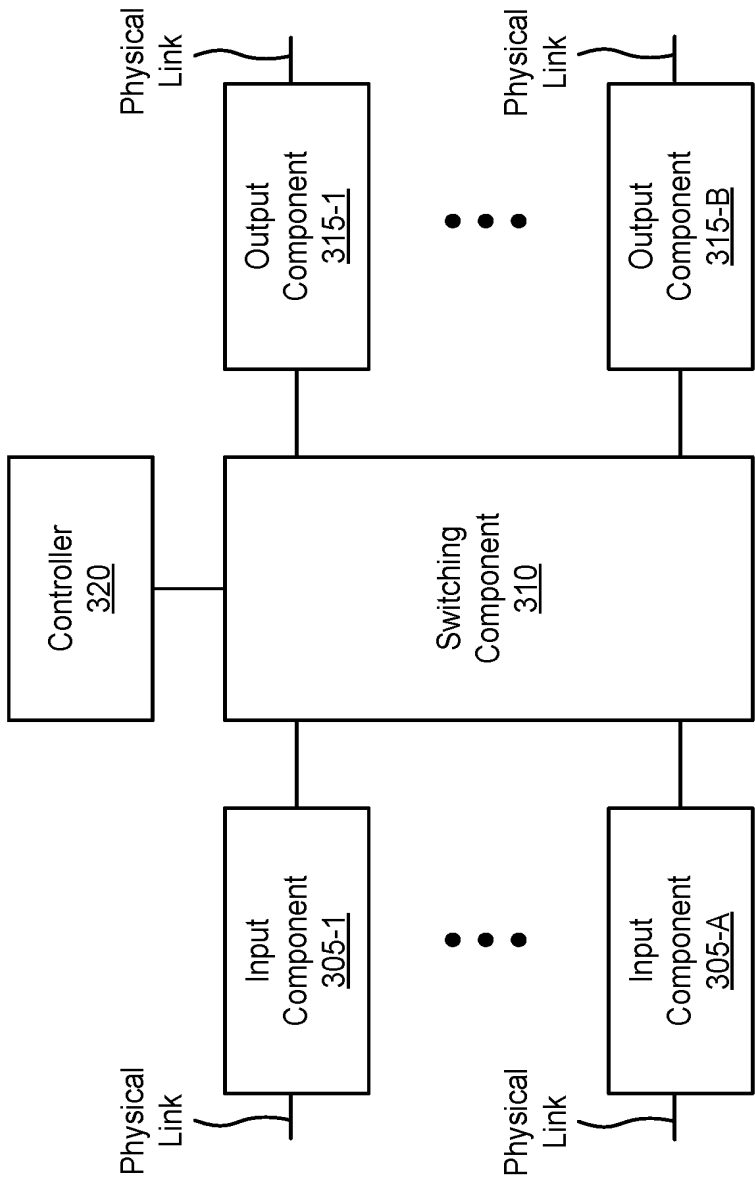
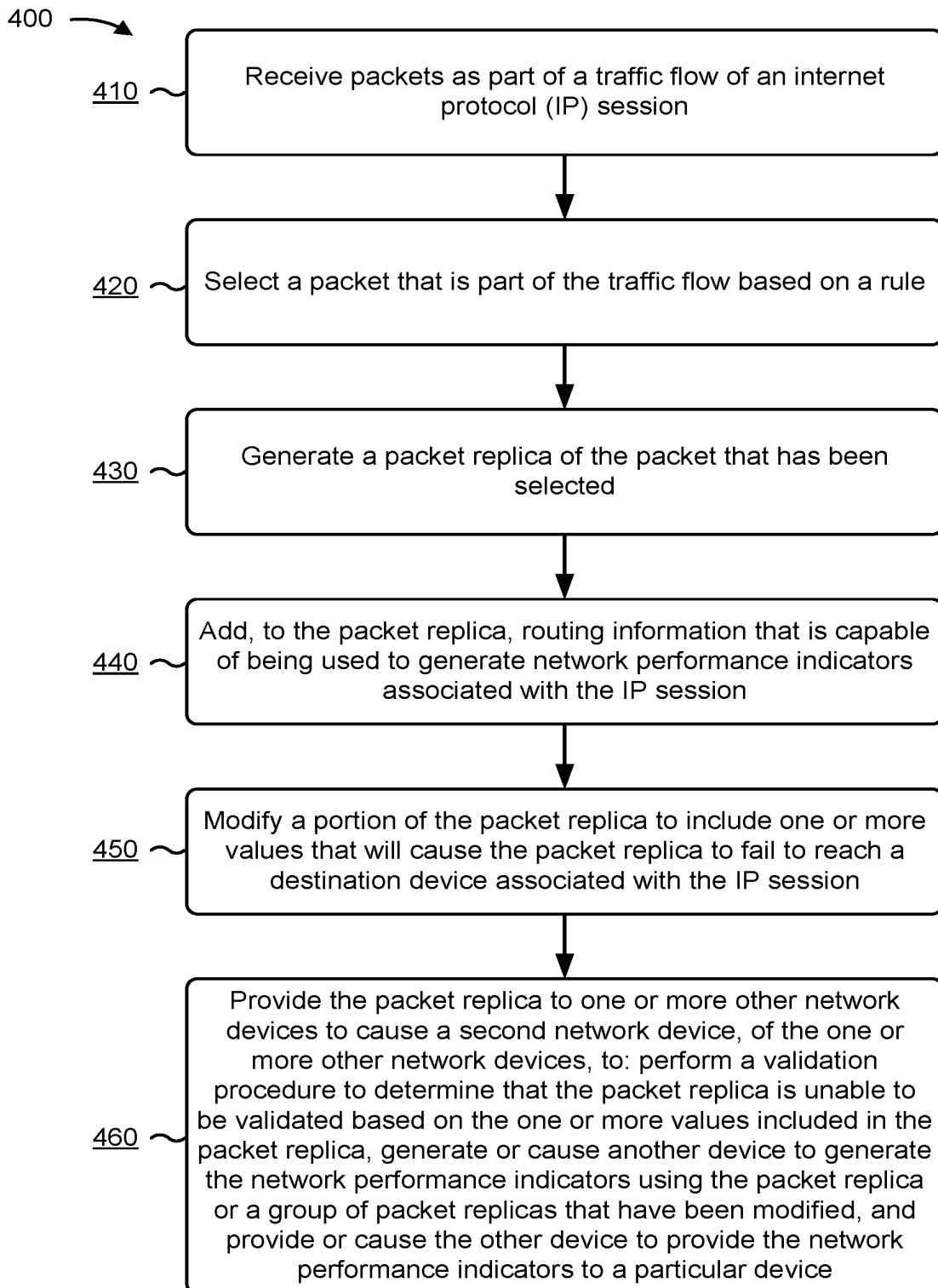


FIG. 3

300 →

**FIG. 4**

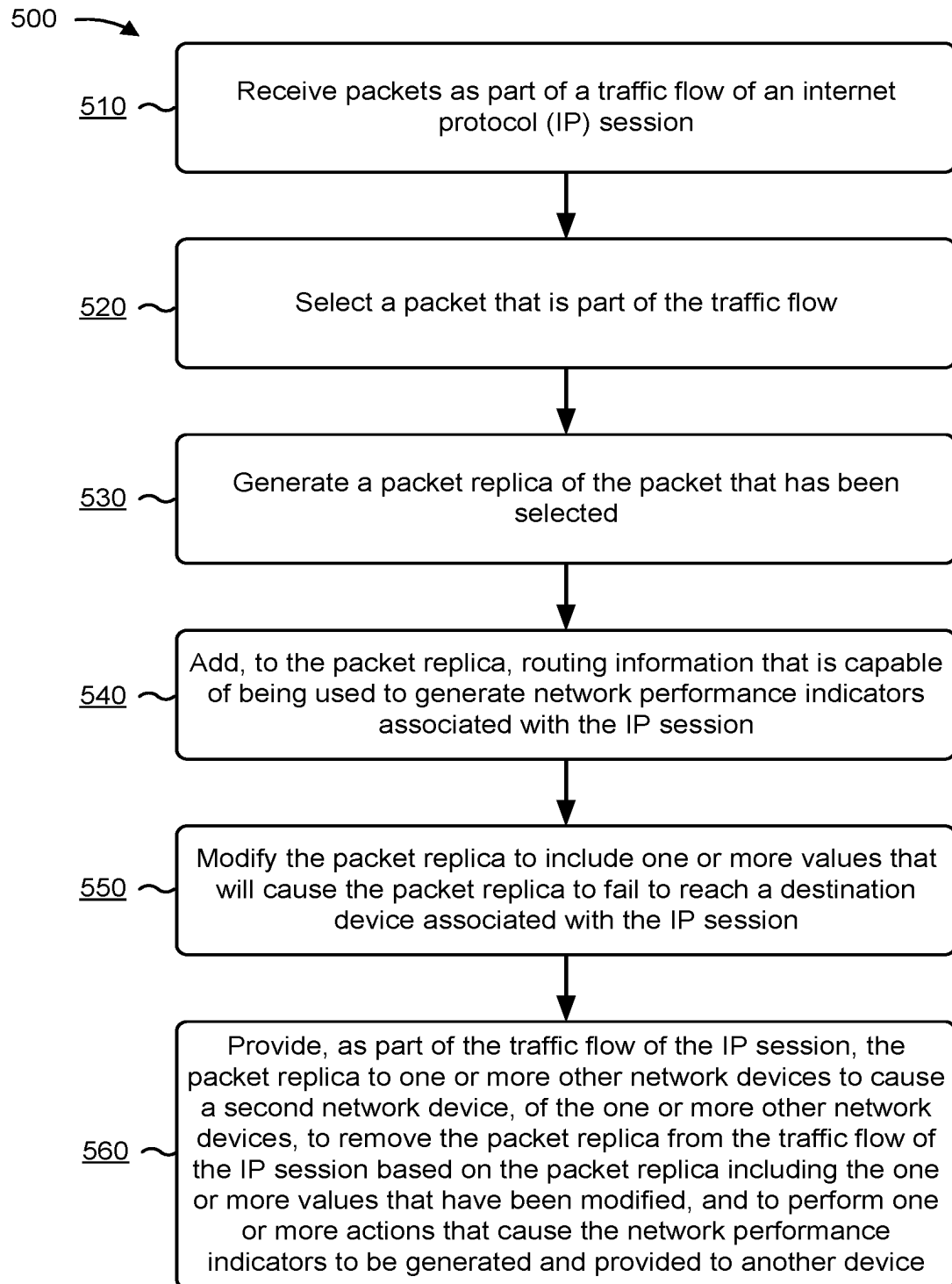


FIG. 5

600 →

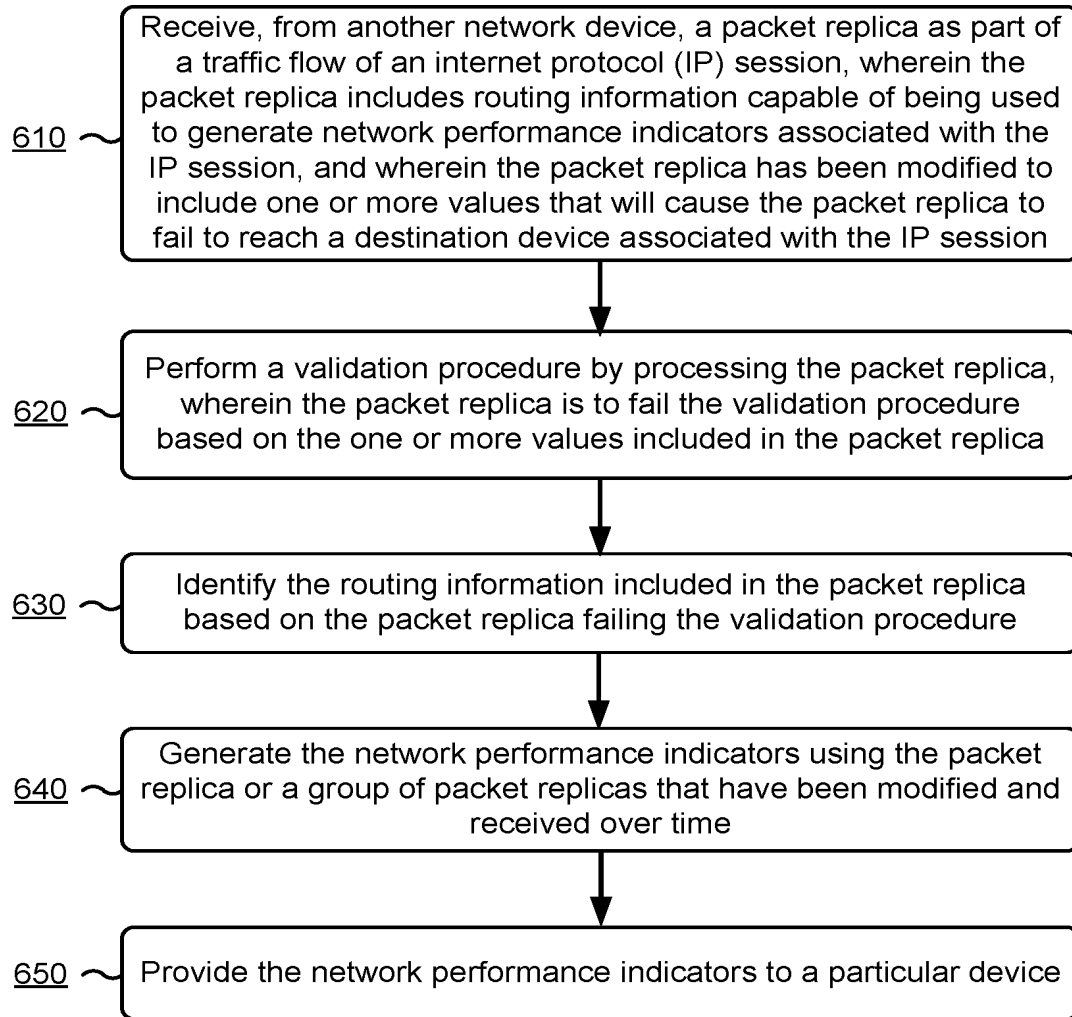


FIG. 6

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		
First Named Inventor/Applicant Name:		Dmitry A. SHOKAREV		
Filer:		Joseph L. Falkiewicz		
Attorney Docket Number:		0023-0948		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1720

Electronic Acknowledgement Receipt

EFS ID:	33727461
Application Number:	16131806
International Application Number:	
Confirmation Number:	2681
Title of Invention:	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING
First Named Inventor/Applicant Name:	Dmitry A. SHOKAREV
Customer Number:	44987
Filer:	Joseph L. Falkiewicz/Kylie Paige
Filer Authorized By:	Joseph L. Falkiewicz
Attorney Docket Number:	0023-0948
Receipt Date:	14-SEP-2018
Filing Date:	
Time Stamp:	16:12:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1720
RAM confirmation Number	091718INTEFSW16125300
Deposit Account	
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	0023-0948_ADS_9-14-18.pdf	122932	no	9
			371b318165033db245495e64d8a97cb9779fc8ec		
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
2	Fee Worksheet (SB06)	0023-0948_FeeTrans_9-14-18.pdf	68963	no	1
			31461abbdda5af79b0fff67d3c7a0945bae32b26		
Warnings:					
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3	Oath or Declaration filed	0023-0948_Declaration_9-14-18.pdf	90351	no	6
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Information:					
4	Power of Attorney	0023-0948_POA_9-14-18.pdf	304068	no	2
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Information:					
5	Transmittal Letter	0023-0948_IDS_9-14-18.pdf	74673	no	3
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Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	0023-0948_1449_9-14-18.pdf	82468	no	1
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7	Non Patent Literature	NPL.pdf	60210	no	29
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Information:					
8		0023-0948_Application_FINAL.pdf	194561	yes	46
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	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	38	
	Claims		39	45	
	Abstract		46	46	
Warnings:					
Information:					
9	Drawings-only black and white line drawings	0023-0948_Drawings_FINAL.pdf	147349	no	8
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10	Fee Worksheet (SB06)	fee-info.pdf	35404	no	2
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Warnings:					
Information:					
Total Files Size (in bytes):			1180979		

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New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0023-0948
		Application Number	
Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		
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. 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.			

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.)
--------------------------	---

Inventor Information:

Inventor 1					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Dmitry	A.	SHOKAREV			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Mountain View	State/Province	CA	Country of Residenceⁱ	US	
Mailing Address of Inventor:						
Address 1	217 ADA AVENUE, UNIT #18					
Address 2						
City	Mountain View	State/Province	CA			
Postal Code	94043	Countryⁱ	US			
Inventor 2					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Nayan	S	PATEL			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Bedford	State/Province	MA	Country of Residenceⁱ	US	
Mailing Address of Inventor:						
Address 1	5 Meeting House Circle					
Address 2						
City	Bedford	State/Province	MA			
Postal Code	01730	Countryⁱ	US			
Inventor 3					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Alex		BABAN			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						

Application Data Sheet 37 CFR 1.76		Attorney Docket Number		0023-0948	
		Application Number			
Title of Invention		SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING			
City	San Jose	State/Province	CA	Country of Residence ⁱ	US
Mailing Address of Inventor:					
Address 1		5918 Manorwood Court			
Address 2					
City	San Jose	State/Province	CA		
Postal Code	95129	Country ⁱ	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					Add

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	44987		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		
Attorney Docket Number	0023-0948	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country ⁱ

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ Request Not to Publish. 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 has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0023-0948
		Application Number	
Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		

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). Either enter 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: ☒ Customer Number ☐ US Patent Practitioner ☐ Limited Recognition (37 CFR 11.9)			
Customer Number	44987		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. 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. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Remove
			Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0023-0948
		Application Number	
Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐	This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.
--------------------------	---

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0023-0948
		Application Number	
Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

- ☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.
- ☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0023-0948
		Application Number	
Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant 1			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
Clear			
☒ Assignee		☐ Legal Representative under 35 U.S.C. 117	
		☐ Joint Inventor	
☐ Person to whom the inventor is obligated to assign.		☐ Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor:			
If the Applicant is an Organization check here. ☒			
Organization Name		Juniper Networks, Inc.	
Mailing Address Information For Applicant:			
Address 1		1133 Innovation Way	
Address 2			
City		Sunnyvale	State/Province
			CA
Country	US	Postal Code	94089
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

Assignee Information including Non-Applicant Assignee Information:

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

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0023-0948
		Application Number	
Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country ⁱ		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/ Joseph Falkiewicz, Reg. No. 74,906 /		Date (YYYY-MM-DD)	2018-09-14
First Name	Joseph	Last Name	Falkiewicz	Registration Number
74,906				
Additional Signature may be generated within this form by selecting the Add button.				

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0023-0948
		Application Number	
Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING		

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

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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.
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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.
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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	
	)	
Juniper Networks, Inc.	)	Group Art Unit: Unassigned
	)	
Application No.: Unassigned	)	Examiner: Unassigned
	)	
Filed: September 14, 2018	)	
	)	
For: SYSTEMS AND METHODS	)	
FOR NON-INTRUSIVE	)	
NETWORK PERFORMANCE	)	
MONITORING	)	

FEE TRANSMITTAL COVER SHEET

U.S. Patent and Trademark Office
Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

The Commissioner is hereby authorized to charge any other appropriate fees that may be required by submission of this application that are not accounted for, and to credit any overpayment, to Deposit Account No. 50-1070.

Respectfully submitted,

HARRITY & HARRITY, LLP

By: / Joseph L. Falkiewicz, Reg. No. 74,906 /
Joseph L. Falkiewicz
Reg. No. 74,906

11350 Random Hills Road
Suite 600
Fairfax, Virginia 22030
(571) 432-0800
CUSTOMER NUMBER: 44987
Date: September 14, 2018

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING
-------------------------------	---

As the below named inventor, I hereby declare that:

This declaration is directed to: ☒ The attached application, or
☐ United States application or PCT international application number _____
 filed on _____.

The above-identified application was made or authorized to be made by me.

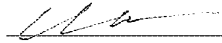
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Dmitry A. SHOKAREV Date (Optional) 9/13/2018
 Signature: 

Note: An application data sheet (PTO/AIA/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/SB/AIA01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.
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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)****Title of
Invention****SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING**

As the below named inventor, I hereby declare that:

This declaration
is directed to:

The attached application, or



United States application or PCT international application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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LEGAL NAME OF INVENTOR

Inventor: **Nayan S. PATEL**Date (Optional) : **9/14/2018**Signature: 

Note: An application data sheet (PTO/AIA/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/SB/AIA01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.**

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING
-------------------------------	---

As the below named inventor, I hereby declare that:

This declaration is directed to: ☒ The attached application, or
☐ United States application or PCT international application number _____
 filed on _____.

The above-identified application was made or authorized to be made by me.

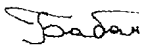
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LEGAL NAME OF INVENTOR

Inventor: Alex BABAN Date (Optional): 9/13/2018
 Signature: 

Note: An application data sheet (PTO/AIA/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/SB/AIA01 form for each additional inventor.

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Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82A (07-12)

Approved for use through 11/30/2014. OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B or equivalent) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5. If the Power of Attorney by Applicant form is not accompanied by this transmittal form or an equivalent, the Power of Attorney will not be recognized in the application.

Application Number	Unassigned
Filing Date	September 14, 2018
First Named Inventor	Dmitry A. SHOKAREV
Title	SYSTEMS AND METHODS FOR NON-INTRUSIVE NETWORK PERFORMANCE MONITORING
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	0023-0948

SIGNATURE of Applicant or Patent Practitioner

Signature	/ Joseph L. Falkiewicz, Reg. No. 74,906 /	Date	September 14, 2018
Name	Joseph L. Falkiewicz	Telephone	(571) 432-0800
Registration Number	74,906		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications.



*Total of 1 forms are submitted.

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

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

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

I hereby appoint:



Practitioners associated with Customer Number:

44987

OR



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

Name	Registration Number

Name	Registration Number

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

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



The address associated with Customer Number:

44987

OR

☐	Firm or Individual Name			
	Address			
	City		State	Zip
	Country			
	Telephone		Email	

Assignee Name and Address: Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089-1206**A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.****SIGNATURE of Assignee of Record**

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

Signature		Date	September 25, 2012
Name	Mitchell Gayner	Telephone	408-745-2000
Title	Executive Vice President		

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

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	
	)	
Juniper Networks, Inc.	)	Group Art Unit: Unassigned
	)	
Application No.: Unassigned	)	Examiner: Unassigned
	)	
Filed: September 14, 2018	)	
	)	
For: SYSTEMS AND METHODS	)	
FOR NON-INTRUSIVE	)	
NETWORK PERFORMANCE	)	
MONITORING	)	

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97(b)

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Randolph Building
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Alexandria, VA 22314

Sir:

Pursuant to 37 C.F.R. §§ 1.56 and 1.97(b), Applicant(s) bring to the attention of the Examiner the documents listed on the attached PTO 1449. This Information Disclosure Statement is being filed before the mailing date of a first Office Action in the above-referenced application. As such, no certification or fee is required. Copies of the non-U.S. patent documents, if any, are attached.

Applicant(s) respectfully request(s) that the Examiner consider the listed documents and indicate that they were considered by making appropriate notations on the attached form.

If any copending application(s) is/are cited on the attached PTO 1449, the Examiner's attention is directed to the foregoing application(s) in compliance with § 2001.06(b) of the Manual of Patent Examining Procedure. By identifying the copending application(s), the assignee and/or applicant of the application(s) do not waive confidentiality of the application(s). Accordingly, the U.S. Patent and Trademark Office is requested to maintain the confidentiality of the copending application(s) under 35 U.S.C. § 122.

This submission does not represent that a search has been made and does not constitute an admission that each or all of the listed documents are material or constitute "prior art." If the Examiner applies any of the documents as prior art against any claim in the application and Applicant(s) determine(s) that the cited document(s) do not constitute "prior art" under United States law, Applicant(s) reserve(s) the right to present to the Office the relevant facts and law regarding the appropriate status of such documents.

Applicant(s) further reserve(s) the right to take appropriate action to establish the patentability of the disclosed invention over the listed documents, should one or more of the documents be applied against the claims of the present application.

Further, no aspect of this submission constitutes a disclaimer of claim scope.

If there is any fee due in connection with the filing of this Statement, please charge the fee to our Deposit Account No. 50-1070.

Respectfully submitted,

HARRITY & HARRITY, LLP

By: / Joseph L. Falkiewicz, Reg. No. 74,906 /
Joseph L. Falkiewicz
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Date: September 14, 2018

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Application Number: 16131806

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