



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/377,223	02/21/2023	11589142		4494

175346 7590 02/01/2023
Joseph L. Vilella
2031 Second Avenue
San Diego, CA 92101

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 120 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 Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

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

Joseph L. Vilella, San Diego, CA;

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

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.

IR103 (Rev. 10/09)

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)

175346 7590 01/13/2023
Joseph L. Vilella
2031 Second Avenue
San Diego, CA 92101

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

Certificate of Mailing or Transmission

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

Joseph L. Vilella	(Typed or printed name)
<i>Joseph L. Vilella</i>	(Signature)
01/18/2023	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/377,223	07/15/2021	Joseph L. Vilella		4494

TITLE OF INVENTION: Mutually secure optical data network and method

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	04/13/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
TOLENTINO, RODERICK	2439	398-045000

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

2. For printing on the patent front page, list

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

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document 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 ☐ 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 *Joseph L. Vilella*
Typed or printed name Joseph L. Vilella

Date 01/18/2023

Registration No. _____

Electronic Patent Application Fee Transmittal				
Application Number:		17377223		
Filing Date:		15-Jul-2021		
Title of Invention:		Mutually secure optical data network and method		
First Named Inventor/Applicant Name:		Joseph L. Vilella		
Filer:		Joseph L. Vilella		
Attorney Docket Number:				
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				480

Electronic Acknowledgement Receipt	
EFS ID:	47388308
Application Number:	17377223
International Application Number:	
Confirmation Number:	4494
Title of Invention:	Mutually secure optical data network and method
First Named Inventor/Applicant Name:	Joseph L. Vilella
Customer Number:	175346
Filer:	Joseph L. Vilella
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	18-JAN-2023
Filing Date:	15-JUL-2021
Time Stamp:	13:13:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$480
RAM confirmation Number	E20231HD16374357
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Feetransmittaldocument.pdf	518956	no	1
			89de6e77151b54768e85614ca4b9f34d90d aecd4		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37413	no	2
			11f75460cf27f0b352348dcd1644067d2ad3 514c		
Warnings:					
Information:					
Total Files Size (in bytes):			556369		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

175346 7590 01/13/2023
Joseph L. Vilella
2031 Second Avenue
San Diego, CA 92101

EXAMINER

TOLENTINO, RODERICK

ART UNIT PAPER NUMBER

2439

DATE MAILED: 01/13/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/377,223	07/15/2021	Joseph L. Vilella		4494

TITLE OF INVENTION: Mutually secure optical data network and method

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	04/13/2023

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 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted 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. 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.

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Commissioner for Patents
P.O. Box 1450
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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

175346 7590 01/13/2023
Joseph L. Vilella
2031 Second Avenue
San Diego, CA 92101

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Certificate of Mailing or Transmission

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/377,223	07/15/2021	Joseph L. Vilella		4494

TITLE OF INVENTION: Mutually secure optical data network and method

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nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	04/13/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
TOLENTINO, RODERICK	2439	398-045000

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

2. For printing on the patent front page, list

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

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(A) NAME OF ASSIGNEE

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

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

4a. 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. _____

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- ☐ Applicant asserting small entity status. See 37 CFR 1.27
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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. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/377,223	07/15/2021	Joseph L. Vilella		4494
175346	7590	01/13/2023		
Joseph L. Vilella 2031 Second Avenue San Diego, CA 92101				
EXAMINER TOLENTINO, RODERICK				
ART UNIT 2439				
PAPER NUMBER				

DATE MAILED: 01/13/2023

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, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 17/377,223	Applicant(s) Vilella, Joseph L.	
	Examiner RODERICK TOLENTINO	Art Unit 2439	AIA (FITF) Status No

-- 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 7/15/2021.
☐ 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 4-12. 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)	5. ☒ Examiner's Amendment/Comment
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date. 10/26/2022.	

/RODERICK TOLENTINO/ Primary Examiner, Art Unit 2439	
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DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.
2. Notice of Allowability to the Instant Application, 17/377,223, filed on 7/15/2021, Terminal Disclaimer filed on 10/26/2022, which has been approved and amendments authorized by Applicant's representative on 10/26/2022. Claims 1-3 have been canceled. Claims 4-12 have been added as New. Claims 4-12 are pending.

EXAMINER'S AMENDMENT

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

Authorization for this examiner's amendment was given in an interview with Inventor Joseph Vilella on 10/26/2022.

The application has been amended as follows:

1. (Cancelled)
2. (Cancelled)
3. (Cancelled)
4. (New) A digital data network communication method comprises:
accepting a plurality of data streams into a primary passive optical network (PON) interface router, interconnected with a secondary PON interface router serving a plurality of user devices through a plurality of optical network units (ONUs);

configuring said primary PON interface router to virtually separate the information intended for at least one private user device of a plurality of user devices, wherein said at least one private user device of a plurality of user devices is connected to at least one of said plurality of ONUs;

wherein said configuring comprises:

generating at least one independently unique virtual routing table by using Virtual Routing and Forwarding (VRF);

virtually separating at least one private data stream intended for said at least one private user device from said plurality of data streams using said at least one independently unique virtual routing table to create at least one virtually separated private data stream containing Internet Protocol (IP) data packages;

uniquely labelling said IP data packages contained in said at least one virtually separated private data stream using Multi-Protocol Label Switching (MPLS) to create MPLS labelled data packages;

sending said plurality of data streams, including said at least one virtually separated private data stream comprising said MPLS labelled data packages, to said secondary PON interface router;

receiving said plurality of data streams including said at least one virtually separated private data stream at said secondary PON interface router;

converting said MPLS labelled data packages contained within said at least one virtually separated private data stream back to said IP data packages;

forwarding said plurality of data streams including said at least one virtually separated private data stream containing said IP data packages from said secondary PON interface router to a PON optical line terminal (OLT);

aggregating within said PON OLT said plurality of data streams and said at least one virtually separated private data stream into a common data feed;

distributing said common data feed to said plurality of ONUs;

wherein said distributing comprises:

replicating said common data feed using at least one optical splitter connected to said plurality of ONUs;

delivering said common data feed to said plurality of ONUs;

extracting within said at least one of said plurality of ONUs, said at least one virtually separated private data stream including said IP data packages from said common data feed;

sending said at least one virtually separated private data stream including said IP data packages from said at least one of said plurality of ONUs to said at least one private user device of a plurality of user devices.

5. (New) The method of claim 4, wherein said at least one of said plurality of ONUs provides services to at least one private user a of plurality of users.

6. (New) The method of claim 4, wherein said secondary PON interface router is serially connected to at least one additional PON interface router that is serially connected to said PON OLT, wherein said least one additional PON interface router

delivers said plurality of data streams including said at least one virtually separated private data stream containing said IP data packages to said PON OLT.

7. (New) The method of claim 6, wherein said at least one additional PON interface router is serially connected to an aggregation switch that is serially connected to said PON OLT, wherein said aggregation switch delivers said plurality of data streams including said at least one virtually separated private data stream containing said IP data packages to said PON OLT.

8. (New) A digital network communication method comprises:

receiving from at least one passive optical network (PON) interface router out of a plurality of PON interface routers at a PON optical line terminal (OLT), at least one private data stream out of a plurality of data streams, wherein said at least one private data stream has been virtually separated using Virtual Routing and Forwarding (VRF) to form at least one virtually separated private data stream comprised of Internet Protocol (IP) data packages, and wherein said at least one virtually separated private data stream including said IP data packages is intended for at least one of a plurality of ONUs, and wherein said at least one of a plurality of ONUs serves at least one private user device of a plurality of user devices;

aggregating within said PON OLT said plurality of data streams and said at least one virtually separated private data stream into a common data feed;

distributing said common data feed to said plurality of ONUs;

wherein said distributing comprises:

replicating said common data feed using at least one optical splitter connected to said plurality of ONUs;

delivering said common data feed to said plurality of ONUs;

extracting within said at least one of said plurality of ONUs, said at least one virtually separated private data stream including said IP data packages from said common data feed;

sending said at least one virtually separated private data stream including said IP data packages from said at least one of said plurality of ONUs to said at least one private user device of a plurality of user devices.

9. (New) The method of claim 8, wherein said at least one of said plurality of ONUs provides services to at least one private user of a plurality of users.

10. (New) The method of claim 8, wherein said at least one PON interface router is serially connected to an aggregation switch that is serially connected to said PON OLT, wherein said aggregation switch delivers said plurality of data streams including said at least one virtually separated private data stream comprising said IP data packages to said PON OLT.

11. (New) A digital network communication method comprises:

receiving at a passive optical network (PON) optical line terminal (OLT), at least one private data stream out of a plurality of data streams, wherein said at least one private data stream has been virtually separated using Virtual Routing and Forwarding

(VRF) to form at least one virtually separated private data stream comprised of Internet Protocol (IP) data packages, and wherein said at least one virtually separated private data stream including said IP data packages is intended for at least one of a plurality of ONUs, and wherein said at least one of a plurality of ONUs serves at least one private user device of a plurality of user devices;

aggregating within said PON OLT said plurality of data streams and said at least one virtually separated private data stream into a common data feed;

distributing said common data feed to said plurality of ONUs;

wherein said distributing comprises:

replicating said common data feed using at least one optical splitter connected to said plurality of ONUs;

delivering said common data feed to said plurality of ONUs;

extracting within said at least one of said plurality of ONUs, said at least one virtually separated private data stream including said IP data packages from said common data feed;

sending said at least one virtually separated private data stream including said IP data packages from said at least one of said plurality of ONUs to said at least one private user device of a plurality of user devices.

12. (New) The method of claim 11, wherein said at least one of said plurality of ONUs provides services to at least one private user out of plurality of users.

Allowable Subject Matter

4. Claims 4-12 are allowed.
5. The instant Application is allowed for similar reasons as parent Application 17/128,042, filed 12/19/2020, now U.S. Patent #11,070,898 along with authorized amendments made by Applicant on 10/26/2022 and Terminal Disclaimer approved on 10/26/2022. An updated search was conducted on 10/26/2022 and the claims are still in condition for Allowance.
6. The closest prior art fails to disclose, teach or even suggest “receiving from at least one passive optical network (PON) interface router out of a plurality of PON interface routers at a PON optical line terminal (OLT), at least one private data stream out of a plurality of data streams, wherein said at least one private data stream has been virtually separated using Virtual Routing and Forwarding (VRF) to form at least one virtually separated private data stream comprised of Internet Protocol (IP) data packages, and wherein said at least one virtually separated private data stream including said IP data packages is intended for at least one of a plurality of ONUs, and wherein said at least one of a plurality of ONUs serves at least one private user device of a plurality of user devices; aggregating within said PON OLT said plurality of data streams and said at least one virtually separated private data stream into a common data feed; distributing said common data feed to said plurality of ONUs; wherein said distributing comprises: replicating said common data feed using at least one optical splitter connected to said plurality of ONUs; delivering said common data feed to said plurality of ONUs; extracting within said at least one of said plurality of ONUs, said at

least one virtually separated private data stream including said IP data packages from said common data feed; sending said at least one virtually separated private data stream including said IP data packages from said at least one of said plurality of ONUs to said at least one private user device of a plurality of user devices.”. Applicant’s inventive steps listed above disclose novel method for its distribution and replication of a feed in an optical network, which is not disclosed by conventional methods which pertain to optical networks. Such as conventional methods do not use the virtual routing and forwarding in the same way as the above. As a result the claims are in condition for Allowance.

7. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODERICK TOLENTINO whose telephone number is (571)272-2661. The examiner can normally be reached on Mon- Fri 8am-4pm.

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, Luu Pham can be reached on 571-270-5002. 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.

RODERICK . TOLENTINO
Examiner
Art Unit 2439

/RODERICK TOLENTINO/
Primary Examiner, Art Unit 2439

<i>Applicant-Initiated Interview Summary</i>	Application No. 17/377,223	Applicant(s) Vilella, Joseph L.		
	Examiner RODERICK TOLENTINO	Art Unit 2439	AIA (First Inventor to File) Status No	Page 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	Title	Type
RODERICK TOLENTINO	Primary Examiner	Telephonic
Joseph Vilella		

Date of Interview: 26 October 2022

Issues Discussed:

Proposed Amendment(s)

Applicant proposed amendments to the claims, Examiner agreed with the amendments. The claims are in condition for Allowance.

/RODERICK TOLENTINO/ Primary Examiner, Art Unit 2439	
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.

<i>Notice of References Cited</i>	Application/Control No. 17/377,223	Applicant(s)/Patent Under Reexamination Vilella, Joseph L.	
	Examiner RODERICK TOLENTINO	Art Unit 2439	Page 1 of 1

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*	B	US-20080212598-A1	09-2008	Kolli; Raja	H04L29/12933	370/409
*	C	US-20040223500-A1	11-2004	Sanderson, David M.	H04L63/0272	370/395.53
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	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*	V	Kim et al., "Design and implementation of ME-VPNS," 2012 14th International Conference on Advanced Communication Technology (ICACT) Year: 2012 Conference Paper Publisher: IEEE
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	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.

U.S. Patent and Trademark Office
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Notice of References Cited

Part of Paper No. 20221003

Issue Classification 	Application/Control No. 17/377,223	Applicant(s)/Patent Under Reexamination Vilella, Joseph L.
	Examiner RODERICK TOLENTINO	Art Unit 2439

CPC						
Symbol					Type	Version
H04Q	/	11	/	0067	F	2013-01-01
H04L	/	63	/	0414	I	2013-01-01
H04B	/	10	/	27	I	2013-01-01
H04Q	/	2011	/	0086	A	2013-01-01
H04Q	/	2011	/	0073	A	2013-01-01

CPC Combination Sets							
Symbol				Type	Set	Ranking	Version
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NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	9	
/RODERICK TOLENTINO/ Primary Examiner, Art Unit 2439	26 October 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	4	1

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Issue Classification 	Application/Control No. 17/377,223	Applicant(s)/Patent Under Reexamination Vilella, Joseph L.
	Examiner RODERICK TOLENTINO	Art Unit 2439

INTERNATIONAL CLASSIFICATION			
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CLASS	SUBCLASS

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

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(Assistant Examiner)	(Date)	9	
/RODERICK TOLENTINO/ Primary Examiner, Art Unit 2439	26 October 2022	O.G. Print Claim(s)	O.G. Print Figure
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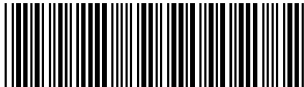
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☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47															
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Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
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	2	8	11												
	3	9	12												
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NONE (Assistant Examiner) _____ (Date) _____ /RODERICK TOLENTINO/ Primary Examiner, Art Unit 2439 (Primary Examiner) _____ (Date) _____		Total Claims Allowed: 9 O.G. Print Claim(s) O.G. Print Figure 4 1	
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Search Notes 	Application/Control No. 17/377,223	Applicant(s)/Patent Under Reexamination Vilella, Joseph L.
	Examiner RODERICK TOLENTINO	Art Unit 2439

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Symbol	Date	Examiner
H04Q11/0067; H04B10/27; H04L63/0414; H04Q2011/0073; H04Q2011/0086	10/26/2022	RT
H04Q11/0067; H04Q2011/0073; H04L47/2416; H04L63/0272	10/26/2022	RT

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Search Notes	Date	Examiner
PE2E Keyword Search (see search history)	10/26/2022	RT
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See search history of parent application 16/600,302 now patent 10,904,649	10/26/2022	RT
IEEE Database Keyword Search	10/26/2022	RT
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ACM Database Keyword Search	10/26/2022	RT

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<i>Search Notes</i> 	Application/Control No. 17/377,223	Applicant(s)/Patent Under Reexamination Vilella, Joseph L.
	Examiner RODERICK TOLENTINO	Art Unit 2439

Interference Search			
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- ☐ Design of Multicast Service Architecture in an Ethernet Passive Optical Network
- HyeonSik Yoon; Jaehoon Yu
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- ☐ New Optical VPN Configuration using Wavelength Routers in a WDM-Passive Optical Network
- Kimio Oguchi; Kohei Okada; Shohei Terada; Kunio Tojo
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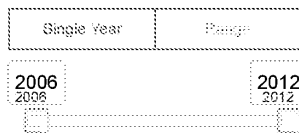
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june 2013

Improving network agility with seamless BGP reconfigurations

 [Stefano Vissicchio](#),  [Laurent Vanbever](#),  [Cristel Pelsser](#),  [Luca Cittadini](#), + 2

IEEE/ACM Transactions on Networking (TON), Volume 21, Issue 3 • June 2013, pp 990–1002 • <https://doi.org/10.1109/TNET.2012.2217506>

The network infrastructure of Internet service providers (ISPs) undergoes constant evolution. Whenever new requirements arise (e.g., the deployment of a new Point of Presence or a change in the business relationship with a neighboring ISP), operators ...

 Highlights 

Feedback

 
7 147

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RESEARCH-ARTICLE

February 2011

Memory-efficient and scalable virtual routers using FPGA

 [Hoang Le](#),  [Thilan Ganegedara](#),  [Viktor K. Prasanna](#)

FPGA '11: Proceedings of the 19th ACM/SIGDA international symposium on Field programmable gate arrays • February 2011, pp 257–266 • <https://doi.org/10.1145/1950413.1950461>

Router virtualization has recently gained much interest in the research community. It allows multiple virtual router instances to run on a common physical router platform. The key metrics in designing network virtual routers are: (1) number of supported ...

 Highlights 


20 399 •  Get Access

ARTICLE

April 2010

Distributed algorithms for minimum cost multicast with network coding

 Yufang Xi,  Edmund M. YehIEEE/ACM Transactions on Networking (TON) (TON), Volume 18, Issue 2 • April 2010, pp 379–392 • <https://doi.org/10.1109/TNET.2009.2026275>

Network coding techniques are used to find the minimum-cost transmission scheme for multicast sessions with or without elastic rate demand. It is shown that in wireline networks, solving for the optimal coding subgraphs in network coding is equivalent ...

 Highlights ✓
10 491 •  Get Access

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September 1994

The turn model for adaptive routing

 [Christopher J. Glass](#),  [Lionel M. Ni](#)

Journal of the ACM (JACM), Volume 41, Issue 5 • Sept. 1994, pp 874–
902 • <https://doi.org/10.1145/185675.185682>

 Highlights 

Feedback

 
322 1,500



February 2010

Scalable network virtualization using FPGAs

 [Deepak Unnikrishnan](#),  [Ramakrishna Vadiamani](#),  [Yong Liao](#), + 4

FPGA '10: Proceedings of the 18th annual ACM/SIGDA international symposium on Field programmable gate arrays • February 2010, pp 219–228 • <https://doi.org/10.1145/1723112.1723150>

Recent virtual network implementations have shown the capability to implement multiple network data planes using a shared hardware substrate. In this project, a new scalable virtual networking data plane is demonstrated which combines the performance ...

 Highlights 

Feedback

 
30 731  •  Get Access

Upcoming Conferences

SenSys '22

📅

November 6 - 9, 2022

📍

Hynes Convention Center,
Boston, MA, USA

SenSys '22 Website ☒

SC '22

📅

November 12 - 18, 2022

📍

Dallas, TX, USA

SC '22 Website ☒

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Feedback

june 2008

Time Jails: A Hybrid Approach to Scalable Network Emulation

 [Andreas.Grau,](#)  [Steffen.Maier,](#)  [Klaus.Herrmann,](#)  [Kurt.Rothermel](#)PADS '08: Proceedings of the 22nd Workshop on Principles of Advanced and Distributed Simulation • June 2008, pp 7–14 • <https://doi.org/10.1109/PADS.2008.19>

It is essential to evaluate the performance of newly developed distributed software and network protocols. Network emulation enables reproducible evaluation of unmodified real implementations. Software built for distributed systems, such as a large ...

 Highlights 

Feedback

 
24 172  •  Get Access

August 2013

A comprehensive performance analysis of virtual routers on FPGA

 [Thilan Ganegedara](#),  [Viktor Prasanna](#)

ACM Transactions on Reconfigurable Technology and Systems (TRETs), Volume 6, Issue 2 • July 2013, Article No.: 9, pp 1–21 • <https://doi.org/10.1145/2492187>

Network virtualization has gained much popularity with the advent of datacenter networking. The hardware aspect of network virtualization, *router virtualization*, allows network service providers to consolidate network hardware, reducing equipment cost ...

 Highlights 

Feedback

 
0 240  •  Get Access

July 2001

Robust position-based routing in wireless Ad Hoc networks with unstable transmission ranges

 [Lali Barrière](#),  [Pierre Fraigniaud](#),  [Lata Narayanan](#)

DIALM '01: Proceedings of the 5th international workshop on Discrete algorithms and methods for mobile computing and communications • July 2001, pp 19 –

27 • <https://doi.org/10.1145/381448.381451>

Several papers showed how to perform routing in *ad hoc* wireless networks based on the positions of the mobile hosts. However, all these protocols are likely to fail if the transmission ranges of the mobile hosts vary due to natural or man-made obstacles ...

 Highlights 

Feedback

 
94 1,000  •  Get Access

April 2005

Ubiquitous access to distributed data in large-scale sensor networks through decentralized erasure codes

 [Alexandros G. Dimakis](#),  [Vinod Prabhakaran](#),  [Kannan Ramchandran](#)

IPSN '05: Proceedings of the 4th international symposium on Information processing in sensor networks • April 2005, pp 15–es

Consider a large-scale wireless sensor network of n nodes, where a fraction k out of n generate data packets of global interest. Assuming that the individual nodes have limited storage and computational capabilities, we address the problem of how to ...

 Highlights 

Feedback

 
40 555

  •  Get Access

April 2014

Libra: divide and conquer to verify forwarding tables in huge networks

 Hongyi Zeng,  Shidong Zhang,  Fei Ye,  Vimalkumar Iyakumar, + 4

NSDI'14: Proceedings of the 11th USENIX Conference on Networked Systems Design and Implementation • April 2014, pp 87–99

Data center networks often have errors in the forwarding tables, causing packets to loop indefinitely, fall into black-holes or simply get dropped before they reach the correct destination. Finding forwarding errors is possible using static analysis, ...

 Highlights 

Feedback


34

FREE

August 2010

QuagFlow: partnering Quagga with OpenFlow

 [Marcelo Ribeiro Nascimento](#),  [Christian Esteve Rothenberg](#), + 2

SIGCOMM '10: Proceedings of the ACM SIGCOMM 2010 conference • August 2010, pp 441–442 • <https://doi.org/10.1145/1851182.1851252>

Computing history has shown that open, multi-layer hardware and software stacks encourage innovation and bring costs down. Only recently this trend is meeting the networking world with the availability of entire open source networking stacks being ...

Also Published in:

ACM SIGCOMM Computer Communication Review: Volume 40 Issue 4, October 2010

[A](#) Highlights 

Feedback

 
30 748   

june 2009

Robust live media streaming in swarms

 [Thomas Locher](#),  [Remo Meier](#),  [Roger Wattenhofer](#), [Stefan Schmid](#)

NOSSDAV '09: Proceedings of the 18th international workshop on Network and operating systems support for digital audio and video • June 2009, pp 121–

126 • <https://doi.org/10.1145/1542245.1542273>

Data dissemination in decentralized networks is often realized by using some form of swarming technique. Swarming enables nodes to gather dynamically in order to fulfill a certain task collaboratively and to exchange resources (typically pieces of files ...

 Highlights 

Feedback

 
8 237  •  Get Access

FREE

August 2011

NetLord: a scalable multi-tenant network architecture for virtualized datacenters

 Jayaram Mudigonda,  Praveen Yalagandula,  Jeff Mogul,  Bryan Stiekes, + 1

SIGCOMM '11: Proceedings of the ACM SIGCOMM 2011 conference • August 2011, pp 62–73 • <https://doi.org/10.1145/2018436.2018444>

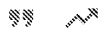
Providers of "Infrastructure-as-a-Service" need datacenter networks that support multi-tenancy, scale, and ease of operation, at low cost. Most existing network architectures cannot meet all of these needs simultaneously. In this paper we present ...

Also Published in:

ACM SIGCOMM Computer Communication Review: Volume 41 Issue 4, August 2011

A Highlights ▼

Feedback



123 1,704



FREE

May 1995

An efficient, fully adaptive deadlock recovery scheme: DISHA

 [K. V. Anjan](#),  [Timothy Mark Pinkston](#)

ISCA '95: Proceedings of the 22nd annual international symposium on Computer architecture • July 1995, pp 201–210 • <https://doi.org/10.1145/223982.224431>

This paper presents a simple, efficient and cost effective routing strategy that considers deadlock recovery as opposed to prevention. Performance is optimized in the absence of deadlocks by allowing maximum flexibility in routing. Disha supports true ...

Also Published in:

ACM SIGARCH Computer Architecture News: Volume 23 Issue 2, May 1995

[A](#) Highlights 

Feedback

 
74 669

FREE

August 2014

SDX: a software defined internet exchange

 Arpit Gupta,  Laurent Vanbever,  Muhammad Shahbaz,  Sean P. Donovan, + 6

SIGCOMM '14: Proceedings of the 2014 ACM conference on SIGCOMM • August 2014, pp 551–562 • <https://doi.org/10.1145/2619239.2626300>

BGP severely constrains how networks can deliver traffic over the Internet. Today's networks can only forward traffic based on the destination IP prefix, by selecting among routes offered by their immediate neighbors. We believe Software Defined ...

Also Published in:

ACM SIGCOMM Computer Communication Review: Volume 44 Issue 4, October 2014

A Highlights ▾

Feedback

 
171 3,137  •  

December 2013

FasTrak: enabling express lanes in multi-tenant data centers

 [Radhika Niranjana Mysore](#),  [George Porter](#),  [Amin Vahdat](#)

CoNEXT '13: Proceedings of the ninth ACM conference on Emerging networking experiments and technologies • December 2013, pp 139–150 • <https://doi.org/10.1145/2535372.2535386>

The shared nature of multi-tenant cloud networks requires providing tenant isolation and quality of service, which in turn requires enforcing thousands of network-level rules, policies, and traffic rate limits. Enforcing these rules in virtual machine ...

 Highlights 

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15 271  •  Get Access

March 2014

Efficient simulation and modelling of non-rectangular NoC topologies

 JL Qi,  Mark Zwolinski

DATE '14: Proceedings of the conference on Design, Automation & Test in Europe • March 2014,
Article No.: 285, pp 1–4

With increasing chip complexity, Networks-on-Chips (NoCs) are becoming a central platform for future on-chip communications. Many regular NoC architectures have been proposed to eliminate the communication bottlenecks of traditional bus-based networks. ...

 Highlights 

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0 39  •  Get Access

October 2012

A low-overhead interconnect architecture for virtual reconfigurable fabrics

 [Aaron Landy](#),  [Greg Stitt](#)

CASES '12: Proceedings of the 2012 international conference on Compilers, architectures and synthesis for embedded systems • October 2012, pp 111–

120 • <https://doi.org/10.1145/2380403.2380427>

Field-programmable gate arrays (FPGAs) have been widely shown to have significant performance and power advantages compared to microprocessors and graphics-processing units (GPUs), but remain a niche technology due in part to productivity challenges. ...

 Highlights 

Feedback

 
13 292  •  Get Access

April 2009

An optimal wake-up scheduling algorithm for minimizing energy consumption while limiting maximum delay in a mesh sensor network

 [Reuven Cohen](#),  [Boris Kapchits](#)

IEEE/ACM Transactions on Networking (TON) (TON), Volume 17, Issue 2 • April 2009, pp 570–581 • <https://doi.org/10.1109/TNET.2009.2014656>

This paper presents an algorithm for maximizing the lifetime of a sensor network while guaranteeing an upper bound on the end-to-end delay. We prove that the proposed algorithm is optimal and requires simple computing operations that can be implemented ...

 Highlights 

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12 381

  •  Get Access

june 2011

Restoration measurements on an IP/MPLS backbone: the effect of fast reroute on link failure

 [Gomathi Ramachandran](#),  [Len Ciavattone](#),  [Al Morton](#)

IWQoS '11: Proceedings of the Nineteenth International Workshop on Quality of Service • June 2011,
Article No.: 38, pp 1–6

In this paper we show data plane restoration measurements for restoration under backbone link failures for a large network with IP/MPLS OSPF routing and also for the same backbone with Traffic Engineering (TE) and Fast Reroute (FRR) deployed. Our study ...

 Highlights 

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0 56

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1 2 3 >

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Bibliographic Data

Application No: 17/377,223

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

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/RODERICK TOLENTINO/

Examiner's Signature

Initials

Title:

Mutually secure optical data network and method

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APPLICANTS

INVENTORS

Joseph L. Vilella, San Diego, CA, UNITED STATES

CONTINUING DATA

This application is a CON of 17128042 12/19/2020 PAT 11070898

17128042 is a CON of 16600302 10/11/2019 PAT 10904649

16600302 is a CON of 16431602 06/04/2019ABN

16431602 is a CIP of 15351315 11/14/2016ABN

15351315 is a CIP of 14419092 02/02/2015ABN

14419092 is a 371 of PCT/US2013/053389 08/02/2013

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	13029234	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/09 04:11 PM
L2	974	(virtual near2 "routing table")	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:11 PM
L3	14	(virtual near2 "routing table" with packets with (tag tagged Id identifier))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:12 PM
L4	8	(virtual near2 "routing table" with packets with (tag tagged Id identifier) with destination)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:16 PM
L5	9	(virtual near2 "routing table" with packets with extract\$3)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:22 PM
L6	3	(virtual near2 "routing table" with packets with common near4 feed)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:23 PM
L7	0	(virtual near2 "routing table" with packets near3 ignor\$3)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:24 PM
L8	3	(virtual near2 "routing table" with packets near3 intended)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:24 PM
L9	1478	L1 and (ethernet with frame with MAC same packet)	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/09 04:39 PM
L10	2351	L1 and (ethernet with frame with MAC same packet)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:39 PM
L11	1016	L1 and (ethernet with frame with "MAC address" same packet)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:39 PM
L12	8	L1 and (ethernet with ignor\$3 with "MAC address" same packet)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/09 04:40 PM
L13	0	("80115221").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/07/13 11:44 AM
L14	1	("8011522").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/07/13 11:44 AM
L15	974	(virtual near2 "routing table")	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/13 01:21 PM
L16	3	(virtual near2 "routing table" with optical)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/13 01:22 PM
L17	11	(virtual near2 "routing table" same optical)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/13 01:22 PM
L18	254	(virtual near2 "routing	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/13

10/26/2022 04:30:28 PM
Workspace: Case 17377223

Page 1 of 9
RT

L19	41	table" with routers) (virtual near2 "routing table" with routers)	EPO) (US-PGPUB; USPAT; EPO)	OR	OFF	OFF	01:22 PM 2020/07/13
L20	13029234	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	01:23 PM 2020/07/13
L21	0	L20 and ("Passive optical network") with "virtual routers"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	02:33 PM 2020/07/13
L22	0	L20 and ("Passive optical network") same "virtual routers"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	02:33 PM 2020/07/13
L23	5	L20 and ("Passive optical network") and "virtual routers"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	02:36 PM 2020/07/13
L24	0	L20 and ("Passive optical network" PON) same "virtual routers"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	02:36 PM 2020/07/13
L25	0	L20 and ("Passive optical network" PON) same (virtual near3 routing near3 table)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	02:38 PM 2020/07/13
L26	263	L20 and ("Passive optical network" PON) same "MAC address"	(US-PGPUB; USPAT; EPO)	OR	ON	ON	02:41 PM 2020/07/13
L27	58	L20 and ("Passive optical network" PON) same "MAC address" with table	(US-PGPUB; USPAT; EPO)	OR	ON	ON	02:56 PM 2020/07/13
L28	0	L20 and ("Passive optical network" PON) same "MAC address" with routing near2 table	(US-PGPUB; USPAT; EPO)	OR	ON	ON	02:57 PM 2020/07/13
L29	12	L20 and ("Passive optical network" PON) with routing near2 table	(US-PGPUB; USPAT; EPO)	OR	ON	ON	03:16 PM 2020/07/13
L30	2	L20 and ("Passive optical network" PON) with routing near2 tables	(US-PGPUB; USPAT; EPO)	OR	ON	ON	03:21 PM 2020/07/13
L31	0	L20 and ("Passive optical network" PON) same packets near4 routing near2 tables	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	03:22 PM 2020/07/13
L32	2	L20 and ("Passive optical network" PON) and packets near4 routing near2 tables	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	03:32 PM 2020/07/13
L33	5	L20 and (virtual near2 "routing tables" same ethernet)	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	03:33 PM 2020/07/13
L34	3	L20 and (virtual near2 "routing tables" same MAC)	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	03:34 PM 2020/07/13
L34							03:36 PM 2020/07/13

10/26/2022 04:30:28 PM
Workspace: Case 17377223

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RT

L35	5	L20 and (virtual near2 "routing tables" near4 devices)	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/13 03:44 PM
L36	0	L20 and ("Passive optical network") same routing near3 tables same virtual	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/13 03:49 PM
L37	0	L20 and ("Passive optical network" PON) same routing near3 tables same virtual	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/13 03:50 PM
L38	3	L20 and ("Passive optical network" PON) same tables same virtual	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/13 03:51 PM
L39	13029289	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/14 10:46 AM
L40	100	L39 and ("virtual routing table")	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/14 10:46 AM
L41	49	L39 and ("virtual routing tables")	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/14 10:47 AM
L42	10	L39 and ("virtual routing tables") and "mac address"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/14 10:50 AM
L43	0	L39 and ("virtual routing tables" same (PON optical))	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/14 10:51 AM
L44	0	L39 and ("virtual routing tables") and PON	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/14 10:51 AM
L45	0	L39 and ("virtual routing tables") and (passive near3 optical)	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/14 10:51 AM
L46	0	L39 and ("virtual routing tables") and PON	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/07/14 10:52 AM
L47	16	L39 and ("virtual routing tables" with router)	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/07/14 10:53 AM
L48	13030025	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/23 08:34 AM
L49	22	L48 and ("virtual routing tables") and MPLS	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/23 08:34 AM
L50	0	L48 and ("virtual routing tables" same MPLS with traffic)	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/23 08:36 AM
L51	75	L48 and ("virtual routing tables" VRF) same MPLS with traffic)	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/23 08:37 AM
L52	79	L48 and ("virtual routing tables" VRF) same MPLS with traffic)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 08:38 AM
L53	49	L48 and ("virtual routing tables" VRF) with MPLS with traffic)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 08:38 AM

L54	114	L48 and ("virtual routing tables" VRF) with MPLS with (packets traffic))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 08:38 AM
L55	8	L48 and ("virtual routing tables" VRF) with MPLS with (packets traffic) same ethernet)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 08:46 AM
L56	1	L48 and ("virtual routing tables" VRF) with MPLS with (packets traffic) same supported)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 08:49 AM
L57	29	L48 and ("virtual routing tables" VRF) with MPLS with (packets traffic) with route)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 08:50 AM
L58	18	L48 and ("virtual routing tables" VRF) with MPLS with (packets traffic) with private)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 08:59 AM
L59	0	L48 and ("virtual routing tables" VRF) with MPLS with (packets traffic) with route) and ONU	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 09:42 AM
L60	11	L48 and ("virtual routing tables" VRF) with MPLS with (packets traffic) with route) and optical	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 09:44 AM
L61	2	L48 and ("virtual routing tables" VRF) with MPLS with (packets traffic) with route) and uplink	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/23 09:45 AM
L62	13030025	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/24 07:31 AM
L63	31	L62 and (MPLS with OLT and ONU)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:31 AM
L64	23	L62 and (MPLS with OLT same ONU)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:32 AM
L65	0	L62 and (MPLS with OLT same ONU same splitter)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:32 AM
L66	14	L62 and (MPLS with OLT same ONU same (traffic packet packages))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:41 AM
L67	2	L62 and (MPLS with OLT same ONUs same	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/24 07:44 AM

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L68	0	(traffic packet packages)) L62 and (MPLS with OLT same ONU same (traffic packet packages) same destinatio)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:45 AM
L69	2	L62 and (MPLS with OLT same ONU same (traffic packet packages) same destination)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:46 AM
L70	0	L62 and (MPLS with OLT same ONU same (traffic packet packages) same aggregat\$4)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:48 AM
L71	0	L62 and (MPLS with OLT same ONU same aggregat\$4)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:48 AM
L72	2	L62 and (MPLS with OLT same aggregat\$4)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:49 AM
L73	0	L62 and (MPLS with OLT same combin\$3 with (feed stream))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/24 07:50 AM
L74	13030025	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/25 08:23 AM
L75	6	L74 and ((PON "passive optical network") same uplink same router same users)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/25 08:23 AM
L76	13030025	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/25 12:00 PM
L77	86	L76 and (optical near3 splitter with replicat\$3)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/25 12:00 PM
L78	3	L76 and (optical near3 splitter with replicat\$3 with (feed traffic stream))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/25 12:12 PM
L79	13030025	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/26 06:51 AM
L80	0	L79 and (MPLS with ONUs with splitter with common)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 06:51 AM
L81	0	L79 and (MPLS with ONUs with splitter with (stream feed traffic))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 06:52 AM
L82	0	L79 and (MPLS with ONUs with splitter same (stream feed traffic))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 06:58 AM
L83	0	L79 and (MPLS same ONUs with splitter with (stream feed traffic))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 06:59 AM

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L84	140	L79 and (splitter with common with (stream feed traffic))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 06:59 AM
L85	0	L79 and (splitter with common with (stream feed traffic) with replicat\$3)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 06:59 AM
L86	0	L79 and (splitter with common with (stream feed traffic) with tags)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:01 AM
L87	0	L79 and (optical near3 splitter with (stream feed traffic) with MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:03 AM
L88	0	L79 and (optical near3 splitter with MPLS with extract\$3)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:05 AM
L89	0	L79 and (optical near3 splitter with MPLS with ONUs)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:08 AM
L90	0	L79 and (optical near3 splitter with replicat\$3 with ONUs)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:10 AM
L91	0	L79 and (optical near3 splitter near6 MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:11 AM
L92	903	L79 and (optical near3 splitter near6 ONUS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:12 AM
L93	0	L79 and (optical near3 splitter near6 ONUS with MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:12 AM
L94	0	L79 and (optical near3 splitter near6 ONUS same MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:12 AM
L95	0	L79 and (splitter near6 ONUS with MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:12 AM
L96	0	L79 and (splitter near6 ONUS same MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:12 AM
L97	6	L79 and (splitter with MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:13 AM
L98	119	L79 and (splitter with ONUs with (stream feed traffic))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:14 AM
L99	0	L79 and (splitter with ONUs with (stream feed traffic) with extract\$3)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:14 AM
L100	0	L79 and (splitter with ONUs with (stream feed traffic) with tag)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:14 AM
L101	32	L79 and (splitter with ONUs with (stream feed traffic) with filter\$3)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:15 AM
L102	0	L79 and (splitter with MPLS near3 (tag	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:18 AM

L103	0	tagged)) L79 and (splitter same MPLS near3 (tag tagged))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:18 AM
L104	8140	L79 and (splitter same users)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:19 AM
L105	0	L79 and (splitter same MPLS same users)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:19 AM
L106	0	L79 and (ONUS with (tag tagged) with MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:22 AM
L107	0	L79 and (ONU with (tag tagged) with MPLS)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:22 AM
L108	13030025	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2020/10/26 07:26 AM
L109	566	L108 and (splitter with replicat\$3)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:26 AM
L110	37	L108 and (splitter with replicat\$3 with (stream feed traffic))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:26 AM
L111	2	L108 and (splitter with replicat\$3 with (stream feed traffic)) and "passive optical network"	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2020/10/26 07:27 AM
L112	1	("20080212598").PN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2020/10/26 08:27 AM
L119	13030637	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2021/02/22 09:00 AM
L120	3390	L119 and (H04Q11/0067 H04B10/27 H04L63/0414 H04Q2011/0073 H04Q2011/0086).cpc.	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:00 AM
L121	0	L119 and (secure with optical near3 network).ti,ab. and (optical near3 network\$3 same virtual near6 table)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:03 AM
L122	4	(secure with optical near3 network).ti,ab. and (optical near3 network\$3 same virtual near6 table)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:04 AM
L123	4	(secure with optical near3 network).ti,ab. and (optical near3 network\$3 same (routing forward\$3 virtual) near6 table)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:04 AM
L124	4	(secure with optical	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22

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L125	4	near3 network).ti,ab. and (optical near3 network\$3 same (routing forward\$3) with virtual)	EPO)				09:05 AM
		(secure with optical near3 network).ti,ab. and (optical near3 network\$3) and ((routing forward\$3) with virtual).clm.	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:06 AM
L126	8	(secure with optical near3 network).ti,ab. and (optical near3 network\$3) and ((routing forward\$3) with virtual).clm.	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:06 AM
L127	8135	L119 AND (H04Q11/0067 H04Q2011/0073 H04L47/2416 H04L63/0272).CPC.	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:07 AM
L128	0	L127 and (secure with optical near3 network) same ((routing forward\$3) with virtual)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:08 AM
L129	1	L127 and (secure with optical near3 network) and ((routing forward\$3) with virtual)	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/02/22 09:08 AM
L130	13031050	@ad<"20120802"	(US-PGPUB; USPAT; EPO)	OR	OFF	OFF	2021/06/07 09:48 PM
L131	8137	L130 AND (H04Q11/0067 H04Q2011/0073 H04L47/2416 H04L63/0272).CPC.	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/06/07 09:48 PM
L132	1	L131 and (secure with optical near3 network) and ((routing forward\$3) with (virtually virtual))	(US-PGPUB; USPAT; EPO)	OR	ON	ON	2021/06/07 09:48 PM
L133	2	("11070898").pn.	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/10/03 10:47 AM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N113	0	(ONU and VRF and MPLS).clm.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/11/17 02:21 PM
N114	0	(ONU and VRF and OIT).clm.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/11/17 02:21 PM
N115	0	(ONU and VRF and (packet package)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/17 02:22 PM

10/26/2022 04:30:29 PM
Workspace: Case 17377223

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N116	19	(ONU and Virtual and forward\$3 and (packet package)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/17 02:23 PM
N117	0	(ONU and Virtual and forward\$3 and (feed stream)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/17 02:23 PM
N118	42	(ONU and Virtual and forward\$3 and optical).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/17 02:23 PM
N133	10	(ONU and replicat\$3 and (virtual virtually)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2021/06/07 09:47 PM

Application Number * 17/377,223 *	Application/Control No. 17/377,223	Applicant(s)/Patent under Reexamination Vilella, Joseph L.	
	Examiner TOLENTINO, RODERICK	Art Unit 2439	
Document Code - DISQ		Internal Document - DO NOT MAIL	

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed: <u>25 October 2022</u>	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:
/JEAN PROCTOR/ Technology Center: <u>OPLC</u> Telephone: <u>(571)272-1040</u> _____

Locket Number (Optional)

Application No.: 17377223

For: Mutually secure optical data network and method

any terminal disclaimer," in the event that said prior patent later expires for failure to pay a maintenance fee;

is found invalid by a court of competent jurisdiction; is statutorily discriminated in whole or terminally discriminated under 37 CFR 1.324; has all claims canceled by a reexamination certificate; is reassued; or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

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Signature

Date 10-23-22

Joseph L. Vilella
Typed or printed name

Inventor
Title

619-884-8360
Telephone Number

☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

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Electronic Patent Application Fee Transmittal				
Application Number:		17377223		
Filing Date:		15-Jul-2021		
Title of Invention:		Mutually secure optical data network and method		
First Named Inventor/Applicant Name:		Joseph L. Vilella		
Filer:		Joseph L. Vilella		
Attorney Docket Number:				
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	170	170
Total in USD (\$)				170

Electronic Acknowledgement Receipt	
EFS ID:	46891973
Application Number:	17377223
International Application Number:	
Confirmation Number:	4494
Title of Invention:	Mutually secure optical data network and method
First Named Inventor/Applicant Name:	Joseph L. Vilella
Customer Number:	175346
Filer:	Joseph L. Vilella
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	25-OCT-2022
Filing Date:	15-JUL-2021
Time Stamp:	20:48:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 170
RAM confirmation Number	E20220OK53121786
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer Filed	TerminalDisclaimer17377223pr intedrotated.pdf	907518	no	1
			0500a053ab126a404115b6d0b1b8ba4b29 75ebf5		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37705	no	2
			825687875e2fd121f9eeef90aa59484a2d11 f860		
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/377,223	07/15/2021	Joseph L. Vilella	

CONFIRMATION NO. 4494
PUBLICATION NOTICE

175346
Joseph L. Vilella
2031 Second Avenue
San Diego, CA 92101



OC000000129599649

Title:Mutually secure optical data network and method

Publication No.US-2021-0345026-A1

Publication Date:11/04/2021

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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
17/377,223	07/15/2021	2636	830		3	1

CONFIRMATION NO. 4494
FILING RECEIPT



0000000127298833

175346
Joseph L. Vilella
2031 Second Avenue
San Diego, CA 92101

Date Mailed: 07/28/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

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Inventor(s)

Joseph L. Vilella, San Diego, CA;

Applicant(s)

Joseph L. Vilella, San Diego, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 17/128,042 12/19/2020 PAT 11070898
which is a CON of 16/600,302 10/11/2019 PAT 10904649
which is a CON of 16/431,602 06/04/2019 ABN
which is a CIP of 15/351,315 11/14/2016 ABN
which is a CIP of 14/419,092 02/02/2015 ABN
which is a 371 of PCT/US2013/053389 08/02/2013
which claims benefit of 61/678,977 08/02/2012

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: 07/28/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/377,223**

Projected Publication Date: 11/04/2021

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Mutually secure optical data network and method

Preliminary Class

398

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

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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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 U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

page 3 of 4

technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 17/377,223				
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	80		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	350		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	3	minus 20 = *	x 50 =	0.00	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *	x 240 =	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				
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.										

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.

UTILITY PATENT APPLICATION TRANSMITTAL (Only for new nonprovisional applications under 37 CFR 1.53(b))		Attorney Docket No.	
		First Named Inventor Joseph L Vilella	
		Title Mutually secured optical data network and method	
		Priority Mail Express® Label No. EFS-Web	

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.		Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450																	
1. ☒ Fee Transmittal Form (PTO/SB/17 or equivalent) 2. ☒ Applicant asserts small entity status. See 37 CFR 1.27 3. ☐ Applicant certifies micro entity status. See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent. 4. ☒ Specification [Total Pages <u>15</u>] Both the claims and abstract must start on a new page. (See MPEP § 608.01(a) for information on the preferred arrangement) 5. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets <u>6</u>] 6. Inventor's Oath or Declaration [Total Pages <u>1</u>] (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e)) a. ☐ Newly executed (original or copy) b. ☒ A copy from a prior application (37 CFR 1.63(d)) 7. ☒ Application Data Sheet * See note below. See 37 CFR 1.76 (PTO/AIA/14 or equivalent) 8. CD-ROM or CD-R in duplicate, large table, or Computer Program (Appendix) ☐ Landscape Table on CD 9. Nucleotide and/or Amino Acid Sequence Submission (if applicable, items a. – c. are required) a. ☐ Computer Readable Form (CRF) b. ☐ Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ Paper c. ☐ Statements verifying identity of above copies		ACCOMPANYING APPLICATION PAPERS 10. ☐ Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 11. ☐ 37 CFR 3.73(c) Statement ☐ Power of Attorney (when there is an assignee) 12. ☐ English Translation Document (if applicable) 13. ☐ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☐ Copies of citations attached 14. ☐ Preliminary Amendment 15. ☐ Return Receipt Postcard (MPEP § 503) (Should be specifically itemized) 16. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed) 17. ☐ Nonpublication Request Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 18. ☐ Other: _____ _____ _____ _____																	
*Note: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 must be included in an Application Data Sheet (ADS). (2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).																			
19. CORRESPONDENCE ADDRESS																			
☒ The address associated with Customer Number: <u>175346</u> OR ☐ Correspondence address below																			
<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td colspan="2">Name</td><td colspan="2"></td></tr><tr><td colspan="2">Address</td><td colspan="2"></td></tr><tr><td>City</td><td>State</td><td>Zip Code</td><td></td></tr><tr><td>Country</td><td>Telephone</td><td>Email</td><td></td></tr></table>				Name				Address				City	State	Zip Code		Country	Telephone	Email	
Name																			
Address																			
City	State	Zip Code																	
Country	Telephone	Email																	
Signature		Date																	
/Joseph L Vilella/		2021-07-15																	
Name (Print/Type)		Registration No. (Attorney/Agent)																	
Joseph L Vilella																			

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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.

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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	Mutually secure optical data network and method
-------------------------------	---

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.

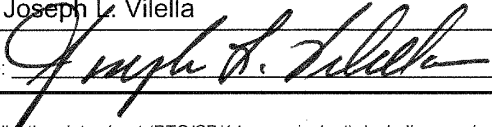
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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: Joseph L. Vilella Date (Optional): 10/11/2019

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 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.

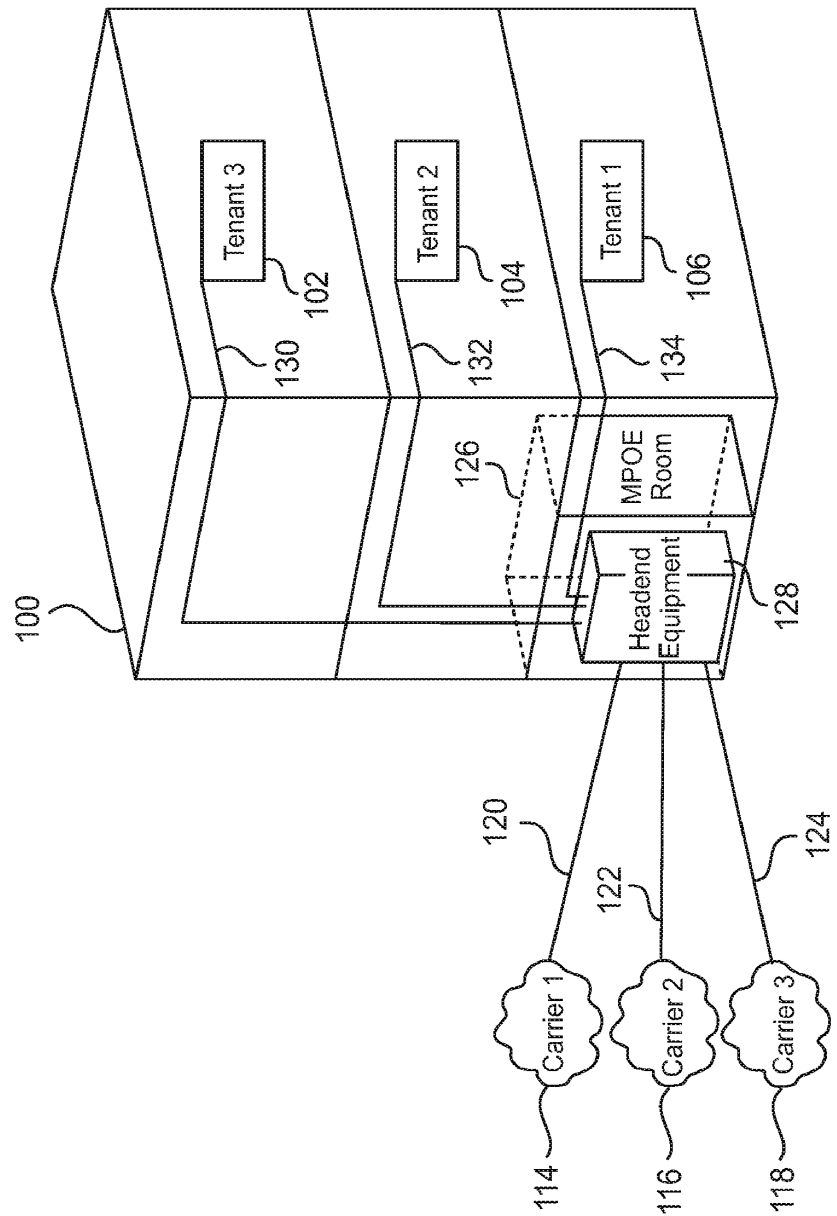


FIG. 1

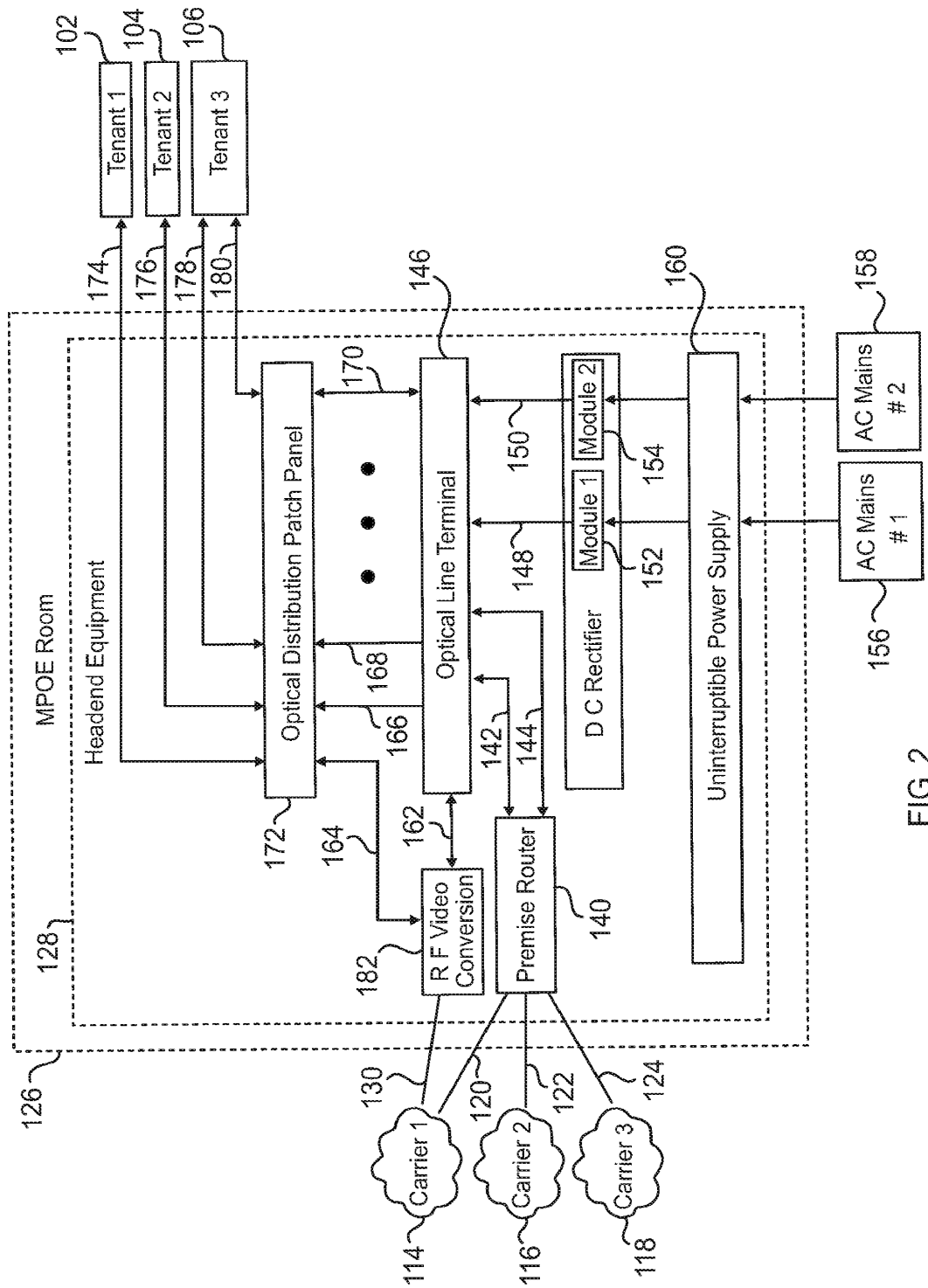


FIG. 2

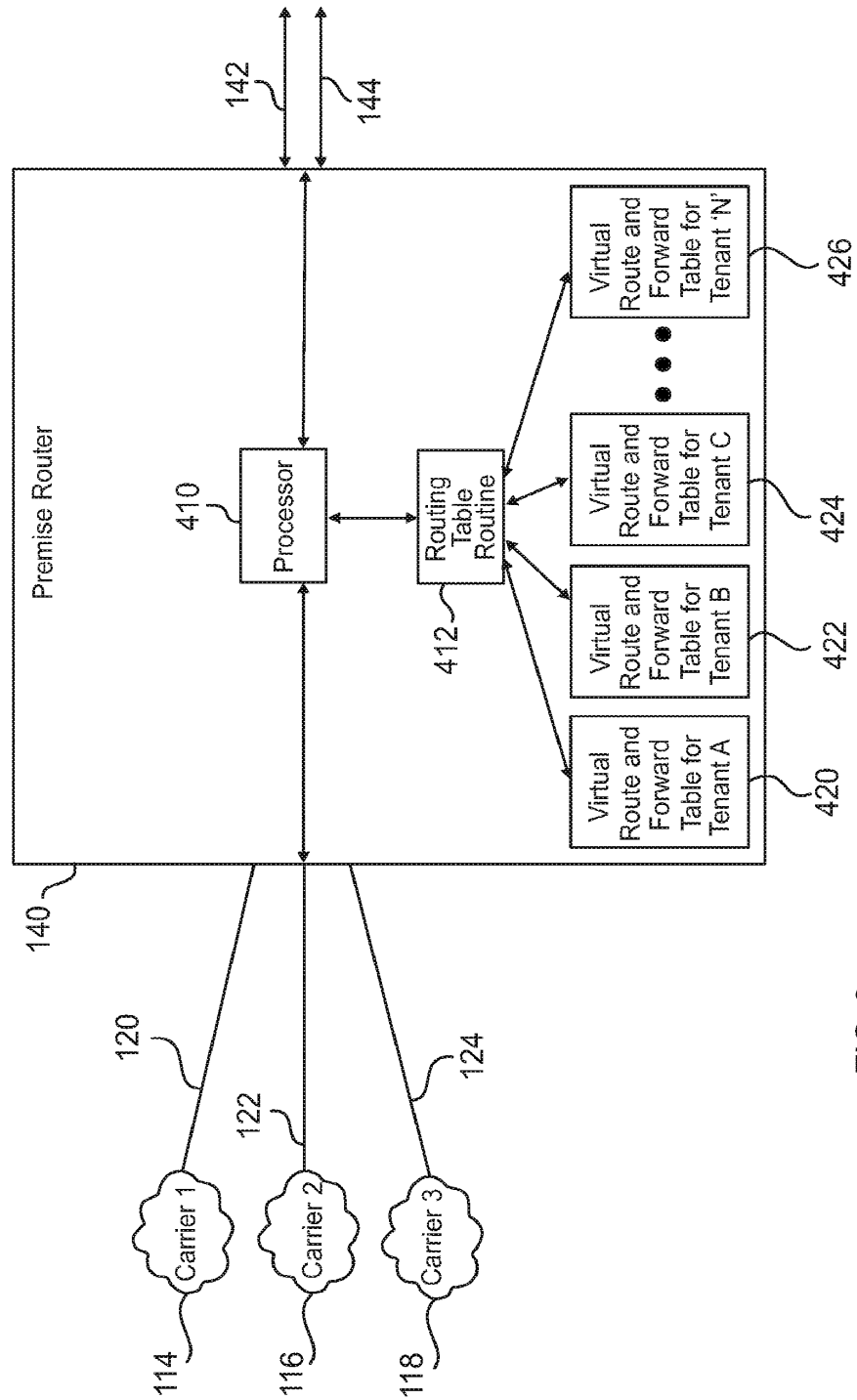
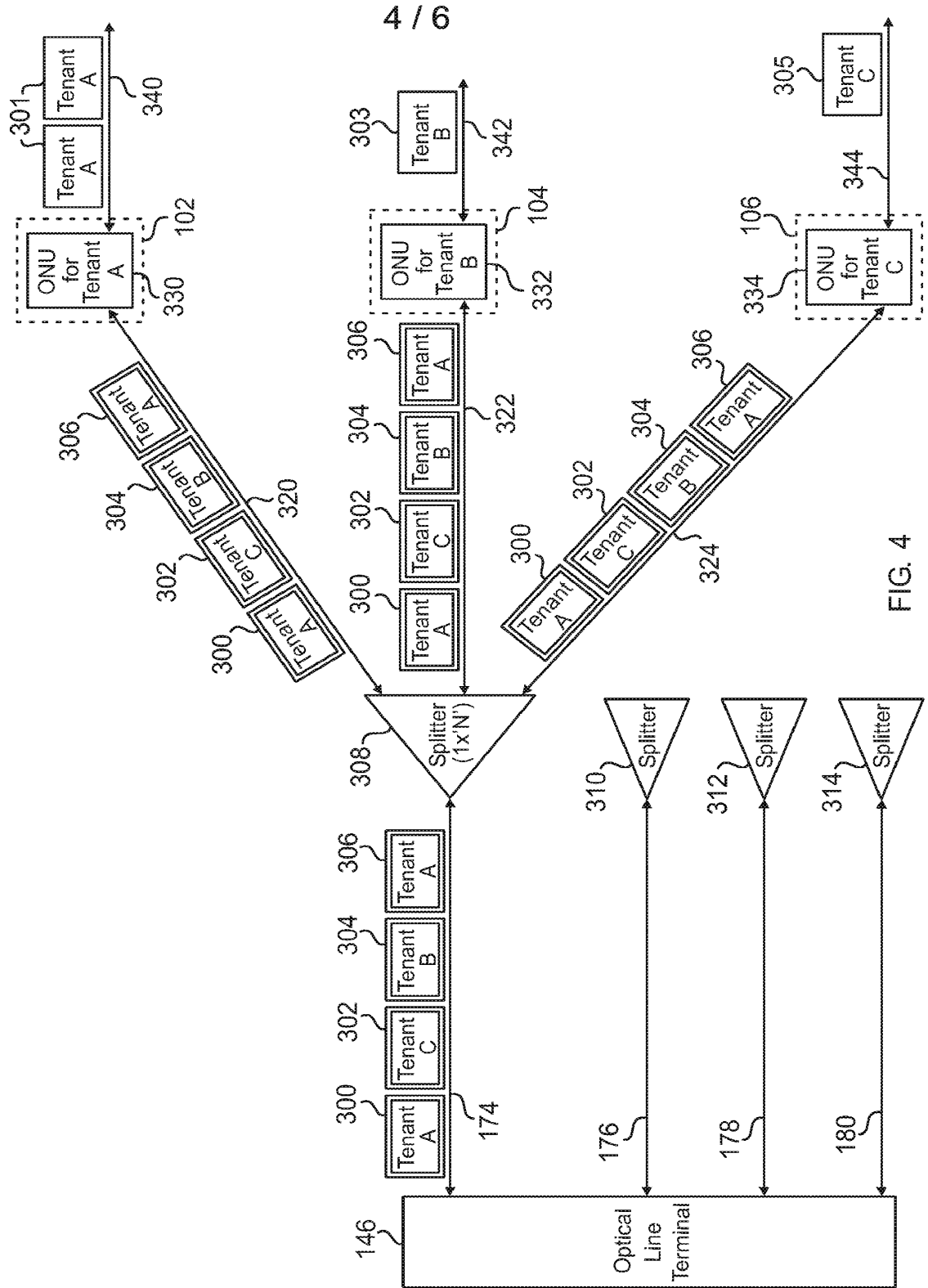


FIG. 3



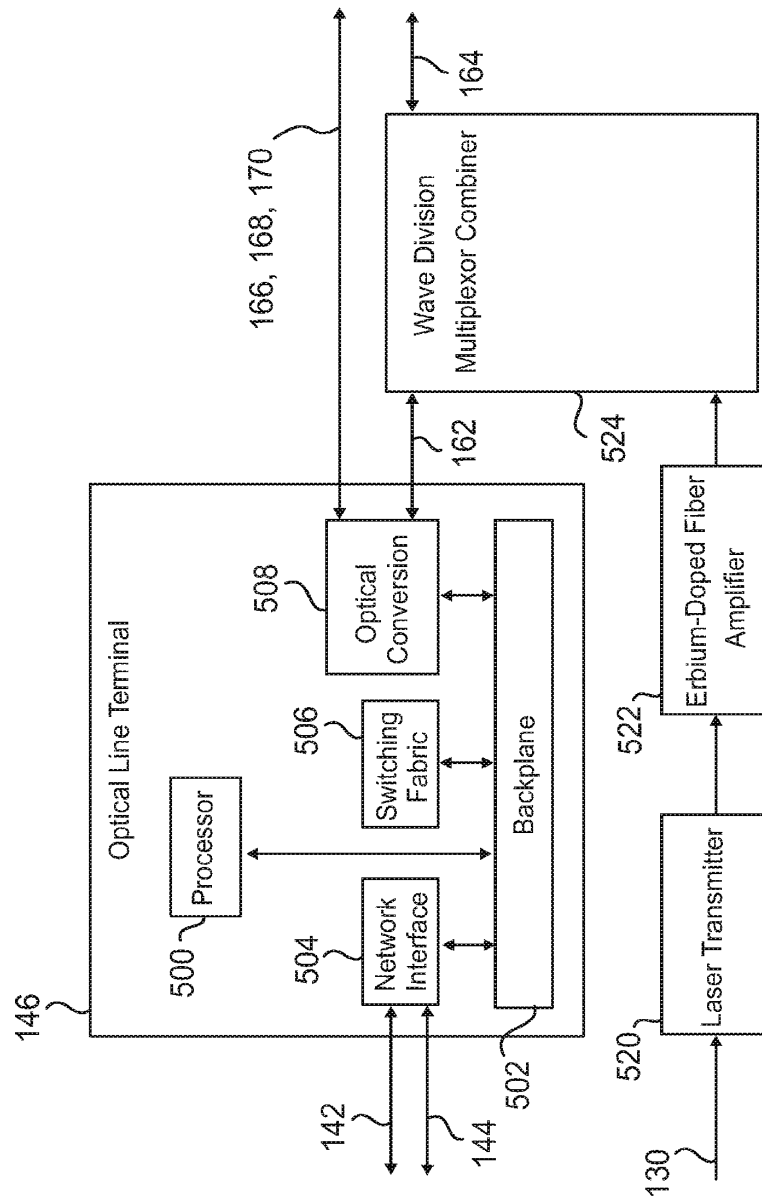


FIG. 5

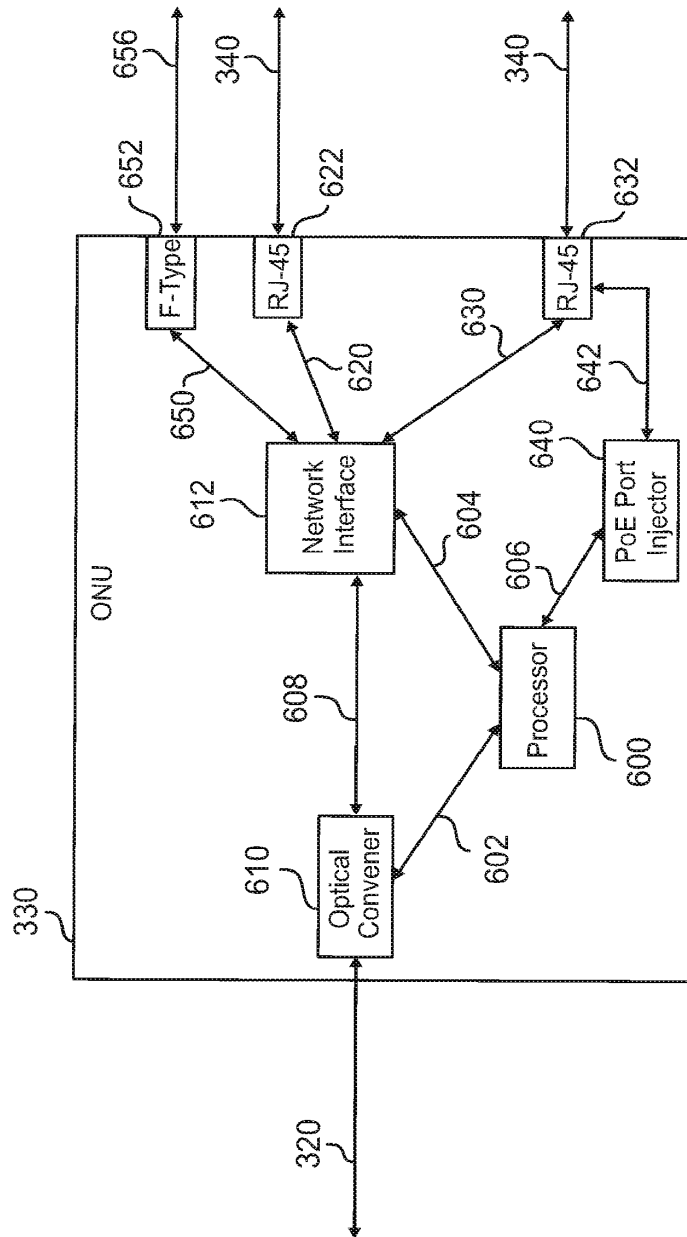


FIG. 6

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		Mutually secure optical data network and method		
First Named Inventor/Applicant Name:		Joseph L. Vilella		
Filer:		Joseph L. Vilella		
Attorney Docket Number:				
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	80	80
UTILITY SEARCH FEE	2111	1	350	350
UTILITY EXAMINATION FEE	2311	1	400	400
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 (\$)				830

Electronic Acknowledgement Receipt	
EFS ID:	43265486
Application Number:	17377223
International Application Number:	
Confirmation Number:	4494
Title of Invention:	Mutually secure optical data network and method
First Named Inventor/Applicant Name:	Joseph L. Vilella
Customer Number:	175346
Filer:	Joseph L. Vilella
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	15-JUL-2021
Filing Date:	
Time Stamp:	19:33:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$830
RAM confirmation Number	E20217EJ37033164
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WebADS.pdf	134346	no	8
			fe74daea9f2b4859055c8840d55671382baa4708		
Warnings:					
Information:					
2	Transmittal of New Application	Utility_Application_Transmittal.pdf	355017	no	2
			7b44e6022896ca5bf1fea3630be7dade439a6faf		
Warnings:					
Information:					
3	Oath or Declaration filed	Vilella_16600302_Continuation_Oath.pdf	95355	no	1
			43be14b603cd82601a7701fb6fee297157c4105c		
Warnings:					
Information:					
4	Specification	Specification_File.pdf	145246	no	15
			7f2f8faf1ee9d0c1304e826f65d1b3c02df662e1		
Warnings:					
Information:					
5	Drawings-only black and white line drawings	Vilella_16600302_Continuation_Drawings.pdf	190631	no	6
			ed1s26a442bd290409b5b2faf0840fa70b4204cbd		
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	34769	no	2
			53183cd8f23de8e9732438c8eb1a812cb64f7c7d		
Warnings:					
Information:					

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 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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	
		Application Number	
Title of Invention	Mutually secure optical data network and method		
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				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Joseph	L.	Vilella	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	San Diego	State/Province	CA	Country of Residence ⁱ US
Mailing Address of Inventor:				
Address 1	Spada Innovations, Inc.			
Address 2	2031 Second Avenue			
City	San Diego	State/Province	CA	
Postal Code	92101	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	175346		
Email Address	joevilella@gmail.com	Add Email	Remove Email

Application Information:

Title of the Invention	Mutually secure optical data network and method		
Attorney Docket Number		Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	
		Application Number	
Title of Invention	Mutually secure optical data network and method		

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

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.

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						
Prefix	Given Name	Middle Name	Family Name	Suffix	Remove	
Registration Number						
Prefix	Given Name	Middle Name	Family Name	Suffix	Remove	
Registration Number						
Additional Representative Information blocks 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	
		Application Number	
Title of Invention	Mutually secure optical data network and method		

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		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	17128042	2020-12-19		
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17128042	Continuation of	16600302	2019-10-11	10904649	2021-01-26
Prior Application Status		Abandoned		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
16600302	Continuation of	16431602	2019-06-04		
Prior Application Status		Abandoned		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
16431602	Continuation in part of	15351315	2016-11-14		
Prior Application Status		Abandoned		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
15351315	Continuation in part of	14419092	2015-02-02		
Prior Application Status		Expired		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
14419092	a 371 of international	PCT/US2013/053389	2013-08-02		

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	
		Application Number	
Title of Invention	Mutually secure optical data network and method		

Prior Application Status			
Expired	Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/US2013/053389	Claims benefit of provisional	61678977	2012-08-02
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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) 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	Filing Date (YYYY-MM-DD)	Access Code ¹ (if applicable)
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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.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	
		Application Number	
Title of Invention	Mutually secure optical data network and method		

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.

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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.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	
		Application Number	
Title of Invention	Mutually secure optical data network and method		

Applicant Information:

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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		
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	
		Application Number	
Title of Invention	Mutually secure optical data network and method		

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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. ☐				
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	
		Application Number	
Title of Invention	Mutually secure optical data network and method		

Signature:

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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 L. Vilella/			Date (YYYY-MM-DD)	
First Name	Joseph	Last Name	Vilella	Registration Number	
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Mutually secure optical data network and method

Prior Application

This is a continuation of co-pending US Patent Application Serial No. 17128042, filed 2020-12-19, which is a continuation of US Patent Application Serial No. 16600302, filed 2019-10-11, now US Patent No. 10904649, issued 2021-01-26, which is a continuation of pending US Patent Application Serial No. 16431602, filed 2019-06-04, which is a continuation-in-part of US Patent Application Serial No. 15351315, filed 2016-11-14, which is a continuation-in-part of US Patent Application Serial No. 14419092, filed 2015-02-02, which is a 371 of International Application Serial No. PCT/US2013/053389, filed 2013-08-02, which claims the benefit of U.S. Provisional Patent Application Serial No. 61678977, filed 2012-08-02 all of which are incorporated herein by reference.

Field of the Invention

The instant invention relates to computer networks and more particularly to optical data network traffic routing to multiple users in a local area.

Background

Nowadays a wide variety of entities are moving towards the use of Passive Optical Networks (“PON”) and benefit from the interconnectivity provided by local and wide area networks, and connection to the Internet. Many entities depending on their purpose have many types of devices connected to the network including personal computers, wireless controllers, application servers, printers, scanners, ambient control systems, security cameras and sensors, phone systems, gaming consoles and television sets. The digital signals carried by the PON include converged voice, data and video signal content traffic.

Many individual and business users send and receive digital information which is intended to remain private and can be confidential to the individual users. Such users can be businesses located in the same office building as co-tenants, guests located in a hotel, users located in a commercial, local, state, federal or similar entity, subscribers in a residential entity such as owners or tenants. In the past, reasonable privacy and security can be accomplished by each user connecting directly to a secure service provider carrier using a dedicated headend located in the entity space including a modem, workgroup switches and routing equipment. This equipment typically requires its own cooling equipment. Often the connection throughout the

local network and to the carrier is through copper wiring which, due to its electrical resistance, can generate additional heat requiring cooling. All this equipment and cooling capability is often multiplied by the number of individual tenants in a building, leading to high power consumption.

A typical limiting factor using copper wiring for digital connection lines is bandwidth. Thus, a particular business tenant may elect to upgrade its individual local network and its connection to the carrier using high bandwidth equipment. Increasing the bandwidth often requires additional copper wiring, and more air conditioning.

With the development of optical fiber technology, photonic networks which are typically referred to as Passive Optical Networks can deliver significantly higher bandwidth and lower power consumption. This need for increased speed and sustainability by reduced power consumption has promoted the accelerated adoption of PON in most commercial and residential sectors.

The higher available bandwidth has led to network designs where one or more PON interface routers can distribute data streams to a multiplicity of users through an Optical Line Terminal ("OLT"). Further, this can eliminate the need for a dedicated router for each user. Unfortunately however, this creates an increased cyber-security risk for all those users connected to the PON interface routers since the global routing table can be surreptitiously accessed by a nefarious user, or some cyber-entity mimicking a user on the PON.

The instant invention results from efforts to provide an improved passive optical networking system that addresses one or more of the above problems.

Summary

The primary and secondary objects of the invention are to provide an improved optical networking system. These and other objects are achieved by providing an optical network interface router including at least one virtual routing table for each of a plurality of optical network units to which the interface router is connected.

In some embodiments there is provided a multi-user optical data network apparatus comprises: a plurality of network service carrier lines connected to a passive optical network interface router; at least one uplink connecting said interface router to an optical line terminal; said optical line terminal being connected to a number of passive optical network feeds for carrying a common data feed to a plurality of optical network units each supporting at least one of a plurality of private user devices; said interface router being configured to have at least one

virtual routing table for each one of said plurality of optical network units; and, wherein each of said optical network units is adapted to extract data packets intended for a supported one of said devices.

In some embodiments said interface router is a premise router.

In some embodiments said interface router is further configured to have a routing table routine generating said at least one virtual routing table for each one of said plurality of optical network units.

In some embodiments each of said optical network units provides service to a separate number of private users.

In some embodiments said uplink carries data including digitized voice and video data.

In some embodiments there is provided a multi-user optical data network apparatus comprises: a plurality of network service carrier lines connected to a plurality of passive optical network interface routers; a plurality of uplinks connecting said interface routers to an optical line terminal; said optical line terminal being connected to a number of passive optical network feeds for carrying a common data feed to a plurality of optical network units each supporting at least one of a plurality of private user devices; wherein each of said interface routers is configured to have at least one virtual routing table for each one of said plurality of optical network units to which said each of said interface routers is connected; and, wherein each of said optical network units is adapted to extract data packets intended for a supported one of said devices.

In some embodiments there is provided a digital data network communication method comprises: accepting a plurality of private data streams into a passive optical network interface router serving a plurality of private users through a plurality of optical network units; aggregating said private data streams into a combined data feed; routing said data feed to at least two of said plurality of optical network units; extracting from said data feed a first one of said private data streams; wherein said routing comprises: generating an independently unique virtual routing table for each of said plurality of optical network units; tagging ethernet frames intended for a first one of said plurality of optical network units according to entries in a first one of said virtual routing tables associated with a first one of said optical network units; distributing said tagged ethernet frames according to said first one of said virtual routing tables.

In some embodiments said distributing comprises associating destinations listed in said first one of said virtual routing tables with said first one of said optical network units.

In some embodiments each of said optical network units provides service to a separate number of private users.

In some embodiments said accepting comprises: interfacing a plurality of service provider data lines through a single headend.

In some embodiments said interfacing comprises: utilizing at least one premise router and a radio frequency video converter; and, feeding an output of said at least one premise router through an optical line terminal.

In some embodiments said interfacing further comprises: feeding an output of said converter through said optical line terminal.

In some embodiments said aggregating comprises using an enterprise aggregating switch.

The text of the original claims is incorporated herein by reference as describing features in some embodiments.

Brief Description of the Drawings

Fig. 1 is a functional block diagram of several data service providers supplying multi-tenant building through a single headend according to an exemplary embodiment of the invention.

Fig. 2 is a functional block diagram of main point of entry room for the data network servicing a multi-tenant building according to an exemplary embodiment of the invention.

Fig. 3 is a functional block diagram for a premise router according to an exemplary embodiment of the invention.

Fig. 4 is a functional block diagram of an optical line terminal servicing multiple tenant users with a common data feed according to an exemplary embodiment of the invention.

Fig. 5 is a functional block diagram of an optical line terminal aggregating data and video streams into a common optical data feed according to an exemplary embodiment of the invention.

Fig. 6 is a functional block diagram of an optical network unit interfacing a tenant private network with a common optical data feed according to an exemplary embodiment of the invention.

Description of the Exemplary Embodiments

Referring now to the drawing, there is illustrated in Figs. 1 - 6 the components of a system **1** used to provide a mutually secure, shared Local Area Network (“LAN”) implementation which can supply a multi-tenant site such as an office building **100** with converged voice, data and video signal content traffic at gigabit speeds to a plurality of mutually secure end point users such as building tenants having multiple end user devices such as computers, access points and wireless controllers, application servers and printers, and television sets.

As shown in Figure 1, a single building **100** can have multiple tenants **102, 104, 106** such as individual companies, each potentially having multiple digital network devices. The system offers each tenant the ability to specify and use their own private address space even if the data feed overlaps with neighboring tenant on the same network, and the transmission of converged content traffic over the shared infrastructure while maintaining the separation and security of the individual tenant content traffic.

The system relies upon a collection of standards-based technologies that are designed and implemented to provide a point-to-multipoint networking through a single aggregation switch that is capable of providing thousands of IP voice, data, and video connection ports.

In a basic configuration, the aggregate downstream rate can be 2.5 Gbps, while the upstream rate can be 1.25 Gbps. Each of the connections can be adapted to support high-bandwidth multimedia applications on a single optical fiber over a distance of 20km or more. Telecommunications service traffic that includes Internet, public switched telephone networks, and broadcast/cable television **108, 110, 112** for the building are provided by one or more commercial carriers **114, 116, 118**. The telecommunications services carrier lines **120, 122, 124** enter the building **100** at a Main Point Of Entry (MPOE) room **126** and terminate into headend equipment **128**. From the headend equipment, the voice, video and data content traffic can be distributed to each of the tenants **102, 104, 106** over data feeds carried by fiber optic cabling **130, 132, 134**.

As shown in Figure 2, the secure, shared multi-tenant LAN architecture can include a Passive Optical Network (“PON”) interface router, which for clarity in this embodiment is a single premise router **140**, an aggregation switch referred to as an Optical Line Terminal (OLT) **146**, a plurality of end user terminal devices such as computers, telephones and televisions located within the physically separate tenant **102, 104, 106** spaces, and an optical distribution network that consists of splitters and fiber cabling infrastructure. It shall be understood that a plural number of interface routers such as premise routers can be used.

The headend equipment **128** receives the plurality of telecommunications service carrier lines **120,122,124** from the separate carrier providers **114, 116, 118**. An RF-based video signal can be supplied by one or more of the carriers to the headend equipment via a broadband coaxial cable **130**. The interface to the carrier lines within the headend equipment is the premise router **140**.

The premise router **140** can be configured with Virtual Routing and Forwarding (VRF) as described in RFC 4381 and RFC 4382, and utilizes Virtual Local Area Network (VLAN) tagging to separate and manage the distribution of the voice, video and data content traffic to each of the users. The VLAN-tagged voice, video, and data content traffic is connected to the Optical Line Terminal (OLT) **146** through an uplink **142** that provides primary communication. Optionally, a secondary uplink **144** may be employed as a backup communication path.

The OLT **146** can be powered by dual 48 VDC power feeds **148, 150** from rectifier modules **152, 154** that are attached to separate AC Mains **156, 158** through an uninterruptible power supply **160**. The OLT has a minimum of eight optical ports, but can have well over fifty such ports. Each port delivers a beam of light that contains the aggregated data for a multiplicity of users. The aggregated data may or may not be encrypted based on the type of PON.

The OLT **146** takes the VLAN-tagged voice, video, and data content traffic **142, 144** and processes each of the ethernet frames by first optionally encrypting them, then converting them into light, and outputting them as a photonic broadcast stream to the appropriate initial passive optical network feeds **162, 164, 166, 168, 170** that connects to an optical distribution patch panel **172**. The optical distribution patch panel **172** is used to provide the ability for cross-connecting the initial feeds **162, 164, 166, 168, 170** to the distribution feeds **174, 176, 178, 180** that traverse the distance to the remotely located tenants **102, 104, 106**. A tenant **106** requiring larger bandwidth can accept multiple distribution feeds **178, 180**.

In the case where a carrier provider **114** supplies an RF-based video signal **130**, the headend equipment **128** receives the RF-based video signal and converts it into light by processing the electrical analog signal and using it to modulate a laser which outputs the equivalent video photonic stream. This new video photonic stream is then combined with an initial feed **162** which results in a modified initial feed **164** that contains a photonic broadcast stream that contains the voice, video and data content traffic that is then fed into the optical distribution patch panel **172**. Of course in some instances the initial feed can contain digitized voice, video and data in which case no bypass of the OLT is necessary.

As shown in Figure 3, the premise router **140** can be the interface to each of the commercial carrier providers **114, 116, 118** through either a packet-switched or a leased-line Wide Area Network (WAN) interface in order to utilize the telecommunications services provided over carrier lines **120, 122, 124**. Logical circuits can make connections between the premise router **140** and carrier providers **114, 116, 118**, utilizing a shared-bandwidth connection that may be shared with other carrier customers and could potentially affect quality of service and bandwidth availability. The leased-line connection provides a direct interface access to the carrier and eliminates the possibility of being affected by other carrier customers. The premise router **140** can be configured to run a routing table routine **412** that accesses the virtual routing table instantiations to create virtual routing tables **420, 422, 424, 426** for each Optical Network Unit (ONU) serving a tenant. This configuration provides for creation of multiple routing tables, one for each ONU, within the single premise router **140**. This capability supports the overlapping of IP addresses for any of the tenants because the routing instances are independent. In this way, data traffic intended for one tenant is automatically isolated from traffic intended for other tenants. Furthermore, queries emanating from one tenant are identified so that one tenant cannot mimic the identity of another. In other words, unique routing for each tenant effectively isolates its traffic from other tenants, vastly improving the networks defense against cyber-attack.

Thus, the premise router processor **410** gets and puts the tenant-specific routing information through the routing table routine **412** into the appropriate virtual routing tables **420, 422, 424, 426**. The updated virtual routing tables are used to uniquely VLAN-tag the voice, video, and data content traffic that is sent and received through the uplinks **142**, to the OLT **146**.

In this way, the overlapping IP address on a single PON infrastructure allows each tenant connected to the infrastructure to transmit and receive information to any of the carriers. Thus all the tenants in a building can simply connect to the PON infrastructure without the need for their own dedicated headend.

A configuration file loaded into the premise router contains the commands to implement the virtual routing tables for each of the ONUs providing service to the tenant users. By way of example, the following pseudo-code implements independent virtual routing tables for two ONUs serving two users, namely "Tenant A" and "Tenant B". Comment lines begin with an exclamation point ("!"):

!--- Begin gateway configuration and programming

```
!--- Configure gateway identity

!--- Establish express forwarding to optimize network performance and
scalability
!--- For each tenant (1..n) Do
!--- Instantiate virtual route table for the Tenant
!--- Enable VPN (Virtual Private Network) for the Tenant
!--- Establish routing and forwarding for the virtual routing table
!--- Creates lists of import and export route-target extended communities
!--- End Do

!--- Set IP (Internet Protocol) address, netmask and enable IS-IS routing

!--- For each tenant (1..n) Do
!--- Establish loopback identifier for the Tenant
!--- Enable VRF (Virtual Routing and Forwarding) for the Tenant
!--- Associate the VRF instance with an interface or sub-interface.
!--- Loopbacks use the same IP address because they belong to different
Tenant VRF's
!--- Broadcast to all hosts on the subnet
!--- End Do

!--- Define and configure the gateway ingress interface
!--- Set bandwidth
!--- Config IP address and netmask
!--- Enable MPLS (MultiProtocol Label Switching)

!--- Enables logging of BGP (Border Gateway Protocol) neighbor resets.
!--- Adds an entry to the BGP or multiprotocol BGP neighbor table
!--- Enables BGP sessions to use a specific operational interface for TCP
(Transmission Control Protocol) connections

!--- Enter address family configuration mode

!--- Sends the community attribute to a BGP neighbor

!--- For each tenant (1..n) Do
!--- Set the address family for the tenant
!--- End Do

!--- Use longest prefix matching or default route

!--- end gateway configuration and programming
```

The above example shows that the premise router **140** can be programmed to create an independent virtual routing table for each user ONU. Thus, each user is effectively encased

within its own separate routing environment, vastly restricting access by cyber attackers to the PON.

Figure 4 represents the Passive Optical Network infrastructure which is an optical distribution network used to convey the photonic broadcast stream feeds that contain the encrypted data packets such as VLAN-tagged ethernet frames **300, 302, 304, 306** that are distributed back and forth between the various tenant spaces **102, 104, 106** and the OLT **146**. Essentially, the OLT can broadcast the combined encrypted VLAN-tagged ethernet frames **300, 302, 304, 306** over the distribution feeds **174, 176, 178, 180** to a number of splitters **308, 310, 312, 314**.

Each splitter **308** can replicate the incoming photonic broadcast stream equally over each of its drop lines **320, 322, 324**. The splitter **308** can attach to the simplex, single-mode fiber from the OLT **146** and can passively redistribute the incoming light stream up to 64 times. The splitter is a Planar Lightwave Circuit (PLC) that is constructed using silica glass waveguide circuits and aligned fiber optic pigtails that are all integrated inside of a single package. The attenuation of the light signal through the PLC of the splitter **308** is symmetrical in both directions. The signal loss from a 1x8 PLC splitter is expected to be less than one dB greater than what would be expected from a perfect splitter, approximately 10 dB. A typical 1x32 PLC splitter shall have approximately 17 dB or less.

Each of the outputs from the optical splitter can be an individual simplex, single-mode fiber called a drop line **320, 322, 324**. The drop lines can be routed and fed into the appropriate tenant physical space **102, 104, 106** and terminated into the tenant's dedicated Optical Network Unit (ONU) **330, 332, 334**.

Each ONU **330, 332, 334** is operated so that it utilizes the VLAN-tagging to select those of the incoming ethernet frames assigned to the particular tenant, and then removes the encryption from the selected ethernet frames. Thus, each ONU strips out or extracts only those incoming frames that are intended for the particular tenant. The decrypted ethernet frames **301, 303, 305** are then made available **340, 342, 344** for the tenant's IP/ethernet end-user equipment. Those frames not assigned to the particular tenant are ignored and cannot be decrypted by the particular tenant. In other words, a first subset of the frames can be associated with a first piece of end-user equipment and a second subset of the frames is associated with a second piece of end-user equipment. The first and second pieces of equipment can be common to a single tenant or can be split among separate tenants.

In other words, for example, tenant A **102** gets supplied to its ONU **330** all incoming encrypted frames **300, 302, 304, 306** via its drop line **320** including those frames that are intended for it **300,306** and those frames that are unintended for it **302, 304**. The ONU strips out its intended encrypted frames **300, and 306** and decrypts them to form its intended decrypted frames **301** which it makes available to Tenant A's dedicated, private data line **340**. The ONU also encrypts outgoing frames.

As shown in Figure 5, the OLT **146** that typically resides in the MPOE room **126** can be a key component of the headend equipment **128**. The OLT **146** can perform as the Layer-2 workgroup switching mechanism for voice, video and data content traffic that is sent and received from the individual tenants.

The OLT **146** equipment can be a chassis having multiple slots used to host circuit boards that perform various functions. Operations of the OLT are managed and controlled by a processor **500**. A backplane **502** of the OLT can provide the communication path for all of the control, management, and data signals between the circuit boards installed within the OLT. A network interface **504** provides the interface to/from the primary uplink **142** and backup uplink **144** connections to the premise router **140**. A switching fabric component **506** can be used to encrypts the VLAN-tagged ethernet frames using the appropriate symmetric key for a specific tenant and sends the result to an optical conversion component **508** for transmission to the tenant. The content traffic on the switching fabric component **506** is encrypted for each tenant location before being transmitted over the shared optical distribution network. Encryption of the layer-2 ethernet frames is used to provide the confidentiality of each tenant's signal traffic.

A symmetric-key algorithm can be used for the encryption of the ethernet frame data packets. This particular implementation utilizes a fixed block size of 128-bits and a key size of 128-bits that operate on a 4x4 column-major order matrix of bytes. It performs 10 cycles of transformation rounds that convert the input plaintext into the final output of ciphertext. Each round can consists of:

- a. First, a byte substitution function is performed where each byte in the state matrix is replaced using an 8-bit substitution.
- b. Next, each of the rows of the state are shifted by a certain number of steps. The first row is left unchanged. Each byte of the second row is shifted one to the left. Similarly, the third and fourth rows are shifted by offsets of two and three respectively. Row n is shifted left circular by n-1 bytes.

c. Finally, the columns of the state are mixed by combining the four bytes in each column. The four bytes of each column of the state are combined using linear transformation. Encryption is used to specifically prevent man-in-the-middle attacks. Additionally, the PON configuration also supports IEEE 802.1x authentication in order to provide port based Network Access Control to limit network access, with features like IP//MAC address limiting to secure the network from unauthorized/malicious users.

The optical conversion component **508** of the OLT **146** can convert the electrical signals of the encrypted VLAN-tagged ethernet frames and output them over the initial feeds **162**, **166**, **168**, **170** as modulated optical signals.

In the case where a carrier provider **114** supplies an RF-based video signal **130** to the headend equipment **128**, the signal is connected to a laser transmitter **520** where the input broadband signal is used to modulate a laser. The modulated output of the laser is a low-level photonic light stream. The photonic light stream is sent to an erbium-doped fiber amplifier **522**, where the signal is increased to approximately 30 dBmV. The resulting amplified video signal is then overlayed on an initial feed **162** through the use of a wave division multiplexor combiner **524**. The output from the wave division multiplexor combiner **524** is a feed line **164** that contains encrypted VLAN-tagged ethernet frames and a laser-modulated, RF-based video signal.

As shown in Figure 6, each tenant can have one or more of an ONU **330** that accepts drop line **320** connections. The ONU **330** terminates optical fibers from a splitter **308** and sends/receives decrypted ethernet frames **340** to the tenant's IP/ethernet equipment, and RF video signals **656** to the tenant's television. The ONU has a processor **600** which controls and manages all activity of the ONU by directly communicating all of the control and management signals **602**, **604**, **606** to/from its internal components **610**, **612**, **640**. The ONU receives the photonic light stream transmitted over the drop line **320**. The optical converter **610** examines the encrypted photonic light stream that enters the component. If the VLAN-tagged ethernet frame has been encrypted with the same symmetric key, it indicates that the VLAN-tagged frame belongs to the tenant of that ONU. After the optical converter **610** performs the decryption, the VLAN-tagged ethernet frame is sent to the network interface **612** of the ONU via the direct communication path **608**. The network interface **612** demultiplexes the electrical signal to divide out baseband telephony/data signals from broadband video channels. The network interface sends/receives the VLAN-tagged ethernet frames to the appropriate physical connection interface **622**, **632**, **652**. The ONU can supply a basic 802.3 ethernet interface **622**, or an 802.3 ethernet interface that include power-over-ethernet (PoE) capability **632**, or an RF-

based video F-Type interface **652** to transmit the RF-based video signal **656**. The PoE port injector **640** implements the Power-Over-Ethernet and Power-Over-Ethernet Plus based upon the IEEE 802.3af-2003 and IEEE 802.3at-2009 standards respectively.

In this way, the above described system empowers a multi-tenant building **100** with an environment to securely host individual tenant data traffic with overall network flexibility. This ability of the system allows it to leverage the high bandwidth and energy efficiency of passive optical network equipment for the entire building. Because optical bandwidth is comparatively unlimited, existing systems often do not utilize this capacity. Thus, the high bandwidth capability of optical fiber can be leveraged to route all traffic optically and uniformly throughout the building on an aggregated feed. Each tenant can extract its share of the traffic from the feed. In this way, a single headend having reduced air conditioning requirements can be located at the building's main point of entry, and no additional air conditioning is needed at the individual tenant spaces for what would have been headend-type network equipment.

While the preferred embodiment of the invention has been described, modifications can be made and other embodiments may be devised without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

CLAIMS

1. A digital network communication method comprises:

receiving from at least one passive optical network (PON) interface router out of a plurality of PON interface routers at a PON optical line terminal (OLT), at least one private data stream out of a plurality of data streams, wherein said at least one private data stream is virtually separated using Virtual Routing and Forwarding (VRF) to form at least one virtually separated private data stream comprised of Multi-Protocol Label Switching (MPLS) data packages that have been uniquely labelled using MPLS for further identification as MPLS labelled data packages, and wherein said at least one virtually separated private data stream including said MPLS labelled data packages is intended for at least one of a plurality of optical network units (ONUs), and wherein said at least one of a plurality of ONUs serves at least one of plurality of private user devices;

aggregating within said OLT said plurality of data streams and said at least one virtually separated private data stream into a common data feed;

distributing said common data feed to said plurality of ONUs;

wherein said distributing comprises:

segregating the common data feed into Virtual Local Area Networks (VLANs) associated with each of said plurality of ONUs;

replicating said common data feed using at least one optical splitter connected to said plurality of ONUs;

delivering said common data feed to said plurality of ONUs based on their VLANs association;

extracting within said at least one of said plurality of ONUs, said at least one virtually separated private data stream including said MPLS labelled data packages from said common data feed;

sending said at least one virtually separated private data stream including said MPLS labelled data packages from said at least one of said plurality of ONUs to said at least one of a plurality of private user devices.

2. The method of Claim 1, wherein said at least one of a plurality of

ONUs provides services to at least one private user out of a plurality of users.

3. The method of Claim 1, wherein a plurality of data streams within the plurality of data streams are private.

Mutually secure optical data network and method

ABSTRACT

A digital optical data network system for improving information security in Passive Optical Networks (“PON”) by providing virtual information separation in the router, such as a premise router, or routers interfacing the entire PON, such as by utilizing virtual routing and forwarding, thus allowing safe data traffic between multiple carriers, service providers accessing the PON and multiple end users on the PON such as tenants in a building, employees of a business entity, or subscribers in a residential community.