UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/552,927	06/08/2021	11032111	20160.0031.NPUS00	1683

63467 7590 05/19/2021

Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

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

Junqing SUN, Fremont, CA;
CREDO TECHNOLOGY GROUP LIMITED, Grand Cayman, CAYMAN ISLANDS;
Haoli QIAN, Fremont, CA;

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16552927
	Filing Date	2019-08-27
	First Named Inventor	Junqing SUN
	Art Unit	2632
	Examiner Name	Malek, Leila
Change(s) applied to document, /C.G./ 4/19/2021	Attorney Docket Number	20160.0031.NPUS00

/L.M/	2	20130343400	A1	~~2014-03-27~~ 12/2013	Lusted et al.	
/L.M/	3	20140086264	A1	2014-03-27	Lusted et al.	
/L.M/	4	20140146833	A1	2014-05-29	Lusted et al.	
/L.M/	5	20150003505	A1	2015-01-01	Lusted et al.	
/L.M/	6	20160337114	A1	2016-11-17	Baden et al.	

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

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
/L.M/	1	Information Technology - Open Systems Interconnection - Basic Reference Model: The Basic Model, 1994	

EFS Web 2.1.17

Doc Code: IFEE PTOL/85B-EFS

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
16552927	27-Aug-2019	Junqing SUN	20160.0031.NPUS00	1683

TITLE OF INVENTION :

SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Regular Undiscounted	Utility under 35 USC 111(a)	2632	219000	LEILA MALEK

Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
$1200	$0	$1200	30-Jun-2021	$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
63467 Ramey & Schwaller, LLP 5020 Montrose Blvd. Suite 800 Houston TX 77006 UNITED STATES 713 426 3923 tevenbly@rameyfirm.com	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status

Change in Entity Status

○ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

○ Applicant asserting small entity status. See 37 CFR 1.27.
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.

◉ Applicant changing to regular undiscounted fee status.
Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

3.The Following Fee(s) Are Submitted:

☒ Issue Fee	☐ I authorize USPTO to apply my previously paid issue fee to the current fees due
☐ Publication Fee	☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____
☐ Advance Order - # of copies _____	☐ If **in addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number _____ . The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. RAMEY & SCHWALLER LLP
2. Daniel J. Krueger
3.

5.Assignee Name(s) and Residence Data To Be Printed

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

Name	City	State	Country	Category
CREDO TECHNOLOGY GROUP LIMITED	Grand Cayman		cayman islands	corporation

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Daniel J. Krueger/	**Date**	05-06-2021
Name	Daniel Joseph Krueger	**Registration Number**	42771

Electronic Patent Application Fee Transmittal

Application Number:	16552927
Filing Date:	27-Aug-2019
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Filer:	Daniel Joseph Krueger/Theresa Evenbly
Attorney Docket Number:	20160.0031.NPUS00

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPL ISSUE FEE	1501	1	1200	1200
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1200**

Electronic Acknowledgement Receipt	
EFS ID:	42653879
Application Number:	16552927
International Application Number:	
Confirmation Number:	1683
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Customer Number:	63467
Filer:	Daniel Joseph Krueger/Theresa Evenbly
Filer Authorized By:	Daniel Joseph Krueger
Attorney Docket Number:	20160.0031.NPUS00
Receipt Date:	06-MAY-2021
Filing Date:	27-AUG-2019
Time Stamp:	13:18:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1200
RAM confirmation Number	E202156D17581871
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)	Web85b.pdf	46387 020bee63df1d5f0f2eb4fd863ad7aa9a72064fd8	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32347 6bdf7ec0320814b1ec603bcf0e4bc304fdb51425	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	78734		

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.

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

63467 7590 03/31/2021

Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

EXAMINER	
MALEK, LEILA	
ART UNIT	PAPER NUMBER
2632	

DATE MAILED: 03/31/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00	1683

TITLE OF INVENTION: SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	06/30/2021

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

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

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

63467 7590 03/31/2021

Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

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.

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00	1683

TITLE OF INVENTION: SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	06/30/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
MALEK, LEILA	2632	375-219000

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

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

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

1_____
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 _____ Date _____

Typed or printed name _____ Registration No. _____

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.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00	1683

63467 7590 03/31/2021

Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

EXAMINER	
MALEK, LEILA	
ART UNIT	PAPER NUMBER
2632	

DATE MAILED: 03/31/2021

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. 16/552,927	Applicant(s) SUN et al.	
	Examiner LEILA MALEK	Art Unit 2632	AIA (FITF) Status Yes

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

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

1. ☑ This communication is responsive to 03/16/2021.
   ☐ 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 2-9,11-13,15-19 and 21-23 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

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

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

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

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

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/LEILA MALEK/
Primary Examiner, Art Unit 2632

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/552,927	SUN et al.
	Examiner	**Art Unit**
	LEILA MALEK	2632

CPC							
Symbol						**Type**	**Version**
H04L	/	25	/	03019		F	2013-01-01
H04L	/	7	/	0087		I	2013-01-01
G06N	/	20	/	00		I	2019-01-01
H04B	/	1	/	40		I	2013-01-01
H04L	/	2025	/	03808		A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	19	
/LEILA MALEK/ Primary Examiner, Art Unit 2632	25 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20210325

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/552,927	SUN et al.
	Examiner	Art Unit
	LEILA MALEK	2632

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04L	/	25	/	03

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
375	219

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					
375	219					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	19	
/LEILA MALEK/ Primary Examiner, Art Unit 2632	25 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20210325

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/552,927	SUN et al.
	Examiner	**Art Unit**
	LEILA MALEK	2632

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

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
-	1	-	10	16	19										
1	2	11	11	-	20										
2	3	12	12	17	21										
3	4	13	13	18	22										
4	5	-	14	19	23										
5	6	9	15												
6	7	10	16												
7	8	14	17												
8	9	15	18												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	19	
/LEILA MALEK/ Primary Examiner, Art Unit 2632	25 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office Part of Paper No.: 20210325

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/552,927	SUN et al.
	Examiner	Art Unit
	LEILA MALEK	2632

CPC - Searched*		
Symbol	Date	Examiner
H04L25/03019, H04L7/0087, G06N20/00, H04B1/40, H04L27/01, H04L25/03885	03/25/2021	L.M.

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
375	219	03/25/2021	L.M.

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

Search Notes		
Search Notes	Date	Examiner
EAST, IEEE, Inventor Name Search, IP.com	03/25/2021	L.M.
H04L25/03019, H04L7/0087, G06N20/00, H04B1/40, H04L27/01, H04L25/03885	03/25/2021	L.M.

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
375	219	03/25/2021	L.M.

OK TO ENTER: /L.M/

20160.0031

Serial No.:	16/552927
Filing Date:	2019-08-27
Confirmation:	1683
Atty Docket:	20160.0031.NPUS00
1st Inventor:	Junqing Sun
Title:	SerDes Pre-equalizer having Adaptable Preset Coefficient Registers
Examiner:	Leila Malek
Art Unit:	2632

REPLY TO FINAL OFFICE ACTION OF 2021-02-04

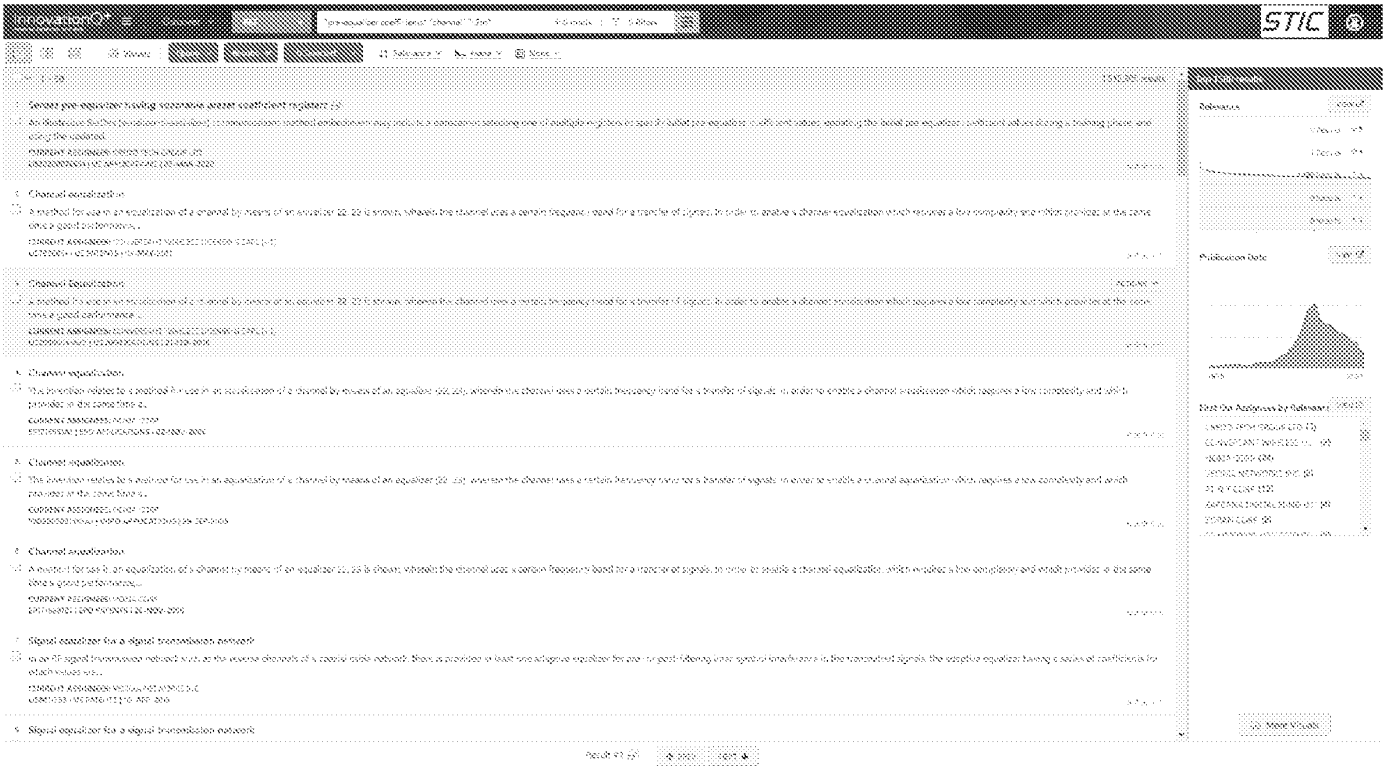
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 23313-1450

Dear Sir or Madam:

This paper is submitted in response to the above-identified office action. Please reconsider the rejections in light of the following amendments and remarks.

An Amendment to the Claims begins on page 2.

Remarks begin on page 5.



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Search History

Mar 25, 2021, 12:10:49 PM

Set #	Search Query	Details Results | Date & Time
55	("Full Text & Metadata":pre-equalizer coefficients) AND ("Full Text & Metadata":register) AND ("Full Text & Metadata":channel model)	23 | Mar 25, 2021, 12:10:09 PM
54	("Full Text & Metadata":chip-to-module) AND ("Full Text & Metadata":pre-equalizer) AND ("Full Text & Metadata":channel model)	6 | Mar 25, 2021, 12:09:13 PM
53	("Full Text & Metadata":chip$1to$1module) AND ("Full Text & Metadata":pre-equalizer) AND ("Full Text & Metadata":channel model)	0 | Mar 25, 2021, 12:08:25 PM
52	("Full Text & Metadata":"ofdm") AND ("Full Text & Metadata":"cpm") AND ("Full Text & Metadata":"bpsk")	138 | Mar 24, 2021, 10:58:07 AM
51	("Full Text & Metadata":phase adjusting the equalizing clock) AND ("Full Text & Metadata":data sampler) AND ("Full Text & Metadata":quality)	133 | Mar 12, 2021, 12:24:33 PM
50	"mimo bf setup frame"	2 | Mar 3, 2021, 4:07:38 PM
49	"mimo bf setup frame"	2 | Mar 3, 2021, 4:06:29 PM
48	"ixss-req-reciprocal subfield"	0 | Mar 3, 2021, 10:48:34 AM
47	"mimo bf setup frame"	2 | Mar 3, 2021, 10:40:16 AM
46	"mimo bf setup frame"	2 | Mar 3, 2021, 10:27:00 AM
45	"mimo bf setup frame"	2 | Mar 3, 2021, 10:25:57 AM
44	"mimo bf setup frame"	2 | Mar 3, 2021, 10:11:46 AM
43	("Full Text & Metadata":"auto-zero") AND ("Full Text & Metadata":multiplexer) AND ("Full Text & Metadata":decision feedback equalizer)	0 | Feb 27, 2021, 10:06:00 AM
42	("Full Text & Metadata":auto-zero) AND ("Full Text & Metadata":decision feedback equalizer)	29 | Feb 27, 2021, 10:05:27 AM
41	("Full Text & Metadata":half-cell) AND ("Full Text & Metadata":auto-zero)	4 | Feb 27, 2021, 10:04:30 AM
40	("Full Text & Metadata":half-cell) AND ("Full Text & Metadata":auto-zero) AND	0 | Feb 27, 2021, 10:04:09 AM

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L10	49	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 11:06 AM
L11	11	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	(US-PGPUB ; USPAT)	OR	ON	ON	2020/06/22 12:06 PM
L12	11	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	(US-PGPUB ; USPAT)	OR	ON	ON	2020/06/22 12:06 PM
L13	2	12 AND (pre$1equaliz$3 near3 coefficient$1)	(US-PGPUB ; USPAT)	OR	ON	ON	2020/06/22 12:06 PM
L14	2	12 AND (pre$1equaliz$3 near3 (tap$1 OR weight$1 OR coefficient$1))	(US-PGPUB ; USPAT)	OR	ON	ON	2020/06/22 12:06 PM
L15	0	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group) near3 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 12:06 PM
L16	91	(select$3 OR pick$3 OR obtain$3 OR choos$3) near4 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 12:06 PM
L17	1	16 AND c2m	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM
L18	1	(select$3 OR pick$3 OR obtain$3 OR choos$3) near4 (pre$1equaliz$3) AND c2m	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM
L19	1	(pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1) AND c2m	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM
L20	1	(pre$1equaliz$3) AND c2m adj1 (channels OR path$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM

L21	2	(pre$1equaliz$3) AND c2m	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM
L22	230	(pre$1equaliz$3) AND (channel adj1 models)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM
L23	44	(pre$1equaliz$3) WITH (channel adj1 models)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM
L24	0	23 AND (different OR multiple OR plurality) adj2 (channel adj1 models)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM
L25	3	(pre$1equaliz$3) WITH (channel adj1 models)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	OFF	ON	2020/06/22 04:06 PM
L26	8	(pre$1equaliz$3 near3 (coefficient$1 OR tap$1 OR weight$1)) WITH (channel adj1 model$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 04:06 PM
L27	44	(pre$1equaliz$3) WITH (channel adj1 model$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/22 05:06 PM
L28	1	serdes AND c2m AND pre$1equaliz$3	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 10:06 AM
L29	1	serdes AND c2m near3 channel$1	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 10:06 AM
L30	12	serdes AND c2m	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 10:06 AM
L31	6	serdes AND c2m AND (coefficient$1 OR weight$1 OR tap$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 11:06 AM
L32	0	serdes AND c2c AND pre$1equaliz$3	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 11:06 AM
L33	45	serdes AND pre$1equaliz$3	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 11:06 AM

L34	13	serdes AND pre$1equaliz$3 AND ((select$3 OR choos$3 OR pick$3 OR determin$3) near7 pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 11:06 AM
L35	524	(channel near2 response) near6 (channel adj1 model)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 11:06 AM
L36	10	pre$1equaliz$3 SAME (coefficient$1 OR tap$1 OR weight$1) SAME (channel adj1 model$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 11:06 AM
L37	4	(select$3 OR choos$3 OR pick$3 OR determin$3) near5 pre$1equaliz$3 SAME (channel adj1 model$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 11:06 AM
L38	0	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (register OR memory OR storage) SAME (pre$1equaliz4)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 03:06 PM
L39	43	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (register OR memory OR storage) SAME (pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 03:06 PM
L40	6	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (table) SAME (pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 03:06 PM
L41	9	(select$3 OR pick$3 OR obtain$3 OR choos$3 OR determin$3 OR decid$3) near2 (set OR group OR table) near3 (coefficient$1 OR tap$1 OR weight$1) SAME pre$1equaliz$3	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 05:06 PM
L42	2	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (training adj1 (mode OR phase OR period))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 05:06 PM
L43	8	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (training)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/23 05:06 PM
L44	3	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (initializ$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 01:06 PM

L45	119	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3 (pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 02:06 PM
L46	0	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3 (pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1) SAME (channel adj1 model)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 02:06 PM
L47	2	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3 (pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1) AND (channel adj1 model)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 02:06 PM
L48	4115	(sav$3 OR stor$3) near4 (coefficient$1 OR tap$1 OR weight$1) near3 (different OR independent OR plurality OR several) near3 (register$1 OR table$1 OR memor$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 03:06 PM
L49	17	(sav$3 OR stor$3) near4 (equalizer OR pre$1equalizer) near2 (coefficient$1 OR tap$1 OR weight$1) near3 (different OR independent OR plurality OR several OR multiple) near3 (register$1 OR memor$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 03:06 PM
L50	51	(registers OR memories OR (memory adj1 units)) near4 (equalizer OR pre$1equalizer) near2 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	OFF	ON	2020/06/24 03:06 PM
L51	4	(registers OR memories OR (memory adj1 units)) near4 (pre$1equaliz$5) near2 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	OFF	ON	2020/06/24 03:06 PM
L52	11	(select$3 OR choos$3 OR pick$3) near3 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 04:06 PM
L53	2	(select$3 OR choos$3 OR pick$3) near5(initial) near4 (pre$1equaliz$3) near5 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 04:06 PM

L54	29	(select$3 OR choos$3 OR pick$3) near4 (pre$1equaliz$3) near5 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 04:06 PM
L55	23	54 AND (updat$3 OR adjust$3) near5 (coefficient$1 OR tap$1 OR weight$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 04:06 PM
L56	8	(coefficient$1 OR tap$1 OR weight$1) near6 pre$1equaliz$3 WITH (channel adj1 model)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L57	31	(coefficient$1 OR tap$1 OR weight$1) near6 pre$1equaliz$3 WITH (impulse adj1 response adj3 channel)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L58	39	(coefficient$1 OR tap$1 OR weight$1) near6 pre$1equaliz$3 WITH ((impulse adj1 response adj3 channel) OR (channel adj1 model))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L59	0	L58 AND (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L60	215	(coefficient$1 OR tap$1 OR weight$1) WITH (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L61	0	(coefficient$1 OR tap$1 OR weight$1) WITH (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model)) AND (pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L62	66	(coefficient$1 OR tap$1 OR weight$1) WITH ((EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 channel) AND (pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM

L63	11	(coefficient$1 OR tap$1 OR weight$1) WITH ((EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 channel) AND ((pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L64	8	(coefficient$1 OR tap$1 OR weight$1) WITH (channel adj1 model) AND ((pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L65	1	c2m AND (insertion adj1 loss) AND (package adj1 loss)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L66	2	((coefficient$1 OR tap$1 OR weight$1) near3 pre$1equaliz$3) WITH ((performance adj1 characteristic$1) OR (error adj1 signal adj1 (power OR energy)) OR (bit adj1 error adj1 rate))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L67	0	(sav$3 OR stor$3) near3 (updated OR adjusted) adj3 (coefficient$1 OR tap$1 OR weight$1) near3 pre$1equaliz$3	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L68	30	(sav$3 OR stor$3) near3 (updated OR adjusted) adj3 (coefficient$1 OR tap$1 OR weight$1) near3 equaliz$3	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L69	11	(port adj1 connector) WITH transceiver WITH pluggable	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L70	2	(port adj1 connector) WITH transceiver WITH pluggable AND pre$1equalizer$1	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L71	2	(port adj1 connector) WITH transceiver WITH pluggable AND pre$1equaliz$3	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L72	0	(chip$1to$1module OR c2m) AND (port adj1 connect$3) AND (plug$4 near3 transceiver)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM
L73	364	(port adj1 connect$3) AND (plug$4 near3 transceiver)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/24 06:06 PM

L74	13	(port adj1 connect$3) WITH (plug$4 near3 transceiver)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 06:06 AM
L75	3	(port adj1 connect$3) WITH (plug$4 near3 transceiver) AND (filter OR pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 06:06 AM
L76	13	(port adj1 connect$3) WITH (plug$4 near3 transceiver)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 06:06 AM
L77	319	(port near2 connect$3) WITH (plug$5 near3 transceiver)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 06:06 AM
L78	3	(port near2 connect$3) WITH (plug$5 near3 transceiver) WITH (port adj1 transceiver)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 06:06 AM
L79	2	(pre$1equaliz$3) near3 (coefficients OR taps OR weights OR (coefficient adj1 values) OR (tap adj1 values)) near5 (registers OR (storage adj1 units) OR memories)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	OFF	ON	2020/06/25 06:06 AM
L80	4	(pre$1equaliz$3) SAME (coefficients OR taps OR weights OR (coefficient adj1 values) OR (tap adj1 values)) near6 (registers OR (storage adj1 units) OR memories)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	OFF	ON	2020/06/25 06:06 AM
L81	1	(pre$1equaliz$3) SAME ((coefficient OR tap OR weight) near2 set) near6 (register$1 OR (storage adj1 unit$1) ormemor$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	OFF	ON	2020/06/25 06:06 AM
L82	9	(pre$1equaliz$3) SAME ((coefficient OR tap OR weight) near2 set) near6 (register$1 OR (storage adj1 unit$1) OR memor$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 06:06 AM
L83	0	(pre$1equaliz$3) SAME (sav$3 OR stor$3) near3 (each OR different OR several OR multiple) adj1 set$1 near3 (coefficient OR tap OR weight)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 06:06 AM
L84	15	(pre$1equaliz$3) SAME (each OR different OR several OR multiple) adj1 set$1 near3 (coefficient OR tap OR weight)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 06:06 AM

L85	0	(pre$1equaliz$3) SAME (port adj1 transmitter)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 10:06 AM
L86	0	(pre$1equaliz$3) SAME3 (port adj1 transmitter)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 10:06 AM
L87	0	(pre$1equaliz$3) AND (port adj1 transmitter)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 10:06 AM
L88	22	(pre$1equaliz$3) AND (port near2 transmitter)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 10:06 AM
L89	55	(pre$1equaliz$3) AND (port near2 transmit$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 10:06 AM
L90	12	(pre$1equaliz$3) AND (port near2 transceiv$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L91	14	(pre$1equaliz$3) AND (port near3 transceiv$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L92	3177	cable SAME (port near3 transceiv$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L93	1601	cable WITH (port near3 transceiv$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L94	2460	network WITH (port near1 transceiv$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L95	1497	network WITH (port adj1 transceiv$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L96	609	network near5(port adj1 transceiv$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L97	0	network near5 "port adj1 transceiv$3"	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM

L98	0	"port adj1 transceiv$3"	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L99	0	"port adj1 transceiver"	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L100	4775	"port transceiver"	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L101	550	"port transceiver" near5 network	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/06/25 11:06 AM
L102	483	"port transceiver" near5 network	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	OFF	ON	2020/06/25 11:06 AM
L103	1	(select$3 near4 register) WITH pre$1equaliz$3 AND (sun.inv. OR qian.inv.)	(US-PGPUB ; USPAT)	OR	ON	ON	2020/07/03 06:07 AM
L104	1	"20020141347" AND (model WITH coefficient$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 03:07 PM
L105	1	"20020141347" AND (model WITH (coefficient$1 OR tap$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 03:07 PM
L106	160	(channel adj1 model) near4 (channel adj1 characteristic$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 03:07 PM
L107	7	(channel adj1 model) WITH (pre$1equalizer near3 (tap$1 OR coefficient$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 04:07 PM
L108	1	"20130223506" AND (pre$1equaliz$3 WITH (fir OR filter$3))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 10:07 PM
L109	839852	20100232493and (control$4 near5 (coefficient$1 OR tap$1 OR register$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 11:07 PM
L110	0	"20100232493" AND (control$4 near5 (coefficient$1 OR tap$1 OR register$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 11:07 PM

L111	2	"20100232493" AND (control$4 WITH (coefficient$1 OR tap$1 OR register$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 11:07 PM
L112	2	"20100232493" AND (control$4 WITH (coefficient$1 OR tap$1 OR register$1)) AND (register WITH coefficient$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/03 11:07 PM
L113	1	"20130201316" AND (connector WITH port)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/04 08:07 AM
L114	1	"20130201316" AND (connector SAME port)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/04 08:07 AM
L115	2	"20130201316" AND (plug$4 SAME (modem OR transceiver))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2020/07/04 09:07 AM
L116	22	((performance adj1 characteristic$1) OR (snr OR snir OR ber) OR (signal adj2 noise adj2 ratio) OR (bit adj1 error adj1 rate) OR (error adj1 signal adj1 energy)) WITH (pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/04 04:01 PM
L117	6	(ber OR (bit adj1 error adj1 rate)) WITH (pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/04 05:01 PM
L118	3	(ber OR (bit adj1 error adj1 rate)) SAME ((choos$3 OR select$3 OR pick$3 OR updat$3 OR adapt$3 OR determin$3 OR calculat$3) near3 pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/05 10:01 AM
L119	35	(ber OR (bit adj1 error adj1 rate)) AND ((choos$3 OR select$3 OR pick$3 OR updat$3 OR adapt$3 OR determin$3 OR calculat$3) near3 pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/05 10:01 AM

L120	93	(ber OR (bit adj1 error adj1 rate)) AND (pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/05 03:01 PM
L121	1	(ber OR (bit adj1 error adj1 rate)) SAME (pre$1equaliz$3 near2 (parameter$1 OR setting$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/05 09:01 PM
L122	28	(ber OR (bit adj1 error adj1 rate)) WITH (pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/05 09:01 PM
L123	58	(ber OR (bit adj1 error adj1 rate)) SAME (pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/05 09:01 PM
L124	1	"20130223506" AND (different near4 channel$1 WITH pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (AU , AP , AT , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/16 04:01 PM
L125	17	((different OR each) adj1 (set$1 OR group$1)) near4(equaliz$3 OR pre$1equaliz$3) near4 (coefficients OR weights OR taps) WITH (stor$3 OR storage OR ram OR table OR memory)	(US-PGPUB ; USPAT ; USOCR ; FIT (AU , AP , AT , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/16 04:01 PM
L126	1	"20130223506" AND ((different OR distinct OR each) near7 channel$1 WITH pre$1equaliz$3)	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/16 04:01 PM
L127	6535	((set$1 OR group$1)) near4(equaliz$3 OR pre$1equaliz$3 OR filter) near4 (coefficient$1 OR weight$1 OR tap$1) near8 (register OR storage OR ram OR table OR memory)	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/19 10:01 AM

L132	14	((each OR every OR different) adj2 (set$1 OR group$1)) near4(equaliz$3 OR pre$1equaliz$3 OR filter$1) near4 (coefficient$1 OR weight$1 OR tap$1) near8 (separate OR different OR distinct) adj1 (register OR storage OR ram OR table OR memory) AND @ad<=20180828	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/19 02:01 PM
L133	2	"20130223506" AND (channel$1 WITH (pre$1equaliz$3 OR equaliz$3))	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/19 03:01 PM
L134	2	"20130223506" AND (channel$1 near5 characteristic$1)	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/19 04:01 PM
L135	2	"20130223506" AND (snr)	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/19 04:01 PM
L136	6	((select$3 OR choos$3 OR pick$3) near4 beam near2 pair) WITH (interfer$3 near4 (enb OR station$1 OR ue$1 OR device$1 OR unit$1))	(US-PGPUB ; USPAT ; USOCR ; FIT (AU , AP , AT , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/01/21 01:01 PM
L137	0	"20130201316" AND (port WITH equaliz$3)	(US-PGPUB ; USPAT)	OR	ON	ON	2021/01/30 05:01 PM
L138	92	((set$1 OR group$1 OR sub$1set$1 OR sub$1groups$1)) near4(equaliz$3 OR pre$1equaliz$3 OR filter) near4 (coefficient$1 OR weight$1 OR tap$1) near8 (register OR storage OR ram OR table OR memory) AND ((set$1 OR group$1 OR sub$1set$1 OR sub$1groups$1) near4 (coefficient$1 OR weight$1 OR tap$1) near6 ((different OR distict OR each) adj2 channel))	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/22 06:03 PM

L139	0	((set$1 OR group$1 OR sub$1set$1 OR sub$1groups$1)) near4(pre$1equaliz$3) near4 (coefficient$1 OR weight$1 OR tap$1) near8 (register OR storage OR ram OR table OR memory) AND ((set$1 OR group$1 OR sub$1set$1 OR sub$1groups$1) near4 (coefficient$1 OR weight$1 OR tap$1) near6 ((different OR distict OR each) adj2 channel))	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/23 05:03 PM
L140	0	((set$1 OR group$1 OR sub$1set$1 OR sub$1groups$1)) near4(pre$1equaliz$3) near4 (coefficients OR weights OR taps) near8 (register OR storage OR ram OR table OR memory) AND ((coefficients OR weights OR taps) near6 ((different OR distict OR each) adj2 channels))	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	OFF	ON	2021/03/23 05:03 PM
L141	2	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN. AND (pre$1equaliz$3)	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/23 05:03 PM
L142	1	(pre$1equaliz$3 near4 (coefficient$1 OR weight$1 OR tap$1) near8 (register OR storage OR ram OR table OR memory)) AND ((coefficient$1 OR weight$1 OR tap$1) near6 channel) AND (sun.inv. OR qian.inv.)	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/23 09:03 PM
L143	163	(pre$1equaliz$3 near4 (coefficients OR weights OR taps)) SAME ((coefficient$1 OR weight$1 OR tap$1) near6 channel)	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/24 10:03 AM
L144	45	(pre$1equaliz$3 near4 (coefficients OR weights OR taps) WITH (channel adj1 (model OR characteristic$1 OR estimation OR (impulse adj1 response))))	(US-PGPUB ; USPAT ; USOCR ; FIT (AP , AT , AU , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/24 10:03 AM

L145	1	((updat$3 OR adapt$3 OR chang$3) near3 pre$1equaliz$3 near4 coefficient$1) AND chip$1to$1module	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/25 11:03 AM
L146	0	((updat$3 OR adapt$3 OR chang$3) near3 pre$1equaliz$3 near4 coefficient$1) WITH (channel$1) AND serdes	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/25 11:03 AM
L147	1	((updat$3 OR adapt$3 OR chang$3) near3 pre$1equaliz$3 near4 coefficient$1) SAME (channel$1) AND serdes	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/25 11:03 AM
L148	3	serdes AND (chip$1to$1module) AND pre$1equaliz$3	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/25 11:03 AM
L149	3	L148 AND ((H04L25/03019 OR H04L7/0087 OR G06N20/00 OR H04B1/40 OR H04L27/01 OR H04L25/03885).cpc.)	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/25 12:03 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	3	serdes AND (chip$1to$1module) AND pre$1equaliz$3	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/25 12:03 PM

Serial No.:	16/552927
Filing Date:	2019-08-27
Confirmation:	1683
Atty Docket:	20160.0031.NPUS00
1st Inventor:	Junqing Sun
Title:	SerDes Pre-equalizer having Adaptable Preset Coefficient Registers
Examiner:	Leila Malek
Art Unit:	2632

REPLY TO FINAL OFFICE ACTION OF 2021-02-04

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 23313-1450

Dear Sir or Madam:

This paper is submitted in response to the above-identified office action. Please reconsider the rejections in light of the following amendments and remarks.

An Amendment to the Claims begins on page 2.

Remarks begin on page 5.

Amendment to the Claims

Please amend the claims to read as provided below:

1. (Canceled)

2. (Previously presented) A SerDes communications method that comprises, in a transceiver:

selecting one of multiple registers to specify initial pre-equalizer coefficient values, each of the multiple registers corresponding to a different channel model;

updating the initial pre-equalizer coefficient values during a training phase; and

using the updated pre-equalizer coefficient values to convey a transmit data stream.

3. (Original) The method of claim 2, wherein at least some of the different channel models are for chip-to-module (C2M) channels with different insertion loss and package loss characteristics.

4. (Original) The method of claim 2, wherein at least some of the different channel models presume different types of receiver equalization.

5. (Currently amended) The method of ~~claim 1~~ claim 2, wherein said selecting includes using the initial pre-equalizer coefficient values to determine a performance characteristic for each of the multiple registers.

6. (Currently amended) The method of ~~claim 1~~ claim 5, wherein the performance characteristic is an error signal energy.

7. (Currently amended) The method of ~~claim 1~~ claim 5, wherein the performance characteristic is a bit error rate.

8. (Currently amended) The method of ~~claim 1~~ claim 5, further comprising updating the selected register with the updated pre-equalizer coefficient values.

9. (Previously presented) A chip-to-module communications link that comprises a port connector coupling a port transceiver to a pluggable module transceiver, the pluggable module transceiver including:

one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to the port transceiver; and

a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values corresponding to a different channel model, the controller using one of the registers to set initial coefficient values for the one or more transmit filters.

10. (Canceled)

11. (Previously presented) A chip-to-module communications link that comprises a port connector coupling a port transceiver to a pluggable module transceiver, the pluggable module transceiver including:

one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to the port transceiver; and

a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values for which the port transceiver determines a performance characteristic,

the controller using one of the registers selected by the port transceiver to specify the initial coefficient values for the one or more transmit filters.

12. (Original) The communications link of claim 11, wherein the performance characteristic is an error signal energy.

13. (Original) The communications link of claim 11, wherein the performance characteristic is a bit error rate.

14. (Canceled)

15. (Previously presented) The communications link of claim 9, wherein at least some of the different channel models are for chip-to-module (C2M) channels with different insertion loss and package loss characteristics.

16. (Previously presented) The communications link of claim 9, wherein at least some of the different channel models presume different types of receiver equalization.

17. (Previously presented) The communications link of claim 11, wherein the port transceiver generates updates for the coefficient values of the one or more transmit filters.

18. (Original) The communications link of claim 17, wherein the controller saves

updated coefficient values in one of the registers.

19. (Previously presented) A pluggable module transceiver including:

one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to a port transceiver; and

a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values corresponding to a different channel model, the controller using one of the registers to set initial coefficient values for the one or more transmit filters.

20. (Canceled)

21. (Previously presented) The pluggable module transceiver of claim 19, wherein the port transceiver determines a performance characteristic for each register.

22. (Previously presented) The pluggable module transceiver of claim 21, wherein the performance characteristic is an error signal energy.

23. (Previously presented) The pluggable module transceiver of claim 21, wherein the performance characteristic is a bit error rate.

Remarks

Status of the Claims

Claims 1-4, 6-9, 11-13, 15-19, and 21-23 were pending. Claim 1 is canceled. Original claim 5 is re-introduced with a new dependency. Claims 6-8 are amended to alter their dependency from canceled claim 1. Claims 2-9, 11-13, 15-19, and 21-23 are now pending.

Rejections Under 35 USC § 103

Claims 1 and 6-8 stand rejected under 35 USC § 103 as being unpatentable over US2013/0223506 ("Kolze") in view of US2010/0232493 ("Thirumoorthy"). Claim 1 is canceled herein, and the dependencies of claims 6-8 are herein amended such that claims 6-8 now depend (indirectly) from allowed claim 2. Claims 6-8 are believed to be in condition for allowance for at least this reason.

Allowable Subject Matter

Claims 2-4, 9, 11-13, 15-19, and 21-23 stand allowed.

Previously canceled claim 5 is re-introduced with a new dependency from independent claim 2, and is believed allowable for at least this reason. Claims 6-8 now depend from claim 5 and are similarly believed allowable at least due to their dependence from claim 2.

All claims are believed to be in condition for allowance.

Conclusion

Applicant appreciates the examiner's careful examination of the present application. The examiner is encouraged to contact the undersigned practitioner if an interview might prove helpful to the examination process.

Respectfully submitted,

/Dan Krueger/ 2021-03-16

_____ _____

Daniel J. Krueger Date
Reg. No. 42,771
(713) 449-9669
Attorney for Applicant

Ramey & Schwaller LLP

5020 Montrose Blvd # 800
Houston TX 77006
713-426-3923 x304

Electronic Acknowledgement Receipt	
EFS ID:	42189968
Application Number:	16552927
International Application Number:	
Confirmation Number:	1683
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Customer Number:	63467
Filer:	Daniel Joseph Krueger/Shanay Hines
Filer Authorized By:	Daniel Joseph Krueger
Attorney Docket Number:	20160.0031.NPUS00
Receipt Date:	16-MAR-2021
Filing Date:	27-AUG-2019
Time Stamp:	10:44:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		C031RTF.pdf	130827 70fa1c824fdde1ea0323059d756780dd06dabb18	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Amendment Copy Claims/Response to Suggested Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	6
Warnings:			
Information:			
	Total Files Size (in bytes):	130827	

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.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/552,927	Filing Date 08/27/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	03/16/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 5	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/JULIET MCMILLAN/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00	1683

63467 7590 02/04/2021

Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

EXAMINER	
MALEK, LEILA	

ART UNIT	PAPER NUMBER
2632	

NOTIFICATION DATE	DELIVERY MODE
02/04/2021	ELECTRONIC

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

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

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

tevenbly@rameyfirm.com
uspto@rameyfirm.com
wramey@rameyfirm.com

Office Action Summary	Application No. 16/552,927	Applicant(s) SUN et al.	
	Examiner LEILA MALEK	Art Unit 2632	AIA (FITF) Status Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 10/07/2020.

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

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

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

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

Disposition of Claims*

5) ☑ Claim(s) 1-4,6-9,11-13,15-19 and 21-23 is/are pending in the application.

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

6) ☑ Claim(s) 2-4,9,11-13,15-19 and 21-23 is/are allowed.

7) ☑ Claim(s) 1 and 6-8 is/are rejected.

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

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

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

Application Papers

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

11)☑ The drawing(s) filed on 08/27/2019 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

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

Attachment(s)

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

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Response to Amendment

2. This Office Action is in response to the amendments received on 10/07/2020.

Claim Rejections - 35 USC § 103

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

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

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

3. Claims 1 and 6-8 are rejected under 35 U.S.C. 103 as being unpatentable over Kolze (US 2013/0223506), in view of Thirumoorthy (US 2010/0232493).

As to claim 1, Kolze discloses a method that comprises, in a transceiver (see paragraph 0042): determining a performance characteristic for initial pre-equalizer coefficient values (see paragraphs 0061 and 0065, Fig. 13, blocks 1310,1320, 1330, and 1340); selecting one of multiple pre-equalizer settings to specify initial pre-equalizer

coefficient values for subsequent use (see paragraphs 0075, 0077, and Fig. 13, blocks 1310 and 1320); updating the initial pre-equalizer coefficient values during a training phase (see paragraph 0079 and Fig. 13, blocks 1330, 1340, and 1350, wherein the channel monitoring phase associated with blocks 1330 and 1340 is interpreted as a training phase); and using the updated pre-equalizer coefficient values to convey a transmit data stream (see Fig. 12, blocks 1230 and 1240 and paragraph 0076). Kolze discloses all the subject matters claimed in claim 1, except that the coefficients are stored in registers. Thirumoorthy, in the same field of endeavor, discloses a transceiver in a communication system comprising an equalizer that includes an n-tap FIR filter having n coefficients (see Fig. 2, block 218 and paragraphs 0035-0036, 0054, 0062, and 0088), where the coefficients of the equalizer are stored in coefficient registers that are accessible by the equalizer (see paragraphs 0036, 0054, 0062, and 0088). It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to modify the teachings of Kolze as suggested by Thirumoorthy and store the coefficients of the filter (e.g., equalizer or pre-equalizer) in multiple registers in order organize and control the coefficients more effectively and independently. Athough Thirumoorthy does not expressly disclose selecting one of the registers, Kolze discloses selecting one of multiple pre-equalizer settings (e.g. coefficient values, see Fig. 13, block 1320) to specify initial pre-equalizer coefficient values and Thirumoorthy discloses saving the coefficients in different registers. One of ordinary skill in the art before the effective filing date of the invention was made would have recognized that when different coefficients (e.g. initial pre-equalizer coefficients) are stored in different registers, selecting a coefficient is equivalent to selecting the register associated with

that coefficient. Therefore, the combination of the Kolze's and Thirumoorthy's teaching covers all the limitations cited in claim 1.

As to claim 6, Kolze discloses that the performance characteristic is an error signal energy (see paragraphs 0061 and 0065, SNR is the signal energy divided by noise (error) energy).

As to claim 7, Kolze discloses that the performance characteristic is a bit error rate (see paragraph 0061, "allowable error rates" (e.g., bit error rate)). There are finite number of performance characteristics known in the art and it would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to pick bit error rate as the performance characteristic to work with, in order to obtain predictable results and increase the performance of the communication system.

As to claim 8, Kolze discloses updating the initial pre-equalizer coefficient values (see paragraph 0079 and Fig. 13, blocks 1330, 1340, and 1350). Thirumoorthy also discloses updating the registers with the updated pre-equalizer coefficient values (see paragraph 0088 and Fig. 9, blocks 916 and 918). It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to modify Kolze's teaching as suggested by Thirumoorthy and update the selected register with the updated pre-equalizer coefficient values in order to make sure that the register contains the most updated version of the pre-equalizer coefficients and increase the reliability of the system.

Allowable Subject Matter

4. Claims 2-4, 9, 11-13, 15-19, and 21-23 are allowed.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEILA MALEK whose telephone number is (571)272-8731. The examiner can normally be reached on Monday-Friday 8:30am-4:30pm.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. 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.

LEILA . MALEK
Examiner
Art Unit 2632

/LEILA MALEK/
Primary Examiner, Art Unit 2632

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/552,927	SUN et al.
	Examiner	**Art Unit**
	LEILA MALEK	2632

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

CLAIMS

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

CLAIM		DATE								
Final	Original	01/30/2021								
	1	✓								
	2	=								
	3	=								
	4	=								
	5	-								
	6	✓								
	7	✓								
	8	✓								
	9	=								
	10	-								
	11	=								
	12	=								
	13	=								
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/552,927	SUN et al.
	Examiner	Art Unit
	LEILA MALEK	2632

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
EAST, IEEE, Inventor Name Search	01/30/2021	L.M.

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

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L10	49	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 11:29 AM
L11	11	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	US-PGPUB; USPAT	OR	ON	ON	2020/06/22 12:04 PM
L12	11	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	US-PGPUB; USPAT	OR	ON	ON	2020/06/22 12:15 PM
L13	2	12 AND (pre$1equaliz$3 near3 coefficient$1)	US-PGPUB; USPAT	OR	ON	ON	2020/06/22 12:15 PM
L14	2	12 AND (pre$1equaliz$3 near3 (tap$1 OR weight$1 OR coefficient$1))	US-PGPUB; USPAT	OR	ON	ON	2020/06/22 12:16 PM
L15	0	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group) near3 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 12:21 PM
L16	91	(select$3 OR pick$3 OR obtain$3 OR choos$3) near4 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 12:21 PM
L17	1	16 AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:07 PM

L18	1	(select$3 OR pick$3 OR obtain$3 OR choos$3) near4 (pre$1equaliz$3) AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:08 PM
L19	1	(pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1) AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:09 PM
L20	1	(pre$1equaliz$3) AND c2m adj1 (channels OR path$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:10 PM
L21	2	(pre$1equaliz$3) AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:10 PM
L22	230	(pre$1equaliz$3) AND (channel adj1 models)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:48 PM
L23	44	(pre$1equaliz$3) WITH (channel adj1 models)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:49 PM
L24	0	23 AND (different OR multiple OR plurality) adj2 (channel adj1 models)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:51 PM
L25	3	(pre$1equaliz$3) WITH (channel adj1 models)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/22 04:54 PM
L26	8	(pre$1equaliz$3 near3 (coefficient$1 OR tap$1 OR weight$1)) WITH (channel adj1 model$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:56 PM
L27	44	(pre$1equaliz$3) WITH (channel adj1 model$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 05:24 PM
L28	1	serdes AND c2m AND pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 10:09 AM
L29	1	serdes AND c2m near3	US-PGPUB; USPAT;	OR	ON	ON	2020/06/23

		channel$1	USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB				10:10 AM
L30	12	serdes AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 10:10 AM
L31	6	serdes AND c2m AND (coefficient$1 OR weight$1 OR tap$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:32 AM
L32	0	serdes AND c2c AND pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:37 AM
L33	45	serdes AND pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:37 AM
L34	13	serdes AND pre$1equaliz$3 AND ((select$3 OR choos$3 OR pick$3 OR determin$3) near7 pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:38 AM
L35	524	(channel near2 response) near6 (channel adj1 model)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:42 AM
L36	10	pre$1equaliz$3 SAME (coefficient$1 OR tap$1 OR weight$1) SAME (channel adj1 model$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:45 AM
L37	4	(select$3 OR choos$3 OR pick$3 OR determin$3) near5 pre$1equaliz$3 SAME (channel adj1 model$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:48 AM
L38	0	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (register OR memory OR storage) SAME (pre$1equaliz4)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 03:17 PM
L39	43	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (register OR	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO;	OR	ON	ON	2020/06/23 03:17 PM

		memory OR storage) SAME (pre$1equaliz$3)	DERWENT; IBM_TDB				
L40	6	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (table) SAME (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 03:52 PM
L41	9	(select$3 OR pick$3 OR obtain$3 OR choos$3 OR determin$3 OR decid$3) near2 (set OR group OR table) near3 (coefficient$1 OR tap$1 OR weight$1) SAME pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 05:09 PM
L42	2	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (training adj1 (mode OR phase OR period))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 05:49 PM
L43	8	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (training)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 05:50 PM
L44	3	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (initializ$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 01:56 PM
L45	119	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3 (pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 02:46 PM
L46	0	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3 (pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1) SAME (channel adj1 model)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 02:49 PM
L47	2	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 02:49 PM

		(pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1) AND (channel adj1 model)					
L48	4115	(sav$3 OR stor$3) near4 (coefficient$1 OR tap$1 OR weight$1) near3 (different OR independent OR plurality OR several) near3 (register$1 OR table$1 OR memor$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 03:12 PM
L49	17	(sav$3 OR stor$3) near4 (equalizer OR pre$1equalizer) near2 (coefficient$1 OR tap$1 OR weight$1) near3 (different OR independent OR plurality OR several OR multiple) near3 (register$1 OR memor$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 03:14 PM
L50	51	(registers OR memories OR (memory adj1 units)) near4 (equalizer OR pre$1equalizer) near2 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/24 03:19 PM
L51	4	(registers OR memories OR (memory adj1 units)) near4 (pre$1equaliz$5) near2 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/24 03:50 PM
L52	11	(select$3 OR choos$3 OR pick$3) near3 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 04:18 PM
L53	2	(select$3 OR choos$3 OR pick$3) near5(initial) near4 (pre$1equaliz$3) near5 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 04:22 PM
L54	29	(select$3 OR choos$3 OR pick$3) near4 (pre$1equaliz$3) near5 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 04:28 PM
L55	23	54 AND (updat$3 OR adjust$3) near5	US-PGPUB; USPAT; USOCR; FIT (CN, FR,	OR	ON	ON	2020/06/24 04:31 PM

		(coefficient$1 OR tap$1 OR weight$1)	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB				
L56	8	(coefficient$1 OR tap$1 OR weight$1) near6 pre$1equaliz$3 WITH (channel adj1 model)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:09 PM
L57	31	(coefficient$1 OR tap$1 OR weight$1) near6 pre$1equaliz$3 WITH (impulse adj1 response adj3 channel)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:13 PM
L58	39	(coefficient$1 OR tap$1 OR weight$1) near6 pre$1equaliz$3 WITH ((impulse adj1 response adj3 channel) OR (channel adj1 model))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:15 PM
L59	0	L58 AND (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:17 PM
L60	215	(coefficient$1 OR tap$1 OR weight$1) WITH (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:18 PM
L61	0	(coefficient$1 OR tap$1 OR weight$1) WITH (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model)) AND (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:18 PM
L62	66	(coefficient$1 OR tap$1 OR weight$1) WITH ((EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 channel) AND (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:19 PM

L63	11	(coefficient$1 OR tap$1 OR weight$1) WITH ((EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 channel) AND ((pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:19 PM
L64	8	(coefficient$1 OR tap$1 OR weight$1) WITH (channel adj1 model) AND ((pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:24 PM
L65	1	c2m AND (insertion adj1 loss) AND (package adj1 loss)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:30 PM
L66	2	((coefficient$1 OR tap$1 OR weight$1) near3 pre$1equaliz$3) WITH ((performance adj1 characteristic$1) OR (error adj1 signal adj1 (power OR energy)) OR (bit adj1 error adj1 rate))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:36 PM
L67	0	(sav$3 OR stor$3) near3 (updated OR adjusted) adj3 (coefficient$1 OR tap$1 OR weight$1) near3 pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:41 PM
L68	30	(sav$3 OR stor$3) near3 (updated OR adjusted) adj3 (coefficient$1 OR tap$1 OR weight$1) near3 equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:41 PM
L69	11	(port adj1 connector) WITH transceiver WITH pluggable	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:49 PM
L70	2	(port adj1 connector) WITH transceiver WITH pluggable AND pre$1equalizer$1	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:49 PM
L71	2	(port adj1 connector) WITH transceiver WITH pluggable AND	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO;	OR	ON	ON	2020/06/24 06:49 PM

		pre$1equaliz$3	DERWENT; IBM_TDB				
L72	0	(chip$1to$1module OR c2m) AND (port adj1 connect$3) AND (plug$4 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:50 PM
L73	364	(port adj1 connect$3) AND (plug$4 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:51 PM
L74	13	(port adj1 connect$3) WITH (plug$4 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:23 AM
L75	3	(port adj1 connect$3) WITH (plug$4 near3 transceiver) AND (filter OR pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:23 AM
L76	13	(port adj1 connect$3) WITH (plug$4 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:27 AM
L77	319	(port near2 connect$3) WITH (plug$5 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:32 AM
L78	3	(port near2 connect$3) WITH (plug$5 near3 transceiver) WITH (port adj1 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:33 AM
L79	2	(pre$1equaliz$3) near3 (coefficients OR taps OR weights OR (coefficient adj1 values) OR (tap adj1 values)) near5 (registers OR (storage adj1 units) OR memories)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/25 06:35 AM
L80	4	(pre$1equaliz$3) SAME (coefficients OR taps OR weights OR (coefficient adj1 values) OR (tap adj1 values)) near6 (registers OR (storage adj1 units) OR memories)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/25 06:36 AM
L81	1	(pre$1equaliz$3) SAME ((coefficient OR tap OR weight) near2 set) near6	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO;	OR	OFF	ON	2020/06/25 06:46 AM

		(register$1 OR (storage adj1 unit$1) ormemor$3)	DERWENT; IBM_TDB				
L82	9	(pre$1equaliz$3) SAME ((coefficient OR tap OR weight) near2 set) near6 (register$1 OR (storage adj1 unit$1) OR memor$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:47 AM
L83	0	(pre$1equaliz$3) SAME (sav$3 OR stor$3) near3 (each OR different OR several OR multiple) adj1 set$1 near3 (coefficient OR tap OR weight)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:51 AM
L84	15	(pre$1equaliz$3) SAME (each OR different OR several OR multiple) adj1 set$1 near3 (coefficient OR tap OR weight)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:52 AM
L85	0	(pre$1equaliz$3) SAME (port adj1 transmitter)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:21 AM
L86	0	(pre$1equaliz$3) SAME3 (port adj1 transmitter)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:21 AM
L87	0	(pre$1equaliz$3) AND (port adj1 transmitter)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:22 AM
L88	22	(pre$1equaliz$3) AND (port near2 transmitter)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:22 AM
L89	55	(pre$1equaliz$3) AND (port near2 transmit$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:24 AM
L90	12	(pre$1equaliz$3) AND (port near2 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:24 AM
L91	14	(pre$1equaliz$3) AND (port near3 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO;	OR	ON	ON	2020/06/25 11:27 AM

			DERWENT; IBM_TDB				
L92	3177	cable SAME (port near3 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:40 AM
L93	1601	cable WITH (port near3 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:40 AM
L94	2460	network WITH (port near1 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:41 AM
L95	1497	network WITH (port adj1 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:41 AM
L96	609	network near5(port adj1 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:41 AM
L97	0	network near5 "port adj1 transceiv$3"	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:43 AM
L98	0	"port adj1 transceiv$3"	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:43 AM
L99	0	"port adj1 transceiver"	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:44 AM
L100	4775	"port transceiver"	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:44 AM
L101	550	"port transceiver" near5 network	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:45 AM
L102	483	"port transceiver" near5 network	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/25 11:45 AM

L103	1	(select$3 near4 register) WITH pre$1equaliz$3 AND (sun.inv. OR qian.inv.)	US-PGPUB; USPAT	OR	ON	ON	2020/07/03 06:52 AM
L104	1	"20020141347" AND (model WITH coefficient$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 03:32 PM
L105	1	"20020141347" AND (model WITH (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 03:36 PM
L106	160	(channel adj1 model) near4 (channel adj1 characteristic$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 03:42 PM
L107	7	(channel adj1 model) WITH (pre$1equalizer near3 (tap$1 OR coefficient$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 04:01 PM
L108	1	"20130223506" AND (pre$1equaliz$3 WITH (fir OR filter$3))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 10:52 PM
L109	839852	20100232493and (control$4 near5 (coefficient$1 OR tap$1 OR register$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 11:14 PM
L110	0	"20100232493" AND (control$4 near5 (coefficient$1 OR tap$1 OR register$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 11:17 PM
L111	2	"20100232493" AND (control$4 WITH (coefficient$1 OR tap$1 OR register$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 11:17 PM
L112	2	"20100232493" AND (control$4 WITH (coefficient$1 OR tap$1 OR register$1)) AND (register WITH coefficient$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 11:18 PM
L113	1	"20130201316" AND (connector WITH port)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO;	OR	ON	ON	2020/07/04 08:44 AM

			DERWENT; IBM_TDB				
L114	1	"20130201316" AND (connector SAME port)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/04 08:46 AM
L115	2	"20130201316" AND (plug$4 SAME (modem OR transceiver))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/04 09:03 AM
L116	22	((performance adj1 characteristic$1) OR (snr OR snir OR ber) OR (signal adj2 noise adj2 ratio) OR (bit adj1 error adj1 rate) OR (error adj1 signal adj1 energy)) WITH (pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/04 04:40 PM
L117	6	(ber OR (bit adj1 error adj1 rate)) WITH (pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/04 05:30 PM
L118	3	(ber OR (bit adj1 error adj1 rate)) SAME ((choos$3 OR select$3 OR pick$3 OR updat$3 OR adapt$3 OR determin$3 OR calculat$3) near3 pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/05 10:30 AM
L119	35	(ber OR (bit adj1 error adj1 rate)) AND ((choos$3 OR select$3 OR pick$3 OR updat$3 OR adapt$3 OR determin$3 OR calculat$3) near3 pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/05 10:31 AM
L120	93	(ber OR (bit adj1 error adj1 rate)) AND (pre$1equaliz$3 near2 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/05 03:22 PM

L121	1	(ber OR (bit adj1 error adj1 rate)) SAME (pre$1equaliz$3 near2 (parameter$1 OR setting$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/05 09:20 PM
L122	28	(ber OR (bit adj1 error adj1 rate)) WITH (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/05 09:22 PM
L123	58	(ber OR (bit adj1 error adj1 rate)) SAME (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/05 09:31 PM
L124	1	"20130223506" AND (different near4 channel$1 WITH pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/16 04:07 PM
L125	17	((different OR each) adj1 (set$1 OR group$1)) near4(equaliz$3 OR pre$1equaliz$3) near4 (coefficients OR weights OR taps) WITH (stor$3 OR storage OR ram OR table OR memory)	US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/16 04:19 PM
L126	1	"20130223506" AND ((different OR distinct OR each) near7 channel$1 WITH pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/16 04:41 PM
L127	6535	((set$1 OR group$1)) near4(equaliz$3 OR pre$1equaliz$3 OR filter) near4 (coefficient$1 OR weight$1 OR tap$1) near8 (register OR storage OR ram OR table OR memory)	US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/19 10:51 AM
L132	14	((each OR every OR different) adj2 (set$1 OR group$1)) near4(equaliz$3 OR pre$1equaliz$3 OR filter$1) near4 (coefficient$1 OR	US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/19 02:42 PM

		weight$1 OR tap$1) near8 (separate OR different OR distinct) adj1 (register OR storage OR ram OR table OR memory) AND @ad<=20180828					
L133	2	"20130223506" AND (channel$1 WITH (pre$1equaliz$3 OR equaliz$3))	US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/19 03:30 PM
L134	2	"20130223506" AND (channel$1 near5 characteristic$1)	US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/19 04:42 PM
L135	2	"20130223506" AND (snr)	US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/19 04:42 PM
L136	6	((select$3 OR choos$3 OR pick$3) near4 beam near2 pair) WITH (interfer$3 near4 (enb OR station$1 OR ue$1 OR device$1 OR unit$1))	US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2021/01/21 01:24 PM
L137	0	"20130201316" AND (port WITH equaliz$3)	US-PGPUB; USPAT	OR	ON	ON	2021/01/30 05:44 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Inventor: Junqing SUN	Atty. Docket No. 20160.0031.NPUS00
Application No. 16/552,927	Confirmation No.: 1683
Filing Date: August 27, 2019	Examiner: MALEK, Leila
Title: SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTER	Group Art Unit: 2632

RESPONSE TO NOTICE REQUIRING EXCESS CLAIMS FEES

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

Dear Commissioner:

Applicant acknowledges receipt of the attached Notice Requiring Excess Claims Fees dated October 14, 2020. The identified excess claim fees (total fees due of $960.00) are filed with this submission.

The reader is encouraged to contact the undersigned representative with any questions.

Respectfully submitted,

Date: December 10, 2020

/Dan Krueger/

Registration No. 42,771
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Attorney for Applicant

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00	1683

63467 7590 10/14/2020

Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

EXAMINER	
MALEK, LEILA	

ART UNIT	PAPER NUMBER
2632	

NOTIFICATION DATE	DELIVERY MODE
10/14/2020	ELECTRONIC

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

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

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

tevenbly@rameyfirm.com
uspto@rameyfirm.com
wramey@rameyfirm.com

NOTICE REQUIRING EXCESS CLAIMS FEES	Application No.	Applicant(s)
	16/552,927	SUN et al.
	Art Unit	AIA (FITF) Status
	OED2	Yes

The excess claim(s) filed on 07 October 2020 is/are not accompanied by the appropriate payment of excess claims fees set forth in 37 CFR 1.16(h)-(j) or 1.492(d)-(f). Excess claims fees are required for each claim in independent form in excess of three (§ 1.16(h)), each claim (whether dependent or independent) in excess of twenty (note that § 1.75(c) indicates how multiple dependent claims are considered for fee calculation purposes) (§ 1.16(i)), and each application that contains a multiple dependent claim (§ 1.16(j)).

Since the application is not under a final rejection, applicant is given a time period of **TWO (2) MONTHS** from the mailing date of this notice to submit either: (1) the fee payment of $ 960.00 , or (2) an amendment in compliance with 37 CFR 1.121 that cancels the excess claim(s), in order to avoid ABANDONMENT. Extensions of this time period may be granted under 37 CFR 1.136, unless the excess claim(s) was/were presented in a preliminary amendment.

☐ 1. The funds in Deposit Account No. _____ are insufficient to cover the entire fee due. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.

☐ 2. The Credit Card payment to cover the entire fee due to Account _____ (**Card type + last 4 digits ONLY**) was refused. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.

☑ 3. The amendment that includes the excess claim(s) has not been entered, since applicant has failed to remit (or authorize charge to a Deposit Account or Credit Card) the fee as indicated on the attached Patent Application Fee Determination Record (PTO/SB/06). Remittance or authorization is due within the time period set forth in this notice .

☐ 4. The fee submitted in this application is insufficient. A balance of $ _____ is due for presentation of excess claims (37 CFR 1.16(h)-(j) or 1.492(d)-(f)).

☐ 5. Other.

Explanation (*Provide specific details of the required correction in order to assist the applicant. Indicate whether a service charge has been added to the fee due*): _____

THE AMOUNT OF THE FEE(S) DUE IS SUBJECT TO CHANGE, GENERALLY ON OCTOBER 1 OF EACH YEAR (37 CFR 1.16, 1.21 & 1.492). THE **AMOUNT OF THE FEE(S) DUE IS DETERMINED AS OF THE DATE A COMPLETE REPLY WITH THE APPROPRIATE FEE(S) IS RECEIVED BY THE OFFICE** (37 CFR 1.8 & 1.10). BECAUSE THE AMOUNT DUE IS SUBJECT TO CHANGE, IT IS RECOMMENDED THAT APPLICANT CHECK THE CURRENT FEE SCHEDULE WHICH IS AVAILABLE ON THE USPTOS WEBSITE AT: ***http://www.uspto.gov/web/offices/ac/qs/ope/fees.htm***

Service Charges: There is a $50 service charge for processing each payment refused (including a check returned unpaid) or charged back by a financial institution (37 CFR 1.21(m)). There is a $25.00 service charge for each month when the balance of a deposit account is below $1000 at the end of the month (37 CFR 1.21(b)(2)).

Technical Support Staff (TSS): /ALLYSON PURNELL/ Phone Number: (571)272-6182

Note to TSS: Please do NOT use this notice if the application is under a final rejection.

Electronic Patent Application Fee Transmittal					
Application Number:	16552927				
Filing Date:	27-Aug-2019				
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS				
First Named Inventor/Applicant Name:	Junqing SUN				
Filer:	Daniel Joseph Krueger/Shanay Hines				
Attorney Docket Number:	20160.0031.NPUS00				
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:					
INDEPENDENT CLAIMS IN EXCESS OF 3		1201	2	480	960
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt	
EFS ID:	41349414
Application Number:	16552927
International Application Number:	
Confirmation Number:	1683
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Customer Number:	63467
Filer:	Daniel Joseph Krueger/Shanay Hines
Filer Authorized By:	Daniel Joseph Krueger
Attorney Docket Number:	20160.0031.NPUS00
Receipt Date:	10-DEC-2020
Filing Date:	27-AUG-2019
Time Stamp:	14:01:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$960
RAM confirmation Number	E2020B0E02329814
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	Transmittal Letter	20160-0031_Response_to_add_claim_excess_fees.pdf	109244 5879cea30e8c0b8e6ef7da05de499e818033cf15	no	1
Warnings:					
Information:					
2	Transmittal Letter	2020-10-14-Notice-of-Additional-fee-16552927.pdf	93035 7cd0fc7825d4548f037681973e4bdc80307242be	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	31000 3e8a4a39ce6b170441281109c6be2374fd5a3d0c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	233279		

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00	1683

63467 7590 10/14/2020

Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

EXAMINER	
MALEK, LEILA	

ART UNIT	PAPER NUMBER
2632	

NOTIFICATION DATE	DELIVERY MODE
10/14/2020	ELECTRONIC

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

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

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

tevenbly@rameyfirm.com
uspto@rameyfirm.com
wramey@rameyfirm.com

NOTICE REQUIRING EXCESS CLAIMS FEES	Application No.	Applicant(s)
	16/552,927	SUN et al.
	Art Unit	AIA (FITF) Status
	OED2	Yes

The excess claim(s) filed on 07 October 2020 is/are not accompanied by the appropriate payment of excess claims fees set forth in 37 CFR 1.16(h)-(j) or 1.492(d)-(f). Excess claims fees are required for each claim in independent form in excess of three (§ 1.16(h)), each claim (whether dependent or independent) in excess of twenty (note that § 1.75(c) indicates how multiple dependent claims are considered for fee calculation purposes) (§ 1.16(i)), and each application that contains a multiple dependent claim (§ 1.16(j)).

Since the application is not under a final rejection, applicant is given a time period of **TWO (2) MONTHS** from the mailing date of this notice to submit either: (1) the fee payment of $ 960.00 , or (2) an amendment in compliance with 37 CFR 1.121 that cancels the excess claim(s), in order to avoid ABANDONMENT. Extensions of this time period may be granted under 37 CFR 1.136, unless the excess claim(s) was/were presented in a preliminary amendment.

☐ 1. The funds in Deposit Account No. _____ are insufficient to cover the entire fee due. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.

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☑ 3. The amendment that includes the excess claim(s) has not been entered, since applicant has failed to remit (or authorize charge to a Deposit Account or Credit Card) the fee as indicated on the attached Patent Application Fee Determination Record (PTO/SB/06). Remittance or authorization is due within the time period set forth in this notice .

☐ 4. The fee submitted in this application is insufficient. A balance of $ _____ is due for presentation of excess claims (37 CFR 1.16(h)-(j) or 1.492(d)-(f)).

☐ 5. Other.

Explanation (*Provide specific details of the required correction in order to assist the applicant. Indicate whether a service charge has been added to the fee due*): _____

THE AMOUNT OF THE FEE(S) DUE IS SUBJECT TO CHANGE, GENERALLY ON OCTOBER 1 OF EACH YEAR (37 CFR 1.16, 1.21 & 1.492). THE **AMOUNT OF THE FEE(S) DUE IS DETERMINED AS OF THE DATE A COMPLETE REPLY WITH THE APPROPRIATE FEE(S) IS RECEIVED BY THE OFFICE** (37 CFR 1.8 & 1.10). BECAUSE THE AMOUNT DUE IS SUBJECT TO CHANGE, IT IS RECOMMENDED THAT APPLICANT CHECK THE CURRENT FEE SCHEDULE WHICH IS AVAILABLE ON THE USPTOS WEBSITE AT: ***http://www.uspto.gov/web/offices/ac/qs/ope/fees.htm***

Service Charges: There is a $50 service charge for processing each payment refused (including a check returned unpaid) or charged back by a financial institution (37 CFR 1.21(m)). There is a $25.00 service charge for each month when the balance of a deposit account is below $1000 at the end of the month (37 CFR 1.21(b)(2)).

Technical Support Staff (TSS): /ALLYSON PURNELL/ Phone Number: (571)272-6182

Note to TSS: Please do NOT use this notice if the application is under a final rejection.

Serial No.:	16/552927
Filing Date:	2019-08-27
Confirmation:	1683
Atty Docket:	20160.0031.NPUS00
1st Inventor:	Junqing Sun
Title:	SerDes Pre-equalizer having Adaptable Preset Coefficient Registers
Examiner:	Leila Malek
Art Unit:	2632

RESPONSE TO OFFICE ACTION OF 2020-07-09

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 23313-1450

Dear Sir or Madam:

This paper is submitted in response to the above-identified office action. Please reconsider the rejections in light of the following amendments and remarks.

An Amendment to the Claims begins on page 2.

Remarks begin on page 5.

Amendment to the Claims

Please amend the claims to read as provided below:

1. (Currently amended) A SerDes communications method that comprises, in a transceiver:

determining a performance characteristic for initial pre-equalizer coefficient values in each of multiple registers;

selecting one of the multiple registers to specify initial pre-equalizer coefficient values for subsequent use;

updating the initial pre-equalizer coefficient values during a training phase; and

using the updated pre-equalizer coefficient values to convey a transmit data stream.

2. (Currently amended) ~~The method of claim 1, wherein~~ A SerDes communications method that comprises, in a transceiver:

selecting one of multiple registers to specify initial pre-equalizer coefficient values, each of the multiple registers ~~corresponds~~ corresponding to a different channel model;

updating the initial pre-equalizer coefficient values during a training phase; and

using the updated pre-equalizer coefficient values to convey a transmit data stream.

3. (Original) The method of claim 2, wherein at least some of the different channel models are for chip-to-module (C2M) channels with different insertion loss and package loss characteristics.

4. (Original) The method of claim 2, wherein at least some of the different channel models presume different types of receiver equalization.

5. (Canceled)

6. (Original) The method of claim 1, wherein the performance characteristic is an error signal energy.

7. (Original) The method of claim 1, wherein the performance characteristic is a bit error rate.

8. (Original) The method of claim 1, further comprising updating the selected register with the updated pre-equalizer coefficient values.

9. (Currently amended) A chip-to-module communications link that comprises a port connector coupling a port transceiver to a pluggable module transceiver, the pluggable module transceiver including:

one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to the port transceiver; and

a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values corresponding to a different channel model, the controller using one of the registers to set initial coefficient values for the one or more transmit filters.

10. (Canceled)

11. ~~The communications link of claim 10, wherein~~ A chip-to-module communications link that comprises a port connector coupling a port transceiver to a pluggable module transceiver, the pluggable module transceiver including:

one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to the port transceiver; and

a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values for which the port transceiver ~~iteratively selects different ones of the multiple registers and~~ determines a performance characteristic ~~for each~~,

the controller using one of the registers selected by the port transceiver to specify the initial coefficient values for the one or more transmit filters.

12. (Original) The communications link of claim 11, wherein the performance characteristic is an error signal energy.

13. (Original) The communications link of claim 11, wherein the performance characteristic is a bit error rate.

14. (Canceled)

15. (Currently amended) The communications link of ~~claim 14~~ claim 9, wherein at

least some of the different channel models are for chip-to-module (C2M) channels with different insertion loss and package loss characteristics.

16. (Currently amended) The communications link of ~~claim 14~~ claim 9, wherein at least some of the different channel models presume different types of receiver equalization.

17. (Currently amended) The communications link of ~~claim 9~~ claim 11, wherein the port transceiver generates updates for the coefficient values of the one or more transmit filters.

18. (Original) The communications link of claim 17, wherein the controller saves updated coefficient values in one of the registers.

19. (Currently amended) A pluggable module transceiver including:

one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to a port transceiver; and

a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values corresponding to a different channel model, the controller using one of the registers to set initial coefficient values for the one or more transmit filters.

20. (Canceled)

21 . (New) The pluggable module transceiver of claim 19, wherein the port transceiver determines a performance characteristic for each register.

22. (New) The pluggable module transceiver of claim 21, wherein the performance characteristic is an error signal energy.

23. (New) The pluggable module transceiver of claim 21, wherein the performance characteristic is a bit error rate.

Remarks

Status of the Claims

Claims 1-20 were pending. Claims 5, 10, 14, and 20 are canceled. Claims 1-2, 9, 11, 15-17, and 19, are amended. New claims 21-23 are added. Claims 1-4, 6-9, 11-13, 15-19, and 21-23 are now pending.

The number of independent claims has increased from 3 to 5. The number of total claims has decreased from 20 to 19.

Rejections Under 35 USC § 112

Claims 6-7 stand rejected under 35 USC § 112 as lacking antecedent basis for "the performance characteristic". These claims depend from independent claim 1, which now provides sufficient antecedent basis. Applicant respectfully submits that this rejection is fully addressed by claim 1 as amended.

Rejections Under 35 USC § 103

Claims 1 and 8 stand rejected under 35 USC § 103 as being unpatentable over US2013/0223506 ("Kolze") in view of US2010/0232493 ("Thirumoorthy").

Claims 9-10 and 17-19 stand rejected under 35 USC § 103 as being unpatentable over Kolze and Thirumoorthy in view of US2013/0201316 ("Binder").

Claim 10 has been canceled. Insofar as the rejections apply to the pending claims as amended, applicant respectfully traverses because the cited art fails to teach or suggest every limitation of the claims.

For example, independent claim 1 has been amended to incorporate limitations from canceled claim 5, which was indicated to contain allowable subject matter. Claim 8 depends from independent claim 1 and is allowable for at least the same reasons.

Independent claim 9 has been amended to incorporate limitations from canceled claim 14, which was indicated to contain allowable subject matter.

Claim 17 has been amended to depend from claim 11, which was indicated to contain allowable subject matter. Claim 18 depends from claim 17 and is allowable for at least the same reasons.

Independent claim 19 has been amended to incorporate limitations from canceled claim 20, which was indicated to contain allowable subject matter. New claims 21-23 depend from independent claim 19 and are believed to be allowable for at least the same reasons.

Allowable Subject Matter

Claims 2-5, 11-16, and 20 were indicated to contain allowable subject matter.

Claim 2 has been amended into independent form, and accordingly claim 2 and its dependent claims 3-4 are believed to be in condition for allowance.

Claim 5 has been canceled and the relevant limitations incorporated into independent claim 1, which is now believed to be in condition for allowance.

Claim 11 has been amended into independent form, and accordingly claim 11 and its dependent claims 12-13 are believed to be in condition for allowance.

Claims 14 has been canceled and the relevant limitations incorporated into independent claim 9, which is now believed to be in condition for allowance along with its dependent claims 15-16.

Claim 20 has been canceled and the relevant limitations incorporated into independent claim 19, which is now believed to be in condition for allowance.

Conclusion

Applicant appreciates the examiner's careful examination of the present application. The examiner is encouraged to contact the undersigned practitioner if an interview might prove helpful to the examination process.

Respectfully submitted,

/Dan Krueger/ 2020-10-07

_____ _____

Daniel J. Krueger Date
Reg. No. 42,771
(713) 449-9669
Attorney for Applicant

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Houston TX 77006
713-426-3923 x304

Electronic Acknowledgement Receipt	
EFS ID:	40787393
Application Number:	16552927
International Application Number:	
Confirmation Number:	1683
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Customer Number:	63467
Filer:	Daniel Joseph Krueger/Shanay Hines
Filer Authorized By:	Daniel Joseph Krueger
Attorney Docket Number:	20160.0031.NPUS00
Receipt Date:	07-OCT-2020
Filing Date:	27-AUG-2019
Time Stamp:	19:06:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		C031RNF.pdf	135958 3ad0d7fd5aef23f0057119d153f005b78e8a aa6c	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	6
Warnings:			
Information:			
	Total Files Size (in bytes):	135958	

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.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/552,927	Filing Date 08/27/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	10/07/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 3	= 2		x $480 =	960
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	960

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ALLYSON PURNELL/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00	1683

63467 7590 07/09/2020

Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

EXAMINER	
MALEK, LEILA	

ART UNIT	PAPER NUMBER
2632	

NOTIFICATION DATE	DELIVERY MODE
07/09/2020	ELECTRONIC

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

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

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

tevenbly@rameyfirm.com
uspto@rameyfirm.com
wramey@rameyfirm.com

Office Action Summary	Application No. 16/552,927	Applicant(s) SUN et al.	
	Examiner LEILA MALEK	Art Unit 2632	AIA (FITF) Status Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 08/27/2019.

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

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

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

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

Disposition of Claims*

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

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

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1,6-10. and 17-19 is/are rejected.

8) ☑ Claim(s) 2-5,11-16 and 20 is/are objected to.

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

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

Application Papers

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

11)☑ The drawing(s) filed on 08/27/2019 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

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

Attachment(s)

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

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Priority

2. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, 365(c), or 386(c) is acknowledged.

Information Disclosure Statement

3. The information disclosure statements submitted on 06/09/2020 have been considered and made of record by the examiner.

Claim Rejections - 35 USC § 112

> The following is a quotation of 35 U.S.C. 112(b):
> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.
>
> The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 6 and 7 recite the limitation "the performance characteristic". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

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

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

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

5. Claims 1 and 8 are rejected under 35 U.S.C. 103 as being unpatentable over Kolze (US 2013/0223506), in view of Thirumoorthy (US 2010/0232493).

As to claim 1, Kolze discloses a method that comprises, in a transceiver (see paragraph 0042): selecting one of multiple pre-equalizer settings to specify initial pre-equalizer coefficient values (see paragraphs 0075, 0077, and Fig. 13, blocks 1310 and 1320); updating the initial pre-equalizer coefficient values during a training phase (see paragraph 0079 and Fig. 13, blocks 1330, 1340, and 1350, wherein the channel monitoring phase associated with blocks 1330 and 1340 is interpreted as a training phase); and using the updated pre-equalizer coefficient values to convey a transmit data stream (see Fig. 12, blocks 1230 and 1240 and paragraph 0076). Kolze discloses all the subject matters claimed in claim 1, except that the coefficients are stored in registers. Thirumoorthy, in the same field of endeavor, discloses a transceiver in a communication system comprising an equalizer that includes an n-tap FIR filter having n coefficients (see Fig. 2, block 218 and paragraphs 0035-0036, 0054, 0062, and 0088), where the coefficients of the equalizer are stored in coefficient registers that are accessible by the equalizer (see paragraphs 0036, 0054, 0062, and 0088). It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to modify the teachings of Kolze as suggested by Thirumoorthy and

store the coefficients of the filter (e.g., equalizer or pre-equalizer) in multiple registers in order organize and control the coefficients more effectively and independently. Athough Thirumoorthy does not expressly disclose selecting one of the registers, Kolze discloses selecting one of multiple pre-equalizer settings to specify initial pre-equalizer coefficient values and Thirumoorthy discloses saving the coefficients in different registers. One of ordinary skill in the art before the effective filing date of the invention was made would have recognized that when different coefficient sets are stored in different registers, selecting a coefficient set is equivalent to selecting the register associated with that coefficient set. Therefore, the combination of the Kolze's and Thirumoorthy's teaching covers all the limitations cited in claim 1.

As to claim 8, Kolze discloses updating the initial pre-equalizer coefficient values (see paragraph 0079 and Fig. 13, blocks 1330, 1340, and 1350). Thirumoorthy also discloses updating the registers with the updated pre-equalizer coefficient values (see paragraph 0088 and Fig. 9, blocks 916 and 918). It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to modify Kolze's teaching as suggested by Thirumoorthy and update the selected register with the updated pre-equalizer coefficient values in order to make sure that the register contains the most updated version of the pre-equalizer coefficients and increase the reliability of the system.

6. Claims 9, 10, and 17-19, are rejected under 35 U.S.C. 103 as being unpatentable over Kolze and Thirumoorthy, further in view of Binder et al. (hereinafter, referred to as Binder) (US 2013/0201316).

As to claim 9, Kolze discloses a transceiver (see paragraph 0042) including: one or more transmit filters to each pre-equalize a corresponding serial symbol stream (see Fig. 6, see all the pre-equalizers) and a controller using one of pre-equalizer settings to set initial coefficient values for the one or more transmit filters (see Fig. 13 and paragraphs 0075, 0077-0079 and 0086). Kolze discloses all the subject matters claimed in claim 9, except that the communication system comprising a port connector coupling a port transceiver to a pluggable module transceiver, where the pre-equalized streams are being transmitted to the port transceiver. Kolze also does not disclose a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values, the controller using one of the registers to set initial coefficient values. Thirumoorthy, in the same field of endeavor, discloses a transceiver in a communication system comprising an equalizer that includes an n-tap FIR filter having n coefficients (see Fig. 2, block 218 and paragraphs 0035-0036, 0054, 0062, and 0088), where the coefficients of the equalizer are stored in coefficient registers that are accessible by the equalizer (see paragraphs 0036, 0054, 0062, and 0088). It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to modify the teachings of Kolze as suggested by Thirumoorthy and store the coefficients of the filter (e.g., equalizer or pre-equalizer) in multiple registers in order organize and control the coefficients more effectively and independently. Thirumoorthy does not expressly disclose selecting one of the registers. Kolze discloses selecting one of multiple pre-equalizer settings to specify initial pre-equalizer coefficient values and Thirumoorthy discloses saving the coefficients in different registers. One of ordinary skill in the art before the effective filing date of the invention was made would

have recognized that when different coefficient sets are stored in different registers, selecting a coefficient set by the controller is equivalent to selecting the register associated with that coefficient set. Therefore, the combination of the Kolze's and Thirumoorthy's teaching covers all the limitations cited in claim 9 associated with selecting a register. Kolze shows that the pre-equalized signals are transmitted to a network (see Fig. 5). Also as previously mentioned, Kolze discloses a transceiver (see paragraph 0042). Kolze and Thirumoorthy disclose all the subject matters claimed in claim 9, except that the communication system comprising a port connector coupling a port transceiver to a pluggable module transceiver, where the pre-equalized streams are being transmitted to the port transceiver. Binder, in the same field of endeavor, discloses a communication system that comprises a transceiver communicating over a network (see paragraph 0041). Binder further discloses that the transceiver is coupled to a port for interfacing and communicating over a network (see paragraphs 0041 and 0273). Binder also discloses that the communication system comprising a port connector coupling a port transceiver to a transceiver (see paragraph 0033, last five lines, paragraph 0041, last four lines, paragraph 0043, last four lines, and paragraphs 0119 and 0172). Binder discloses that the transceiver is a modem (see paragraph 0050). Even though Binder does not expressly disclose that the transceiver (modem) is pluggable, however, it would have been extremely recognizable to one of ordinary skill in the art that all the modems are pluggable devices. It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to make the modem (transceiver) pluggable in order to enable the modem (transceiver) to serve its function. It would have been obvious to one of ordinary skill in the art before

the effective filing date of the invention was made to modify Kolze's and Thirumoorthy's teaching as suggested by Binder in order to enable the transceiver to communicate with the network.

As to claim 10, although Thirumoorthy does not expressly disclose selecting one of the registers by the transceiver, Kolze discloses selecting one of multiple pre-equalizer settings, by the transceiver, to specify initial pre-equalizer coefficient values and Thirumoorthy discloses saving the coefficients in different registers. One of ordinary skill in the art before the effective filing date of the invention was made would have recognized that the when different coefficient sets are stored in different registers, selecting a coefficient set is equivalent to selecting the register associated with that coefficient set. Therefore, the combination of the Kolze's and Thirumoorthy's teaching covers all the limitations cited in claim 10.

As to claim 17, Kolze discloses that the transceiver updates the initial pre-equalizer coefficient values of the one or more pre-equalizers (see paragraph 0079 and Fig. 13, blocks 1330, 1340, and 1350).

As to claim 18, Kolze discloses updating the initial pre-equalizer coefficient values during (see paragraph 0079 and Fig. 13, blocks 1330, 1340, and 1350). Thirumoorthy also discloses updating the registers with the updated pre-equalizer coefficient values (see paragraph 0088 and Fig. 9, blocks 916 and 918). It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to modify Kolze's teaching as suggested by Thirumoorthy and update the selected register with the updated pre-equalizer coefficient values in order to

make sure that the register contains the most updated version of the pre-equalizer coefficients and increase the reliability of the system.

As to claim 19, Kolze discloses a transceiver (see paragraph 0042) including: one or more transmit filters to each pre-equalize a corresponding serial symbol stream (see Fig. 6, see all the pre-equalizers) and a controller using one of pre-equalizer settings to set initial coefficient values for the one or more transmit filters (see Fig. 13 and paragraphs 0075, 0077-0079 and 0086). Kolze discloses all the subject matters claimed in claim 19, except that the pre-equalized streams are being transmitted to a port transceiver. Kolze also does not disclose a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values, the controller using one of the registers to set initial coefficient values. Thirumoorthy, in the same field of endeavor, discloses a transceiver in a communication system comprising an equalizer that includes an n-tap FIR filter having n coefficients (see Fig. 2, block 218 and paragraphs 0035-0036, 0054, 0062, and 0088), where the coefficients of the equalizer are stored in coefficient registers that are accessible by the equalizer (see paragraphs 0036, 0054, 0062, and 0088). It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to modify the teachings of Kolze as suggested by Thirumoorthy and store the coefficients of the filter (equalizer or pre-equalizer) in multiple registers in order organize and control the coefficients more effectively and independently. Although Thirumoorthy does not expressly disclose selecting one of the registers, Kolze discloses selecting one of multiple pre-equalizer settings to specify initial pre-equalizer coefficient values and Thirumoorthy discloses saving the coefficients in different registers. One of ordinary skill

in the art before the effective filing date of the invention was made would have recognized that when different coefficient sets are stored in different registers, selecting a coefficient set by the controller is equivalent to selecting the register associated with that coefficient set by the controller. Therefore, the combination of the Kolze's and Thirumoorthy's teaching covers all the limitations cited in claim 19 associated with selecting a register. Kolze shows that the pre-equalized signals are transmitted to a network (see Fig. 5). Also as previously mentioned, Kolze discloses a transceiver (see paragraph 0042). Kolze and Thirumoorthy disclose all the subject matters claimed in claim 19, except that pre-equalized streams are being transmitted to a port transceiver. Binder, in the same field of endeavor, discloses a communication system that comprises a transceiver communicating over a network (see paragraph 0041). Binder discloses that the transceiver is coupled to a port for interfacing and communicating over a network (see paragraphs 0041 and 0273). It would have been obvious to one of ordinary skill in the art before the effective filing date of the invention was made to modify Kolze's and Thirumoorthy's teaching as suggested by Binder in order to enable the transceiver to communicate with the network.

Allowable Subject Matter

7. Claims 2-5, 11-16, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEILA MALEK whose telephone number is (571)272-8731. The examiner can normally be reached on Monday-Friday 8:30am-4:30pm.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. 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.

LEILA . MALEK
Examiner
Art Unit 2632

/LEILA MALEK/
Primary Examiner, Art Unit 2632

Notice of References Cited	Application/Control No. 16/552,927	Applicant(s)/Patent Under Reexamination SUN et al.	
	Examiner LEILA MALEK	Art Unit 2632	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20130223506-A1	08-2013	Kolze; Thomas J.	H04L27/01	375/232
*	B	US-20100232493-A1	09-2010	Thirumoorthy; Hari	H04L27/0014	375/232
*	C	US-20130201316-A1	08-2013	BINDER; Yehuda	H04L67/12	348/77
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/552,927	SUN et al.
	Examiner	Art Unit
	LEILA MALEK	2632

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
EAST, IEEE, IDS, Inventor Name Search	07/05/2020	L.M.

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

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/552,927	SUN et al.
	Examiner	**Art Unit**
	LEILA MALEK	2632

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

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant					☐ CPA		☐ T.D.		☐ R.1.47	
CLAIM		**DATE**								
Final	Original	07/05/2020								
	1	✓								
	2	O								
	3	O								
	4	O								
	5	O								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	O								
	12	O								
	13	O								
	14	O								
	15	O								
	16	O								
	17	✓								
	18	✓								
	19	✓								
	20	O								

PTO/SB/08a (01-10)
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Application Number	16552927
Filing Date	2019-08-27
First Named Inventor	Junqing SUN
Art Unit	2632
Examiner Name	Malek, Leila
Attorney Docket Number	20160.0031.NPUS00

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/L.M/	1	8301036	B2	2012-10-30	He	
/L.M/	2	9071479	B2	2015-06-30	Qian et al.	
/L.M/	3	9935800	B1	2018-04-03	He	
/L.M/	4	9385859	B2	2016-07-05	Kuan et al.	
/L.M/	5	10212260	B2	2019-02-19	Sun	

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/L.M/	1	20200076651	A1	2020-03-05	SUN et al.	

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	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

/L.M/	2	20130343400	A1	2014-03-27	Lusted et al.	
/L.M/	3	20140086264	A1	2014-03-27	Lusted et al.	
/L.M/	4	20140146833	A1	2014-05-29	Lusted et al.	
/L.M/	5	20150003505	A1	2015-01-01	Lusted et al.	
/L.M/	6	20160337114	A1	2016-11-17	Baden et al.	

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/L.M/	1	Information Technology - Open Systems Interconnection - Basic Reference Model: The Basic Model, 1994	

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	First Named Inventor	Junqing SUN
	Art Unit	2632
	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

/L.M/	2	International Search Report dated December 6, 2017 in International Application No. PCT/CN2017/075961	
/L.M/	3	Non-Final Office Action dated January 24, 2018 in 15/487,045	
/L.M/	4	Reed-Solomon Forward Error Correction (RS-FEC) Sublayer for 100GBASE-R PHYs.	
/L.M/	5	Notice of Allowance dated June 8, 2018 in Application No. 15/487,045	
/L.M/	6	"Physical Coding Sublayer (PCS) for 64B/66B, type 50GBASE-R" Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 132-141, 10 pgs.	
/L.M/	7	"Physical Medium Attachment (PMA) sublayer, Physical Medium Dependent (PMD) sublayer, and baseband medium, type 1000GBASE-KP4," IEEE Standard for Ethernet, Section Six, pp. 481-519, 39 pgs.	
/L.M/	8	"Physical Medium Dependent (PMD) sublayer and baseband medium, type 50GBASE-CR, 100GBASE-CR2, and 200GBASE-CR4," Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 184-215, 32 pgs.	
/L.M/	9	"Reed-Solomon Forward Error Correction (RS-FEC) sublayer for 50GBASE-R PHYs," Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 142-159, 18 pgs.	

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	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

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Name/Print	Daniel Krueger	Registration Number	42771

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Bibliographic Data

Application No: 16/552,927

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /LEILA MALEK/ (Examiner's Signature) | L.M. (Initials)

Title: SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
08/27/2019	375	2632	20160.0031.NPUS00
RULE			

APPLICANTS

CREDO TECHNOLOGY GROUP LIMITED, Grand Cayman, CAYMAN ISLANDS

INVENTORS

Junqing SUN Fremont, CA, UNITED STATES

Haoli QIAN Fremont, CA, UNITED STATES

CONTINUING DATA

This application has PRO of 62723701 08/28/2018

FOREIGN APPLICATIONS

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First Named Inventor	Junqing SUN
Art Unit	2632
Examiner Name	Malek, Leila
Attorney Docket Number	20160.0031.NPUS00

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/L.M/	2	9071479	B2	2015-06-30	Qian et al.	
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/L.M/	3	20140086264	A1	2014-03-27	Lusted et al.	
/L.M/	4	20140146833	A1	2014-05-29	Lusted et al.	
/L.M/	5	20150003505	A1	2015-01-01	Lusted et al.	
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/L.M/	2	International Search Report dated December 6, 2017 in International Application No. PCT/CN2017/075961	

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Signature	/Dan Krueger/	Date (YYYY-MM-DD)	2020-06-09
Name/Print	Daniel Krueger	Registration Number	42771

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L10	49	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 11:29 AM
L11	11	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	US-PGPUB; USPAT	OR	ON	ON	2020/06/22 12:04 PM
L12	11	("10212260"|"20130343400"|"20140086264"|"20140146833"|"20150003505"|"20160337114"|"20200076651"|"8301036"|"9071479"|"9385859"|"9935800").PN.	US-PGPUB; USPAT	OR	ON	ON	2020/06/22 12:15 PM
L13	2	12 AND (pre$1equaliz$3 near3 coefficient$1)	US-PGPUB; USPAT	OR	ON	ON	2020/06/22 12:15 PM
L14	2	12 AND (pre$1equaliz$3 near3 (tap$1 OR weight$1 OR coefficient$1))	US-PGPUB; USPAT	OR	ON	ON	2020/06/22 12:16 PM
L15	0	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group) near3 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 12:21 PM
L16	91	(select$3 OR pick$3 OR obtain$3 OR choos$3) near4 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 12:21 PM
L17	1	16 AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:07 PM
L18	1	(select$3 OR pick$3 OR obtain$3 OR choos$3) near4 (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO;	OR	ON	ON	2020/06/22 04:08 PM

		AND c2m	DERWENT; IBM_TDB				
L19	1	(pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1) AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:09 PM
L20	1	(pre$1equaliz$3) AND c2m adj1 (channels OR path$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:10 PM
L21	2	(pre$1equaliz$3) AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:10 PM
L22	230	(pre$1equaliz$3) AND (channel adj1 models)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:48 PM
L23	44	(pre$1equaliz$3) WITH (channel adj1 models)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:49 PM
L24	0	23 AND (different OR multiple OR plurality) adj2 (channel adj1 models)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:51 PM
L25	3	(pre$1equaliz$3) WITH (channel adj1 models)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/22 04:54 PM
L26	8	(pre$1equaliz$3 near3 (coefficient$1 OR tap$1 OR weight$1)) WITH (channel adj1 model$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 04:56 PM
L27	44	(pre$1equaliz$3) WITH (channel adj1 model$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/22 05:24 PM
L28	1	serdes AND c2m AND pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 10:09 AM
L29	1	serdes AND c2m near3 channel$1	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 10:10 AM
L30	12	serdes AND c2m	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO;	OR	ON	ON	2020/06/23 10:10 AM

			DERWENT; IBM_TDB				
L31	6	serdes AND c2m AND (coefficient$1 OR weight$1 OR tap$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:32 AM
L32	0	serdes AND c2c AND pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:37 AM
L33	45	serdes AND pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:37 AM
L34	13	serdes AND pre$1equaliz$3 AND ((select$3 OR choos$3 OR pick$3 OR determin$3) near7 pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:38 AM
L35	524	(channel near2 response) near6 (channel adj1 model)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:42 AM
L36	10	pre$1equaliz$3 SAME (coefficient$1 OR tap$1 OR weight$1) SAME (channel adj1 model$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:45 AM
L37	4	(select$3 OR choos$3 OR pick$3 OR determin$3) near5 pre$1equaliz$3 SAME (channel adj1 model$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 11:48 AM
L38	0	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (register OR memory OR storage) SAME (pre$1equaliz4)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 03:17 PM
L39	43	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (register OR memory OR storage) SAME (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 03:17 PM
L40	6	(select$3 OR choos$3 OR pick$3 OR determin$3) near4 (table) SAME (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 03:52 PM
L41	9	(select$3 OR pick$3 OR	US-PGPUB; USPAT;	OR	ON	ON	2020/06/23

		obtain$3 OR choos$3 OR determin$3 OR decid$3) near2 (set OR group OR table) near3 (coefficient$1 OR tap$1 OR weight$1) SAME pre$1equaliz$3	USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB				05:09 PM
L42	2	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (training adj1 (mode OR phase OR period))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 05:49 PM
L43	8	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (training)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/23 05:50 PM
L44	3	updat$3 near4 (coefficient$1 OR tap$1 OR weight$1) near4 (pre$1equaliz$3) WITH (initializ$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 01:56 PM
L45	119	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3 (pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 02:46 PM
L46	0	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3 (pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1) SAME (channel adj1 model)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 02:49 PM
L47	2	(select$3 OR pick$3 OR obtain$3 OR choos$3) near2 (set OR group OR table OR register) near3 (pre$1distort$3) near3 (coefficient$1 OR tap$1 OR weight$1) AND (channel adj1 model)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 02:49 PM
L48	4115	(sav$3 OR stor$3) near4 (coefficient$1 OR tap$1 OR weight$1) near3 (different OR independent OR plurality OR several) near3 (register$1 OR table$1 OR memor$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 03:12 PM

L49	17	(sav$3 OR stor$3) near4 (equalizer OR pre$1equalizer) near2 (coefficient$1 OR tap$1 OR weight$1) near3 (different OR independent OR plurality OR several OR multiple) near3 (register$1 OR memor$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 03:14 PM
L50	51	(registers OR memories OR (memory adj1 units)) near4 (equalizer OR pre$1equalizer) near2 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/24 03:19 PM
L51	4	(registers OR memories OR (memory adj1 units)) near4 (pre$1equaliz$5) near2 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/24 03:50 PM
L52	11	(select$3 OR choos$3 OR pick$3) near3 (pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 04:18 PM
L53	2	(select$3 OR choos$3 OR pick$3) near5(initial) near4 (pre$1equaliz$3) near5 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 04:22 PM
L54	29	(select$3 OR choos$3 OR pick$3) near4 (pre$1equaliz$3) near5 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 04:28 PM
L55	23	54 AND (updat$3 OR adjust$3) near5 (coefficient$1 OR tap$1 OR weight$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 04:31 PM
L56	8	(coefficient$1 OR tap$1 OR weight$1) near6 pre$1equaliz$3 WITH (channel adj1 model)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:09 PM
L57	31	(coefficient$1 OR tap$1 OR weight$1) near6 pre$1equaliz$3 WITH (impulse adj1 response adj3 channel)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:13 PM
L58	39	(coefficient$1 OR tap$1 OR weight$1) near6	US-PGPUB; USPAT; USOCR; FIT (CN, FR,	OR	ON	ON	2020/06/24 06:15 PM

		pre$1equaliz$3 WITH ((impulse adj1 response adj3 channel) OR (channel adj1 model))	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB				
L59	0	L58 AND (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:17 PM
L60	215	(coefficient$1 OR tap$1 OR weight$1) WITH (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:18 PM
L61	0	(coefficient$1 OR tap$1 OR weight$1) WITH (EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 ((channel adj1 impulse) OR (channel adj1 model)) AND (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:18 PM
L62	66	(coefficient$1 OR tap$1 OR weight$1) WITH ((EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 channel) AND (pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:19 PM
L63	11	(coefficient$1 OR tap$1 OR weight$1) WITH ((EACH OR DIFFERENT OR MULTIPLE OR distinct OR plurality OR every) adj1 channel) AND ((pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:19 PM
L64	8	(coefficient$1 OR tap$1 OR weight$1) WITH (channel adj1 model) AND ((pre$1equaliz$3) near3 (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:24 PM
L65	1	c2m AND (insertion adj1 loss) AND (package adj1 loss)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:30 PM

L66	2	((coefficient$1 OR tap$1 OR weight$1) near3 pre$1equaliz$3) WITH ((performance adj1 characteristic$1) OR (error adj1 signal adj1 (power OR energy)) OR (bit adj1 error adj1 rate))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:36 PM
L67	0	(sav$3 OR stor$3) near3 (updated OR adjusted) adj3 (coefficient$1 OR tap$1 OR weight$1) near3 pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:41 PM
L68	30	(sav$3 OR stor$3) near3 (updated OR adjusted) adj3 (coefficient$1 OR tap$1 OR weight$1) near3 equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:41 PM
L69	11	(port adj1 connector) WITH transceiver WITH pluggable	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:49 PM
L70	2	(port adj1 connector) WITH transceiver WITH pluggable AND pre$1equalizer$1	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:49 PM
L71	2	(port adj1 connector) WITH transceiver WITH pluggable AND pre$1equaliz$3	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:49 PM
L72	0	(chip$1to$1module OR c2m) AND (port adj1 connect$3) AND (plug$4 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:50 PM
L73	364	(port adj1 connect$3) AND (plug$4 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/24 06:51 PM
L74	13	(port adj1 connect$3) WITH (plug$4 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:23 AM
L75	3	(port adj1 connect$3) WITH (plug$4 near3 transceiver) AND (filter OR pre$1equaliz$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:23 AM
L76	13	(port adj1 connect$3) WITH (plug$4 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:27 AM

L77	319	(port near2 connect$3) WITH (plug$5 near3 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:32 AM
L78	3	(port near2 connect$3) WITH (plug$5 near3 transceiver) WITH (port adj1 transceiver)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:33 AM
L79	2	(pre$1equaliz$3) near3 (coefficients OR taps OR weights OR (coefficient adj1 values) OR (tap adj1 values)) near5 (registers OR (storage adj1 units) OR memories)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/25 06:35 AM
L80	4	(pre$1equaliz$3) SAME (coefficients OR taps OR weights OR (coefficient adj1 values) OR (tap adj1 values)) near6 (registers OR (storage adj1 units) OR memories)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/25 06:36 AM
L81	1	(pre$1equaliz$3) SAME ((coefficient OR tap OR weight) near2 set) near6 (register$1 OR (storage adj1 unit$1) ormemor$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/25 06:46 AM
L82	9	(pre$1equaliz$3) SAME ((coefficient OR tap OR weight) near2 set) near6 (register$1 OR (storage adj1 unit$1) OR memor$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:47 AM
L83	0	(pre$1equaliz$3) SAME (sav$3 OR stor$3) near3 (each OR different OR several OR multiple) adj1 set$1 near3 (coefficient OR tap OR weight)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:51 AM
L84	15	(pre$1equaliz$3) SAME (each OR different OR several OR multiple) adj1 set$1 near3 (coefficient OR tap OR weight)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 06:52 AM
L85	0	(pre$1equaliz$3) SAME (port adj1 transmitter)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:21 AM
L86	0	(pre$1equaliz$3) SAME3	US-PGPUB; USPAT;	OR	ON	ON	2020/06/25

		(port adj1 transmitter)	USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB				10:21 AM
L87	0	(pre$1equaliz$3) AND (port adj1 transmitter)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:22 AM
L88	22	(pre$1equaliz$3) AND (port near2 transmitter)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:22 AM
L89	55	(pre$1equaliz$3) AND (port near2 transmit$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 10:24 AM
L90	12	(pre$1equaliz$3) AND (port near2 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:24 AM
L91	14	(pre$1equaliz$3) AND (port near3 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:27 AM
L92	3177	cable SAME (port near3 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:40 AM
L93	1601	cable WITH (port near3 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:40 AM
L94	2460	network WITH (port near1 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:41 AM
L95	1497	network WITH (port adj1 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:41 AM
L96	609	network near5(port adj1 transceiv$3)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:41 AM
L97	0	network near5 "port adj1 transceiv$3"	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:43 AM
L98	0	"port adj1 transceiv$3"	US-PGPUB; USPAT;	OR	ON	ON	2020/06/25

			USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB				11:43 AM
L99	0	"port adj1 transceiver"	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:44 AM
L100	4775	"port transceiver"	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:44 AM
L101	550	"port transceiver" near5 network	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/06/25 11:45 AM
L102	483	"port transceiver" near5 network	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	ON	2020/06/25 11:45 AM
L103	1	(select$3 near4 register) WITH pre$1equaliz$3 AND (sun.inv. OR qian.inv.)	US-PGPUB; USPAT	OR	ON	ON	2020/07/03 06:52 AM
L104	1	"20020141347" AND (model WITH coefficient$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 03:32 PM
L105	1	"20020141347" AND (model WITH (coefficient$1 OR tap$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 03:36 PM
L106	160	(channel adj1 model) near4 (channel adj1 characteristic$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 03:42 PM
L107	7	(channel adj1 model) WITH (pre$1equalizer near3 (tap$1 OR coefficient$1 OR weight$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 04:01 PM
L108	1	"20130223506" AND (pre$1equaliz$3 WITH (fir OR filter$3))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 10:52 PM
L109	839852	20100232493and (control$4 near5 (coefficient$1 OR tap$1 OR register$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 11:14 PM

L110	0	"20100232493" AND (control$4 near5 (coefficient$1 OR tap$1 OR register$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 11:17 PM
L111	2	"20100232493" AND (control$4 WITH (coefficient$1 OR tap$1 OR register$1))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 11:17 PM
L112	2	"20100232493" AND (control$4 WITH (coefficient$1 OR tap$1 OR register$1)) AND (register WITH coefficient$1)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/03 11:18 PM
L113	1	"20130201316" AND (connector WITH port)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/04 08:44 AM
L114	1	"20130201316" AND (connector SAME port)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/04 08:46 AM
L115	2	"20130201316" AND (plug$4 SAME (modem OR transceiver))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/04 09:03 AM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

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Sale Item Reference Number	Effective Date
16552927	06/26/2020

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY.DOCKET NO./TITLE	REQUEST ID
16/552,927	08/27/2019	CREDO TECHNOLOGY GROUP LIMITED	20160.0031.NPUS00	115316

Acknowledgement of Loss of Entitlement to Entity Status Discount

The entity status change request below filed through Private PAIR on 06/25/2020 has been accepted.

CERTIFICATIONS:

Change of Entity Status:

X Applicant changing to regular undiscounted fee status.

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

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Signature:	/Daniel J. Krueger/
Name:	Daniel J. Krueger
Registration Number:	42771

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16552927
	Filing Date	2019-08-27
	First Named Inventor	Junqing SUN
	Art Unit	2632
	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8301036	B2	2012-10-30	He	
	2	9071479	B2	2015-06-30	Qian et al.	
	3	9935800	B1	2018-04-03	He	
	4	9385859	B2	2016-07-05	Kuan et al.	
	5	10212260	B2	2019-02-19	Sun	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20200076651	A1	2020-03-05	SUN et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16552927
	Filing Date	2019-08-27
	First Named Inventor	Junqing SUN
	Art Unit	2632
	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

	2	20130343400	A1	2014-03-27	Lusted et al.	
	3	20140086264	A1	2014-03-27	Lusted et al.	
	4	20140146833	A1	2014-05-29	Lusted et al.	
	5	20150003505	A1	2015-01-01	Lusted et al.	
	6	20160337114	A1	2016-11-17	Baden et al.	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Information Technology - Open Systems Interconnection - Basic Reference Model: The Basic Model, 1994	

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	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

	2	International Search Report dated December 6, 2017 in International Application No. PCT/CN2017/075961	
	3	Non-Final Office Action dated January 24, 2018 in 15/487,045	
	4	Reed-Solomon Forward Error Correction (RS-FEC) Sublayer for 100GBASE-R PHYs.	
	5	Notice of Allowance dated June 8, 2018 in Application No. 15/487,045	
	6	"Physical Coding Sublayer (PCS) for 64B/66B, type 50GBASE-R" Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 132-141, 10 pgs.	
	7	"Physical Medium Attachment (PMA) sublayer, Physical Medium Dependent (PMD) sublayer, and baseband medium, type 1000GBASE-KP4," IEEE Standard for Ethernet, Section Six, pp. 481-519, 39 pgs.	
	8	"Physical Medium Dependent (PMD) sublayer and baseband medium, type 50GBASE-CR, 100GBASE-CR2, and 200GBASE-CR4," Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 184-215, 32 pgs.	
	9	"Reed-Solomon Forward Error Correction (RS-FEC) sublayer for 50GBASE-R PHYs," Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 142-159, 18 pgs.	

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

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	Filing Date	2019-08-27
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	Art Unit	2632
	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

CERTIFICATION STATEMENT

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

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

OR

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See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Dan Krueger/	Date (YYYY-MM-DD)	2020-06-09
Name/Print	Daniel Krueger	Registration Number	42771

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EFS ID:	39674203
Application Number:	16552927
International Application Number:	
Confirmation Number:	1683
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Customer Number:	63467
Filer:	Daniel Joseph Krueger/Shanay Hines
Filer Authorized By:	Daniel Joseph Krueger
Attorney Docket Number:	20160.0031.NPUS00
Receipt Date:	09-JUN-2020
Filing Date:	27-AUG-2019
Time Stamp:	22:51:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SB08_20160-0031_1.pdf	613024 9db203a2b157e9cabcddd92645c9a2e5d8a171ae	no	5

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First Named Inventor	Junqing SUN
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Attorney Docket Number	20160.0031.NPUS00

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8301036	B2	2012-10-30	He	
	2	9071479	B2	2015-06-30	Qian et al.	
	3	9935800	B1	2018-04-03	He	
	4	9385859	B2	2016-07-05	Kuan et al.	

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	1	20200076651	A1	2020-03-05	SUN et al.	
	2	20130343400	A1	2014-03-27	Lusted et al.	

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	First Named Inventor	Junqing SUN
	Art Unit	2632
	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

	3	20140086264	A1	2014-03-27	Lusted et al.	
	4	20140146833	A1	2014-05-29	Lusted et al.	
	5	20150003505	A1	2015-01-01	Lusted et al.	
	6	20160337114	A1	2016-11-17	Baden et al.	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Information Technology - Open Systems Interconnection - Basic Reference Model: The Basic Model, 1994	
	2	International Search Report dated December 6, 2017 in International Application No. PCT/CN2017/075961	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16552927
	Filing Date	2019-08-27
	First Named Inventor	Junqing SUN
	Art Unit	2632
	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

	3	Non-Final Office Action dated January 24, 2018 in 15/487,045	
	4	Reed-Solomon Forward Error Correction (RS-FEC) Sublayer for 100GBASE-R PHYs.	
	5	Notice of Allowance dated June 8, 2018 in Application No. 15/487,045	
	6	"Physical Coding Sublayer (PCS) for 64B/66B, type 50GBASE-R" Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 132-141, 10 pgs.	
	7	"Physical Medium Attachment (PMA) sublayer, Physical Medium Dependent (PMD) sublayer, and baseband medium, type 1000GBASE-KP4," IEEE Standard for Ethernet, Section Six, pp. 481-519, 39 pgs.	
	8	"Physical Medium Dependent (PMD) sublayer and baseband medium, type 50GBASE-CR, 100GBASE-CR2, and 200GBASE-CR4," Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 184-215, 32 pgs.	
	9	"Reed-Solomon Forward Error Correction (RS-FEC) sublayer for 50GBASE-R PHYs," Draft Amendment to IEEE Std 802.3-2015, February 3, 2017, pp. 142-159, 18 pgs.	

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16552927
	Filing Date	2019-08-27
	First Named Inventor	Junqing SUN
	Art Unit	2632
	Examiner Name	Malek, Leila
	Attorney Docket Number	20160.0031.NPUS00

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Dan Krueger/	Date (YYYY-MM-DD)	2020-06-09
Name/Print	Daniel Krueger	Registration Number	42771

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

201712111316470

2R3

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

200233
435 Guiping Road, Shanghai, China
SHANGHAI PATENT & TRADEMARK LAW OFFICE, LLC

171594 1PCW0 DZ_X236

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 06. Dec. 2017 (06. 12. 2017)
Applicant's or agent's file reference 171594PCW0	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/CN2017/075961	International filing date *(day/month/year)* 08. Mar. 2017 (08. 03. 2017)
Applicant CREDO TECHNOLOGY GROUP LTD.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20,Switzerland, Facsimile No.:+41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later);otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA(ISA/CN) 6,Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088 Facsimile No. (86-10) 62019451	Authorized officer CHEN, Xi Telephone No.: (86-10) 6 [illegible]27

Form PCT/ISA/220 (July 2009)

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, paragraph 296).

What parts of the international application may be amended ?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When ? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How ? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet or sheets containing a complete set of claims in replacement of all the claims previously filed must be submitted.

Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively in Arabic numerals (Section 205(a)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments ?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

(i) the claim is unchanged;
(ii) the claim is cancelled;
(iii) the claim is new;
(iv) the claim replaces one or more claims as filed;
(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
   "Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
   "Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
   "Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
   "Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
   "Claims 1-10 unchanged, claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1*bis*(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of FormPCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43*bis*.1(c)).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, National Chapters.

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PATENT COOPERATION TREATY

PCT

171594 1PCT0 DZ_X236

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
171594PCT0		
International application No. PCT/CN2017/075961	International filing date *(day/month/year)* 08 Mar. 2017 (08. 03. 2017)	(Earliest)Priority date *(day/month/year)*

Applicant

CREDO TECHNOLOGY GROUP LTD.

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and /or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box IV.

The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. The figure of the **drawings** to be published with the abstract is Figure No.3

☐ as suggested by the applicant

☒ as selected by this Authority, because the applicant failed to suggest a figure

☐ as selected by this Authority, because this figure better characterizes the invention

b. ☐ none of the figures is to be published with the abstract

中华人民共和国国家知识产权局 专利审查业务章

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/075961

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/24 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
CNPAT, CNKI, WPI, EPODOC, IEEE: 802.3, ethernet, extend+, PMA, physical medium attachment, auto w negotiation, training, data, phase, back w channel, modulat+, convey+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014146833A1 (LUSTED, Kent C. et al.) 29 May 2014(29.05.2014) abstract, description, paragraphs [0042]-[0059], [0098]-[0104], [0119]-[0122] and figure 1	1-23
X	US 2014086264A1 (LUSTED, Kent C. et al.) 27 Mar.2014(27.03.2014) abstract, description, paragraphs [0041]-[0054], [0099]-[0107], [0119]-[0122] and figure 1	1-23
X	US 2013343400A1 (LUSTED, Kent C. et al.) 26 Dec.2013(26.12.2013) abstract, description, paragraphs [0036]-[0049], [0082] and figure 1	1-23
A	CN 1941649A (BROADCOM CORPORATION) 04 Apr.2007(04.04.2007) the whole document	1-23
A	LAN/MAN Standards Committee of the IEEE Computer Society IEEE Standard for Ethernet IEEE Std 802.3™-2015 03 Sep.2015(03.09.2015) the whole document	1-23

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

Form PCT/ISA /210 (2 sheet) (July 2009)

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/075961

001

* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&"document member of the same patent family
Date of the actual completion of the international search 08 Nov. 2017(08. 11. 2017)	Date of mailing of the international search report 06 Dec. 2017(06. 12. 2017)
Name and mailing address of the ISA/CN STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088, China Facsimile No.(86-10)62019451	Authorized officer CHEN, Xiaowei Telephone No.: (86-10) 61648277

Form PCT/ISA /210 (3 sheet) (July 2009)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/075961

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US2014146833A1	29.05.2014	JP2014107869A	09.06.2014
		DE202013105453U1	06.11.2014
US2014086264A1	27.03.2014	JP2014068345A	17.04.2014
		DE202013104344U1	20.02.2014
US2013343400A1	26.12.2013	WO2013191912A1	27.12.2013
		CN104322014A	28.01.2015
		CA2908681A1	27.12.2013
CN1941649A	04.04.2007	EP1770912A1	04.04.2007
		US2013243011A1	19.09.2013
		TW200729833A	01.08.2007
		US2007076722A1	05.04.2007
		US2011205934A1	25.08.2011
		DE602006003500E	18.12.2008

Form PCT/ISA/210(patent family annex)(July 2009)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

200233

435 Guiping Road, Shanghai, China

SHANGHAI PATENT & TRADEMARK LAW OFFICE, LLC

171594 1PCW0 DZ_X236

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43 *bis*.1)

Date of mailing(*day/month/year*)	06. Dec. 2017 (06. 12. 2017)
Applicant's or agent's file reference	171594PCW0
FOR FURTHER ACTION	See paragraph 2 below
International application No.	PCT/CN2017/075961
International filing date(*day/month/year*)	08. Mar. 2017 (08. 03. 2017)
Priority date (*day/month/year*)	
International Patent Classification (IPC) or both national classification and IPC	H04L 12/24(2006. 01)i
Applicant	CREDO TECHNOLOGY GROUP LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No.II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No.VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No.VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinon of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/CN	Date of completion of this opinion	Authorized officer
STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	24. Nov. 2017 (24. 11. 2017)	**CHEN,Xiaowei** Telephone No. (86-10)61648377

Form PCT/ISA/237(cover sheet)(July 2009)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

international application No.
PCT/CN2017/075961

005

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into_____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rule 43bis.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application ,this opinion has been established on the basis of a sequence listing filed or furnished :

a. (means):

☐ on paper

☐ in electronic form

b. (time):

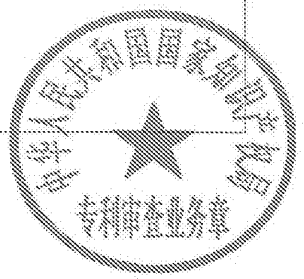
☐ in the international application as filed

☐ together with the international application in electronic form

☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:



WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/CN2017/075961

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement:

Novelty (N)	Claims 1-23	YES
	Claims None	NO
Inventive step (IS)	Claims None	YES
	Claims 1-23	NO
Industrial applicability (IA)	Claims 1-23	YES
	Claims None	NO

2. Citations and explanations

The reasoning with claim 14 is based on the prediction in Box No. VIII.

(1) Reference is made to the following document:

D1: US2014146833A1

(2) Novelty and Inventive step

(2.1) D1 discloses a method for implementing PMA alignment and rapid transition from a link training mode to a data mode (see abstract, description, paragraphs [0042]-[0059], [0098]-[0104], [0119]-[0122] and figure 1): The PHY structure of one embodiment of a 100 GBASE-KP4 link is illustrated in FIG. 1. The PHY is responsible for dealing with details of operation of the signals on a particular link between two link partners, depicted by components A and B. The physical connectivity of each interconnect link is made up of four differential pairs of signals 100, comprising lanes 0-3 in each direction. Each port supports a link pair consisting of two uni-directional links to complete the connection between two components. Each port comprises a Transmit (Tx) link interface and a Receive (Rx) link interface. The 100 GBASE-KP4 link is established using the following sequence: (1) Auto-negotiate capabilities to link partner; (2) Send out training sequence to tune PHY for the channel's characteristics; (3) Count down to data mode and Send out idle symbols. The training frames are transmitted using Physical Media Attachment (PMA) framing logic. Component A has a Tx port102 that is connected to Component B Rx port104. Meanwhile, Component B has a Tx port104 that is connected to Component B Rx port108. The 100 GBASE-KP4 PHY uses PAM4 signal to send and receive data across the channel. The following information is implicitly disclosed based on the disclosure of D1: (claim 1) an Ethernet link extender that comprises: a first and a second PMA circuit having a transmitter and a receiver, and their communication manner; (claim 11) an Ethernet link extension method that comprises: in a first communications phase for auto-negotiation and its details; and a subsequent communications phase for training; and (claim 21) an Ethernet link extension method that comprises, in a first communications phase for

auto-negotiation: coupling a transmitter of a second PMA circuit to a receiver of a first PMA circuit to retransmit channel signal waveforms received from a first node; coupling a transmitter of the first PMA circuit to a receiver of the second PMA circuit to retransmit channel signal waveforms received from a second node; and a subsequent frame-forwarding phase.

(2.2) The subject matter of claim 1 differs from D1 in that: (1) the first and second PMA circuits each including a respective training controller that, during the training phase, generates training frames for transmission by the transmitter of the respective PMA circuit based in part on back-channel information and training status information from the receiver of the respective PMA circuit.

The subject matter of claim 11 differs from D1 in that: said (1).

The subject matter of claim 21 differs from D1 in that: (2) the auto-negotiation phase includes: monitoring spectra of the channel signal waveforms received from at least one of the first and second nodes to detect an end of the auto-negotiation phase; (3) the details of frame-forwarding phase.

Therefore, the subject matter of claims 1, 11 and 21 is novel in the sense of PCT Article 33(2).

As to the above differences, D1 discloses: data mode, the 100 GBASE-KP4 PHY uses a 4-level pulse amplitude modulation PAM4 signal to send and receive data across the channel. Hence, difference (3) is a normal design option known to the person skilled in the art. And differences (1), (2) are also normal design option known to the person skilled in the art. Therefore, the subject matter of claims 1, 11, 21 does not involve an inventive step in the sense of PCT Article 33(3).

(2.3) Claims 2-10, 12-20, 22-23 are dependent claims. Part of the additional features are disclosed by D1 (see the same reference), the other part of the additional features are common technical means to the person skilled in the art. Therefore, the subject matter of claims 2-10, 12-20, 22-23 is novel in the sense of PCT Article 33(2), but does not involve an inventive step in the sense of PCT Article 33(3).

(3) Industrial applicability

Claims 1-23 meet the requirements of PCT Article 33(4).

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CN2017/076951

135

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claim supported by the description, are made:

The subject matter of dependent claim 14 is different from the subject matter of independent claim 1. Therefore, claim 14 is not clear in the sense of PCT Article 6. The reasoning with claim 14 in Box No.V is based on the following prediction: the subject matter of claim 14 is "The method claim 11".

Electronic Acknowledgement Receipt

EFS ID:	39674170
Application Number:	16552927
International Application Number:	
Confirmation Number:	1683
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Customer Number:	63467
Filer:	Daniel Joseph Krueger/Shanay Hines
Filer Authorized By:	Daniel Joseph Krueger
Attorney Docket Number:	20160.0031.NPUS00
Receipt Date:	09-JUN-2020
Filing Date:	27-AUG-2019
Time Stamp:	22:38:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SB08_20160-0031.pdf	613099 9cfc69e63903a66d9debbf101233fbc3008cb866	no	5

Warnings:

Information:					
2	Non Patent Literature	NPL_Open_Systems_Interconnect.pdf	9081420 6ee0d122cb7bd6205dec48006cef1d40959 41b9a	no	68
Warnings:					
Information:					
3	Other Reference-Patent/App/Search documents	NPL_0010PCT000_12062017_ISRWO.pdf	3489196 629388a8f6060010c75c4b4c72d612a6f06f 14f4	no	12
Warnings:					
Information:					
4	Other Reference-Patent/App/Search documents	NPL_0011NPUS00_01242018_NFOA.pdf	159296 4707e5b25b32ca3ee1f2011d552d283661a 9b1ac	no	13
Warnings:					
Information:					
5	Non Patent Literature	NPL_Reed_Solomon_100GBASE.pdf	715949 d8628e1a7325c0063526e258993796059e4 493c5	no	33
Warnings:					
Information:					
6	Other Reference-Patent/App/Search documents	NPL_0011NPUS00_06082018_NOA.pdf	1103434 e35e15347e90c9b9fdb6955d38fa0e775cb 186ae	no	16
Warnings:					
Information:					
7	Non Patent Literature	Clause_94.pdf	416230 a48130865d9c74261e1c061a79e9a8e194a 396c2	no	39
Warnings:					
Information:					
8	Non Patent Literature	_133_1.pdf	308981 a561f5d75c8a4fa454c1c260e5d180d97795 bc79	no	10
Warnings:					
Information:					

9	Non Patent Literature	_136_1.pdf	1024687 a6345920856e28130965d38c29476ff78c5a359a	no	32
Warnings:					
Information:					
10	Non Patent Literature	_134_1.pdf	445760 057b9663a3937c517069bfd70c0043a41e2a2cba	no	18
Warnings:					
Information:					
			Total Files Size (in bytes):	17358052	

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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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00

CONFIRMATION NO. 1683

63467
Ramey & Schwaller, LLP
Ramey & Schwaller
5020 Montrose Blvd.
Suite 800
Houston, TX 77006

PUBLICATION NOTICE

Title:SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS

Publication No.US-2020-0076651-A1
Publication Date:03/05/2020

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00

CONFIRMATION NO. 1683

63467
Ramey & Schwaller, LLP
Ramey & Schwaller
5020 Montrose Blvd.
Suite 750
Houston, TX 77006

POA ACCEPTANCE LETTER

OC000000111962658

Date Mailed: 10/18/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 10/15/2019.

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

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

/mbeyene/

Doc Code: PA..
Document Description: Power of Attorney

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NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16/552,927
Filing Date	August 27, 2019
First Named Inventor	Junqing (Phil) SUN
Title	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
Art Unit	
Examiner Name	
Attorney Docket Number	20160.0031.NPUS00

SIGNATURE of Applicant or Patent Practitioner

Signature	/Daniel J. Krueger/	Date (Optional)	2019-10-15
Name	Daniel J. Krueger	Registration Number	42,771
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)	Credo Technology Group Limited		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Doc Code: PA..
Document Description: Power of Attorney

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☐ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

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OR

☐ The address associated with Customer Number:

OR

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Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☐ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name			
Title			

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

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POWER OF ATTORNEY BY APPLICANT

No more than ten (10) patent practitioners total may be appointed as set forth below by name and registration number. This page need not be submitted if appointing the Patent Practitioner(s) associated with a Customer Number (see form PTO/AIA/82B):

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

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

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

I hereby appoint:

■ Practitioners associated with Customer Number: 63467

OR

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

Name	Registration Number	Name	Registration Number

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

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

■ The address associated with Customer Number: 63467

OR

☐

Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address: Credo Technology Group Limited, Ugland House, Grand Cayman Ky1-1104, Cayman Islands

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

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

Signature		Date	2-9-2018
Name	Adam Thorngate-Gottlund	Telephone	408-664-9329 x127
Title	General Counsel		

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

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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Junqing (Phil) SUN and Haoli QIAN

Application No./Patent No.: 16/552,927 Filed/Issue Date: August 27, 2019

Titled: SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS

Credo Technology Group Limited, a corporation

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

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

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

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

1. From: _____ To: _____

   The document was recorded in the United States Patent and Trademark Office at

   Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

   The document was recorded in the United States Patent and Trademark Office at

   Reel _____, Frame _____, or for which a copy thereof is attached.

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

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

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

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

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

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

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

/Daniel J . Krueger/	August 14, 2019
Signature	Date
Daniel J . Krueger	42,771
Printed or Typed Name	Title or Registration 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.

Docket No.: 20160.0031.PZUS00

WORLDWIDE ASSIGNMENT

WHEREAS, I/WE, (hereinafter referred to as the "ASSIGNOR(S)"):

Junqing Sun, a citizen of P.R. China, residing in Fremont, California, U.S.A.
Haoli Qian, a citizen of P.R. China, residing in Fremont, California, U.S.A.

has/have invented a **SERDES PRE-EQUALIZER HAVING EFFICIENT ADAPTATION** ("Invention") for which one or more applications for patent, design registration, utility model registration, or other form of protection, rights, or title have been or will be made in certain countries ("Applications"), as further described below:

US, Application No. 62/723,701; Filed August 28, 2018;

AND WHEREAS, **CREDO TECHNOLOGY GROUP LIMITED**, (hereinafter referred to as the "ASSIGNEE"), a limited company organized under the laws of the Cayman Islands, having a place of business at Ugland House, Grand Cayman KY1-1104, Cayman Islands, is desirous of acquiring the full and exclusive right, title and interest in and to said Invention, said Applications inclusive of all ancillary rights relating thereto, any and all priority rights derived from said Applications, and all patents, design registrations, utility model registrations and other forms of protection, rights and titles relating to said Invention, in any country or countries and in respect of the whole or any part or parts of or improvements to the Invention;

NOW THEREFORE, for valuable consideration, the receipt and sufficiency of which are hereby acknowledged, ASSIGNOR(S) does/do hereby confirm that ASSIGNOR(S) has/have transferred, conveyed and assigned, and by way of further assurance does/do hereby transfer, convey and assign, any and all of ASSIGNOR(S)'s respective rights, title and interest in and to: the Invention; the Applications; any further applications for patent, design registration, utility model registration or other forms of protection, rights or titles for the whole or any part or parts of or improvements to the Invention in any country or countries ("Further Applications") together with the right to file divisional applications, substitute applications and continuation applications of any one or more of the Applications and Further Applications ("Divisionals"); the right to obtain patents, design registrations, utility model registrations and all other forms of protection, rights and titles relating to the Invention; the right in and to any patent or reissue patent relating to the Applications, Further Applications and Divisionals ("Grants"); and the right to obtain any extensions / supplementary protection certificates ("Extensions"); together with the right to bring proceedings to recover damages and/or to obtain other remedies for acts committed in respect of one or more of the aforesaid Invention, Applications, Grants, Further Applications, Divisionals and Extensions, whether such acts are committed before or after the date of this

Worldwide Assignment; with the intent that the Invention, Applications, Grants, Further Applications, Divisionals and Extensions are owned and enjoyed by ASSIGNEE absolutely to the full end of the term or terms for same.

ASSIGNOR(S) does/do hereby agree, upon request, to provide assistance and to execute any and all further documents, at the expense of ASSIGNEE and/or its successors and assigns (as applicable), which may be necessary or desirable to enable ASSIGNEE, and/or its successors and assigns (as applicable), to file, prosecute, bring proceedings and take other actions with respect to any and all of the Invention, Applications, Further Applications, Divisionals, Grants and Extensions, and any and all patents and registrations granted thereon and other forms of protection, rights and titles relating thereto, and ASSIGNOR(S) further agrees/agree to execute, upon request and at the expense of ASSIGNEE and/or its successors and assigns (as applicable), any and all further documents which may be necessary or desirable to vest or perfect the title of ASSIGNEE therein.

ASSIGNOR(S) does/do hereby authorize ASSIGNEE or its patent agents or attorneys to insert, above, the jurisdictions, application numbers, filing dates and any other indicia identifying the Applications when such information is available for the purpose of recording this assignment.

ASSIGNOR(S) does/do hereby authorize and request The Commissioner of Patents or any equivalent authority to issue to ASSIGNEE each and every patent, registration and other form of protection, right, and title granted upon the Applications, Further Applications, Divisionals and Extensions.

THIS WORLDWIDE ASSIGNMENT shall inure to the benefit of ASSIGNEE and its successors and assigns, and shall be binding upon ASSIGNOR(S) and their successors and permitted assigns.

DELIVERY of this Worldwide Assignment by copy, however transmitted, constitutes valid and effective delivery. This Worldwide Assignment may be executed in one or more counterparts, each of which when so executed and delivered shall be an original, and such counterparts shall together constitute one and the same instrument.

IN WITNESS WHEREOF, this Worldwide Assignment has been executed below by the undersigned:

Date: 7/25/2019

Junqing Sun

STATEMENT BY WITNESS

I, Sahar Zardkoohi, whose full Post Office address is

1600 Technology Drive, Fl 7, San Jose, CA 95110
(Address of Witness)

hereby declare that I was personally present and did see the above named person, personally known to me to be a person named in the Worldwide Assignment, duly sign and execute same.

Date: 7/25/19

(Signature of Witness)

IN WITNESS WHEREOF, this Worldwide Assignment has been executed below by the undersigned:

Date: 07/25/2019

Haoli Qian

STATEMENT BY WITNESS

I, Sahar Zarabooni, whose full Post Office address is

1600 Technology Drive, FL 7, San Jose, CA 95110
(Address of Witness)

hereby declare that I was personally present and did see the above named person, personally known to me to be a person named in the Worldwide Assignment, duly sign and execute same.

Date: 7/25/19

(Signature of Witness)

Electronic Acknowledgement Receipt

EFS ID:	37461403
Application Number:	16552927
International Application Number:	
Confirmation Number:	1683
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Customer Number:	63467
Filer:	Daniel Joseph Krueger/Theresa Evenbly
Filer Authorized By:	Daniel Joseph Krueger
Attorney Docket Number:	20160.0031.NPUS00
Receipt Date:	15-OCT-2019
Filing Date:	27-AUG-2019
Time Stamp:	15:46:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	Executed_Declaration_Sun.pdf	378648 3ac79de97196b06dba62287e1499816ea470ec91	no	1

Warnings:

Information:					
2	Oath or Declaration filed	Executed_Declaration_Qian.pdf	371867 f3d1d8857db9a3e5f33cee50479ed9e0baf0c150	no	1
Warnings:					
Information:					
3	Power of Attorney	Xtml-POAaia0082.pdf	221545 d79f413a69552acf64e09f28761494686 94a1b3b	no	4
Warnings:					
Information:					
4	Power of Attorney	Executed_Gen_POA.pdf	147741 5b3b108513db50144c0821f8db29774017aab720	no	1
Warnings:					
Information:					
5	Assignee showing of ownership per 37 CFR 3.73	Stmt3-73aia0096.pdf	735933 9ce7d1926f0b25466e545b9fa1157c5869849c6b	no	3
Warnings:					
Information:					
6	Assignee showing of ownership per 37 CFR 3.73	Executed_Assignment.pdf	1047902 bbb72c7c5e0c27ba1e650bca8b9fed1eee760476	no	4
Warnings:					
Information:					
			Total Files Size (in bytes):	2903636	

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.

PTO/AIA/01 (08-12)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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

Title of invention	SERDES PRE-EQUALIZER HAVING EFFICIENT ADAPTATION

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 62/723,701 filed on August 28, 2018.

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: Junqing Sun Date (Optional): 7/25/2019

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.

PTO/AIA/01 (06-12)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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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	SERDES PRE-EQUALIZER HAVING EFFICIENT ADAPTATION

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 62723701 filed on August 28, 2018.

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: Haoli Qian Date (Optional): _____

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.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/552,927

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 230 =	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	785		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	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))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	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))									
	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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/552,927	08/27/2019	Junqing SUN	20160.0031.NPUS00

CONFIRMATION NO. 1683

63467
Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 750
Houston, TX 77006

INFORMAL NOTICE

OC000000110941492

Date Mailed: 09/10/2019

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Junqing SUN
  Haoli QIAN

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

/tgebre/

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/552,927	08/27/2019	2631	865	20160.0031.NPUS00	20	3

CONFIRMATION NO. 1683

63467
Ramey & Schwaller, LLP
5020 Montrose Blvd.
Suite 750
Houston, TX 77006

FILING RECEIPT

OC000000110941491

Date Mailed: 09/10/2019

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.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Junqing SUN, Fremont, CA;
Haoli QIAN, Fremont, CA;

Applicant(s)

CREDO TECHNOLOGY GROUP LIMITED, Grand Cayman, CAYMAN ISLANDS;

Assignment For Published Patent Application

CREDO TECHNOLOGY GROUP LIMITED, Grand Cayman, CAYMAN ISLANDS

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/723,701 08/28/2018

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: 09/06/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/552,927**

Projected Publication Date: 03/05/2020

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS

Preliminary Class

375

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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 AssetsControl, 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).

SelectUSA

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

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	20160.0031.NPUS00
	Application Number	
Title of Invention	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Junqing		SUN	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	Fremont	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	c/o Credo Inc., 1600 Technology Drive, Fifth Floor
Address 2	

City	San Jose	State/Province	CA
Postal Code	95110	Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Haoli		QIAN	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

City	Fremont	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	c/o Credo, Inc.
Address 2	1600 Technology Drive, Fifth Floor

City	San Jose	State/Province	CA
Postal Code	95110	Country	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).

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	20160.0031.NPUS00
	Application Number	
Title of Invention	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS	

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

Customer Number	63467		
Email Address	uspto@rameyfirm.com	Add Email	Remove Email

Application Information:

Title of the Invention	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS		
Attorney Docket Number	20160.0031.NPUS00	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	**Suggested Figure for Publication (if any)**	8

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	63467		

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	20160.0031.NPUS00
	Application Number	
Title of Invention	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS	

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)
	Claims benefit of provisional	62723701	2018-08-28

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

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	20160.0031.NPUS00
	Application Number	
Title of Invention	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS	

Authorization or Opt-Out of Authorization to Permit Access:

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

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

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

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

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

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

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

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

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

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	20160.0031.NPUS00
	Application Number	
Title of Invention	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS	

Applicant Information:

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

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	CREDO TECHNOLOGY GROUP LIMITED		
Mailing Address Information For Applicant:			
Address 1	Ugland House		
Address 2			
City	Grand Cayman	**State/Province**	
Country	KY	Postal Code	KY1-1104
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	20160.0031.NPUS00
	Application Number	
Title of Invention	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS	

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.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	CREDO TECHNOLOGY GROUP LIMITED

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	Ugland House		
Address 2			
City	Grand Cayman	**State/Province**	
Country i	KY	Postal Code	KY1-1104
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

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

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

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

Signature	/Daniel J. Krueger/			Date (YYYY-MM-DD)	2019-08-27
First Name	Daniel J.	Last Name	Krueger	Registration Number	42771

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	20160.0031.NPUS00
	Application Number	
Title of Invention	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

FIG. 1

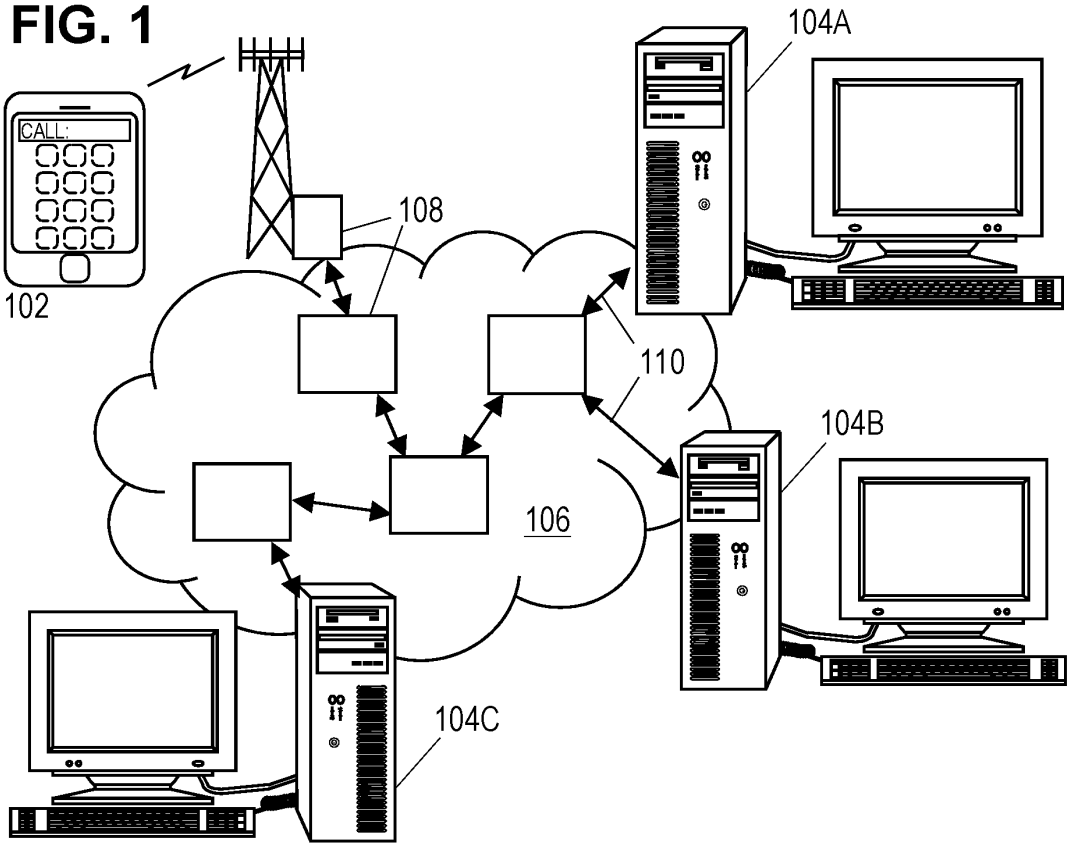
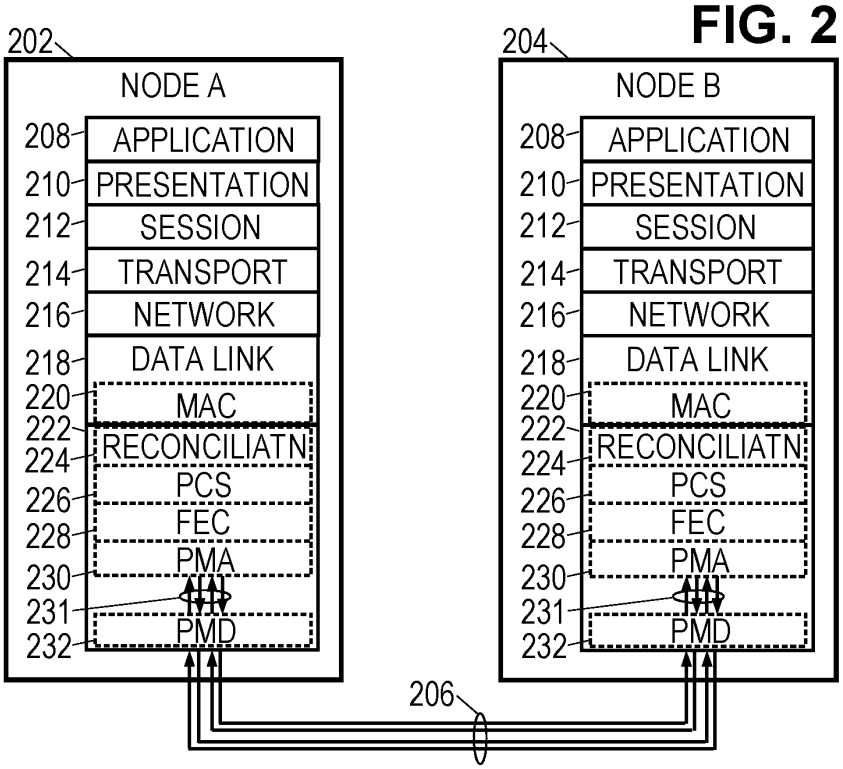


FIG. 2


202
NODE A
208
APPLICATION
210
PRESENTATION
212
SESSION
214
TRANSPORT
216
NETWORK
218
DATA LINK
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MAC
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RECONCILIATN
224
PCS
226
FEC
228
PMA
230
231
PMD
232
204
NODE B
208
APPLICATION
210
PRESENTATION
212
SESSION
214
TRANSPORT
216
NETWORK
218
DATA LINK
220
MAC
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FEC
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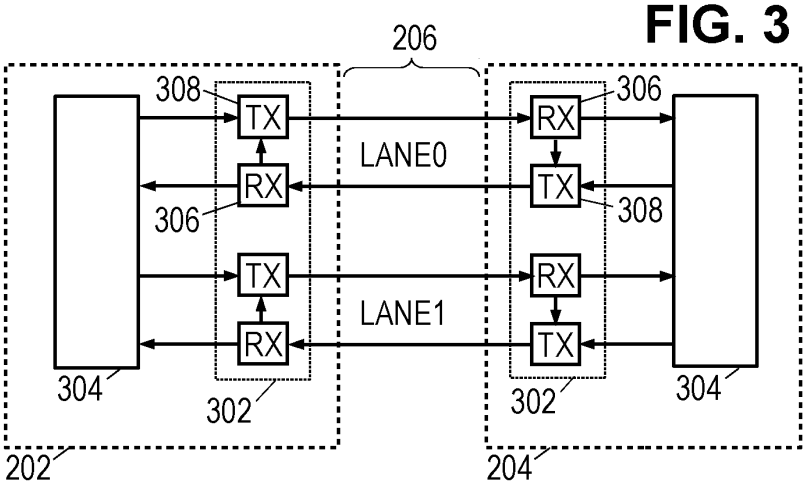
231
PMD
232
206

FIG. 3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TX
RX
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LANE1
RX
TX
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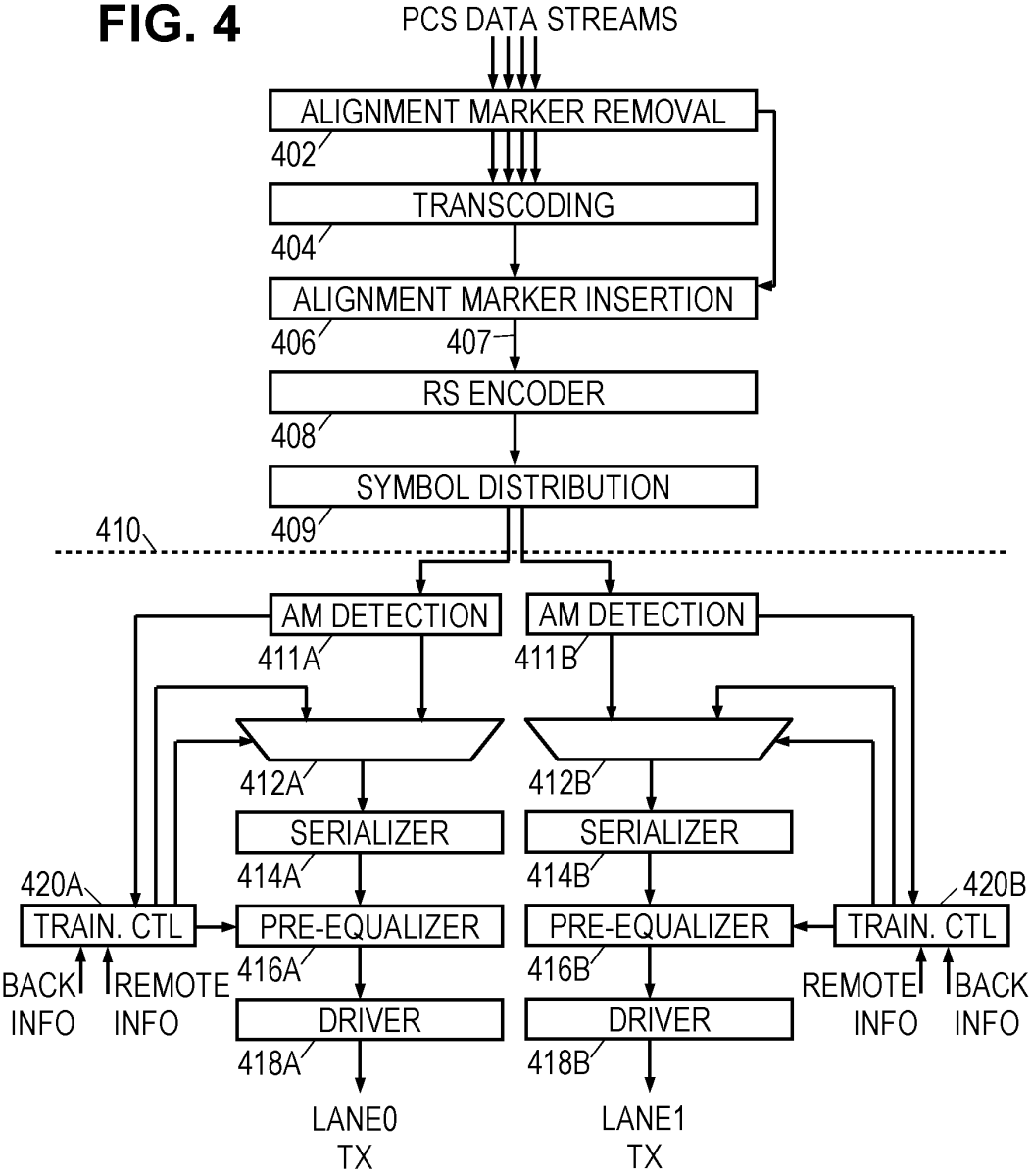
302
304
202
204

FIG. 4


PCS DATA STREAMS
ALIGNMENT MARKER REMOVAL
402
TRANSCODING
404
ALIGNMENT MARKER INSERTION
406
407
RS ENCODER
408
SYMBOL DISTRIBUTION
409
410
AM DETECTION
411A
AM DETECTION
411B
412A
412B
SERIALIZER
414A
SERIALIZER
414B
420A
TRAIN. CTL
PRE-EQUALIZER
416A
PRE-EQUALIZER
416B
TRAIN. CTL
420B
BACK INFO
REMOTE INFO
DRIVER
418A
DRIVER
418B
REMOTE INFO
BACK INFO
LANE0 TX
LANE1 TX

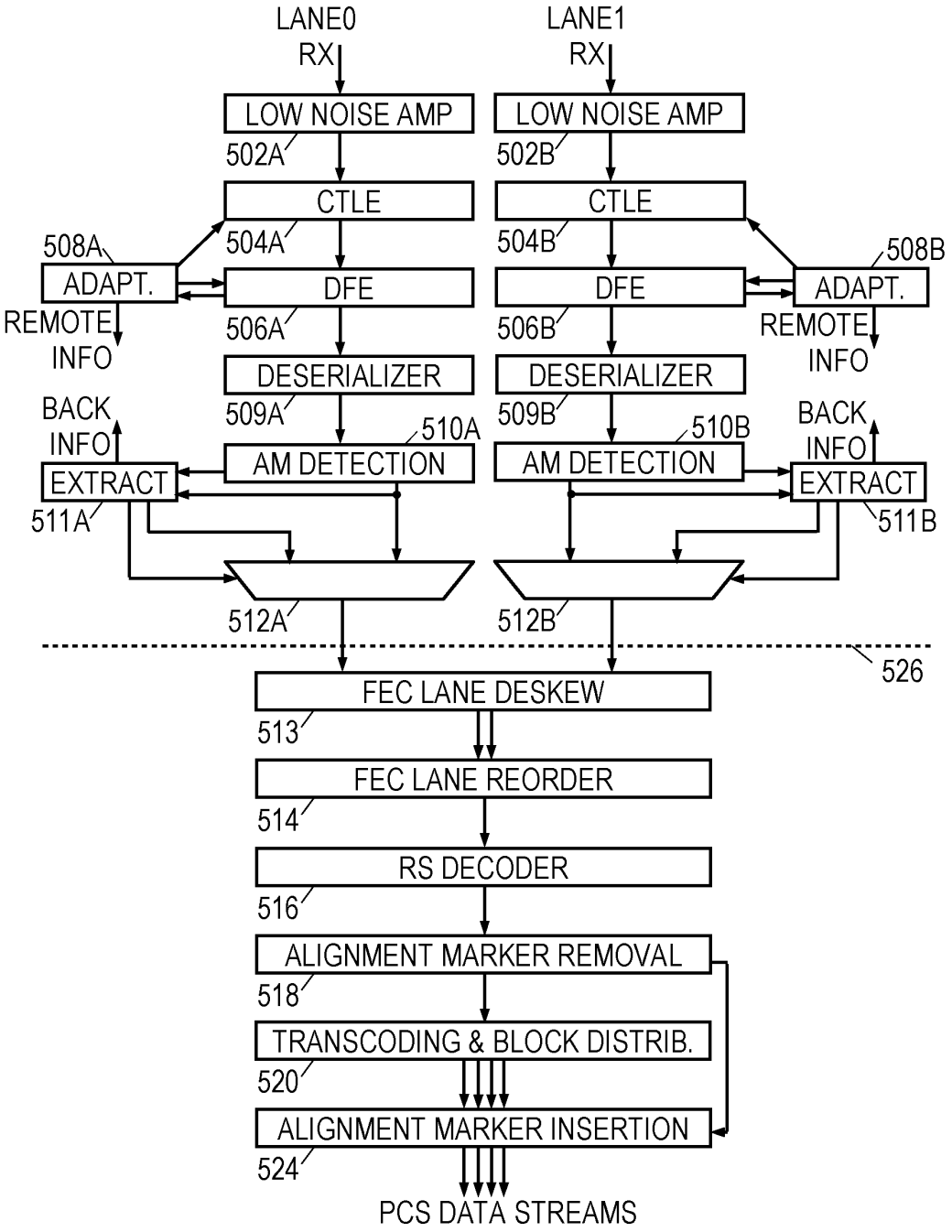

LANE0
RX
LANE1
RX
LOW NOISE AMP
502A
LOW NOISE AMP
502B
CTLE
504A
CTLE
504B
508A
ADAPT.
DFE
506A
DFE
506B
ADAPT.
508B
REMOTE INFO
REMOTE INFO
DESERIALIZER
509A
DESERIALIZER
509B
BACK INFO
BACK INFO
510A
AM DETECTION
510B
AM DETECTION
EXTRACT
EXTRACT
511A
511B
512A
512B
526
FEC LANE DESKEW
513
FEC LANE REORDER
514
RS DECODER
516
ALIGNMENT MARKER REMOVAL
518
TRANSCODING & BLOCK DISTRIB.
520
ALIGNMENT MARKER INSERTION
524
PCS DATA STREAMS

FIG. 5

FIG. 6A

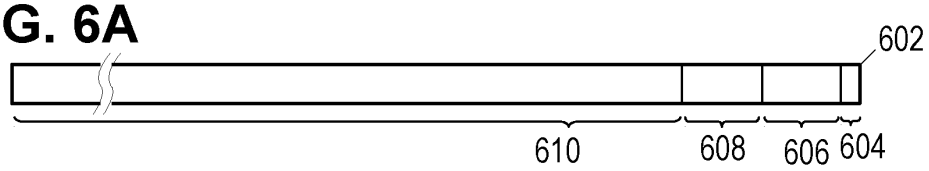


FIG. 6B

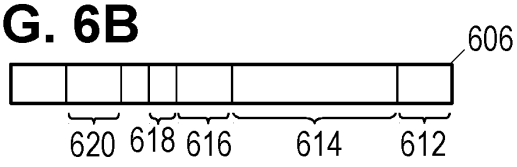


FIG. 6C

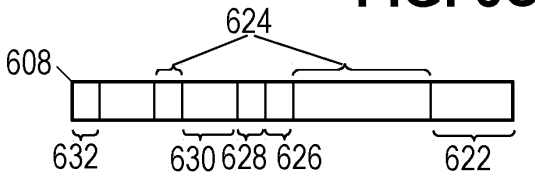


FIG. 7A

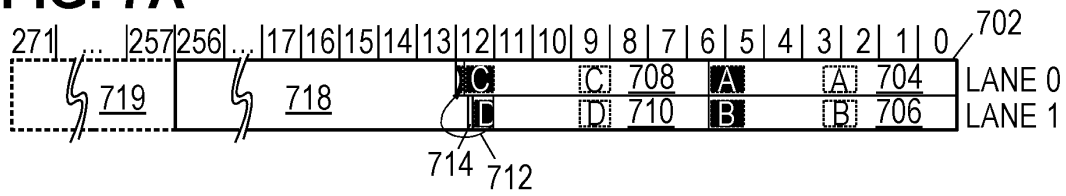


FIG. 7B

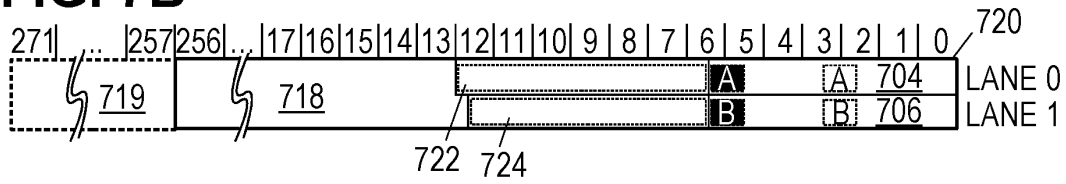


FIG. 7C

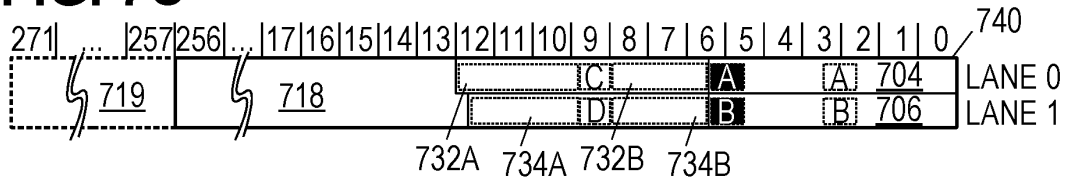


FIG. 7D

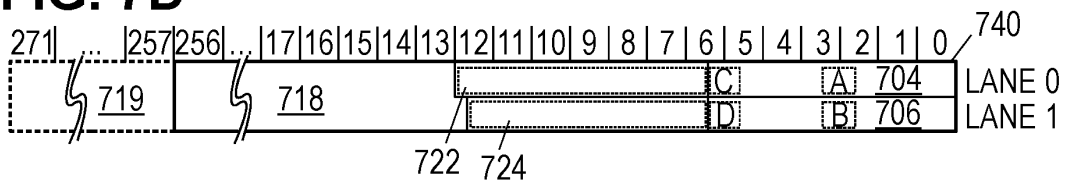


FIG. 8

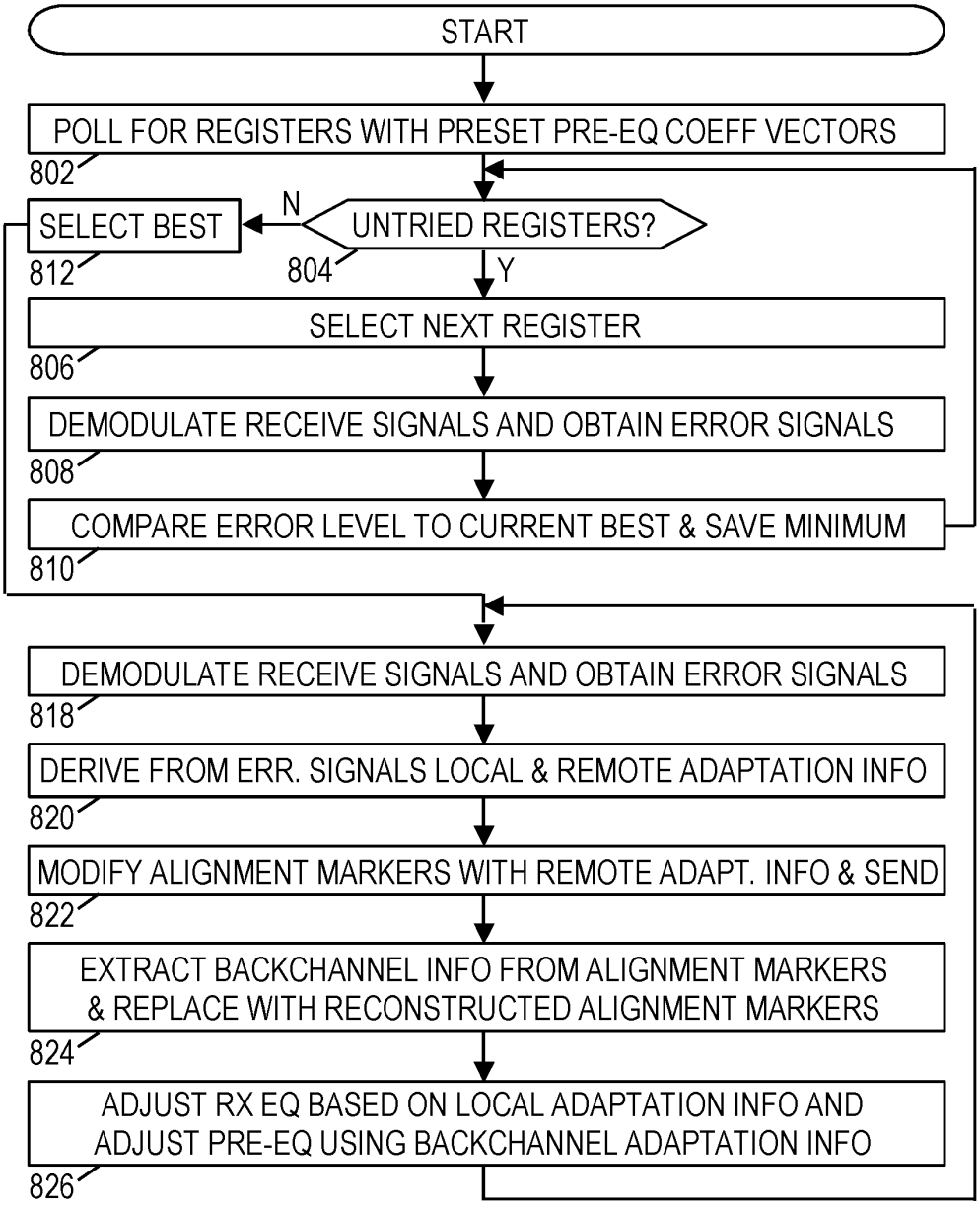
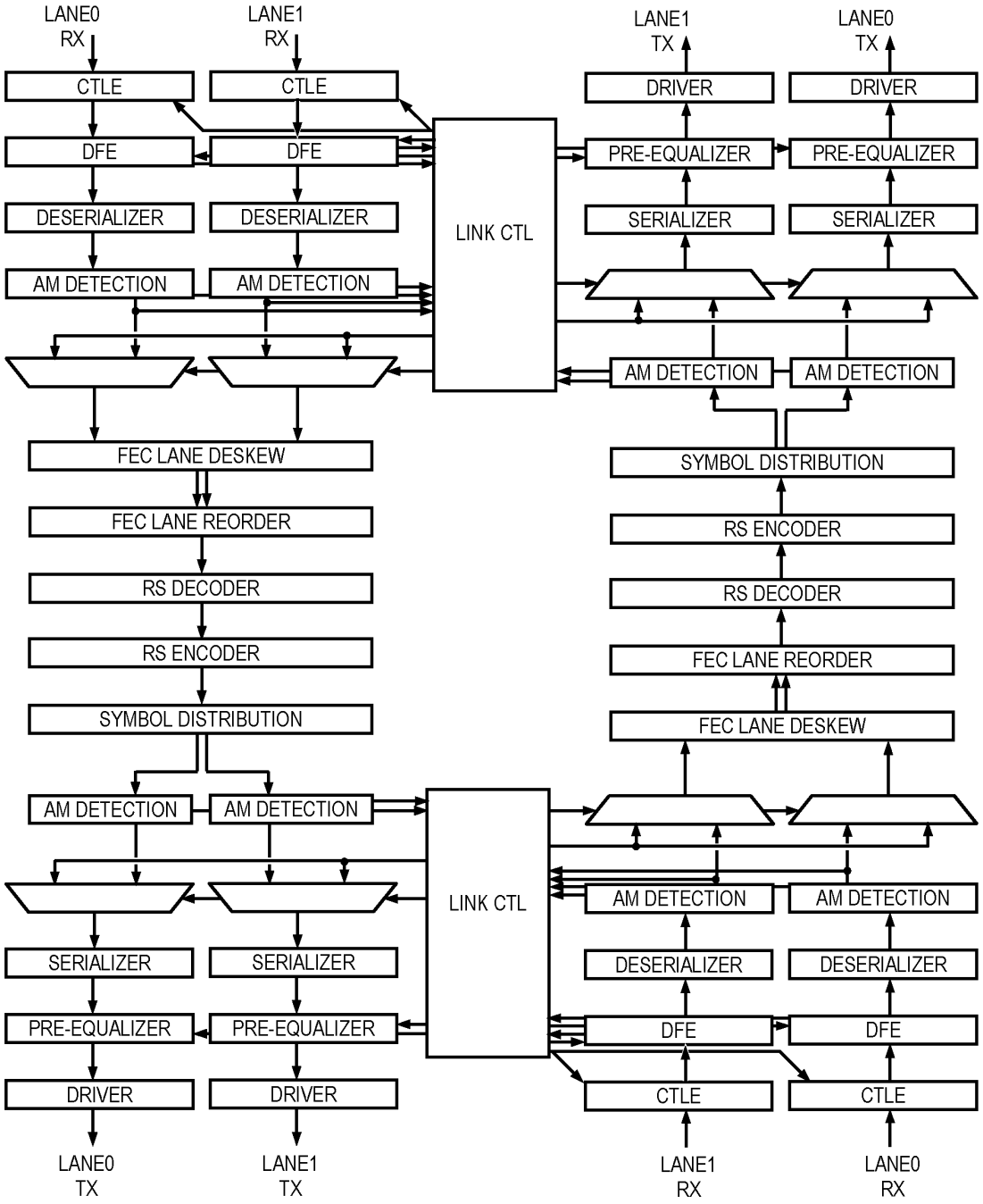

START
POLL FOR REGISTERS WITH PRESET PRE-EQ COEFF VECTORS
802
SELECT BEST
812
N
UNTRIED REGISTERS?
804
Y
SELECT NEXT REGISTER
806
DEMODULATE RECEIVE SIGNALS AND OBTAIN ERROR SIGNALS
808
COMPARE ERROR LEVEL TO CURRENT BEST & SAVE MINIMUM
810
DEMODULATE RECEIVE SIGNALS AND OBTAIN ERROR SIGNALS
818
DERIVE FROM ERR. SIGNALS LOCAL & REMOTE ADAPTATION INFO
820
MODIFY ALIGNMENT MARKERS WITH REMOTE ADAPT. INFO & SEND
822
EXTRACT BACKCHANNEL INFO FROM ALIGNMENT MARKERS & REPLACE WITH RECONSTRUCTED ALIGNMENT MARKERS
824
ADJUST RX EQ BASED ON LOCAL ADAPTATION INFO AND ADJUST PRE-EQ USING BACKCHANNEL ADAPTATION INFO
826

FIG. 9


LANE0 RX
LANE1 RX
LANE1 TX
LANE0 TX
CTLE
CTLE
DRIVER
DRIVER
DFE
DFE
PRE-EQUALIZER
PRE-EQUALIZER
DESERIALIZER
DESERIALIZER
SERIALIZER
SERIALIZER
LINK CTL
AM DETECTION
AM DETECTION
AM DETECTION
AM DETECTION
FEC LANE DESKEW
SYMBOL DISTRIBUTION
FEC LANE REORDER
RS ENCODER
RS DECODER
RS DECODER
RS ENCODER
FEC LANE REORDER
SYMBOL DISTRIBUTION
FEC LANE DESKEW
AM DETECTION
AM DETECTION
LINK CTL
AM DETECTION
AM DETECTION
SERIALIZER
SERIALIZER
DESERIALIZER
DESERIALIZER
PRE-EQUALIZER
PRE-EQUALIZER
DFE
DFE
DRIVER
DRIVER
CTLE
CTLE
LANE0 TX
LANE1 TX
LANE1 RX
LANE0 RX

SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Provisional Application US 62/723,701, filed 2018-08-28 and titled "SerDes Pre-Equalizer Having Efficient Adaptation" by inventors J.Sun and H.Qian, which is hereby incorporated herein by reference. This application further relates to Application US 15/654,446, filed 2017-07-19 and titled "SerDes Architecture with a Hidden Backchannel Protocol" by inventor J.Sun.

BACKGROUND

[0002] The Institute of Electrical and Electronics Engineers (IEEE) Standards Association publishes an IEEE Standard for Ethernet, IEEE Std 802.3-2015, which will be familiar to those of ordinary skill in the art to which this application pertains. This standard provides a common media access control specification for local area network (LAN) operations at selected speeds from 1 Mb/s to 100 Gb/s over coaxial cable, twisted wire pair cable, fiber optic cable, and electrical backplanes, with various channel signal constellations. As demand continues for ever-higher data rates, extensions to the standard must account for increased channel attenuation and dispersion even as the equalizers are forced to operate at faster symbol rates. One potential course of action employs enhanced equalization techniques, but such techniques should be implemented in a manner that does not limit performance or introduce undesirable hardware complexity or cost.

SUMMARY

[0003] Accordingly, there are disclosed herein a serializer-deserializer (SerDes) architecture and method that implements an efficient adaptation interface for transmitter pre-equalizers in a standards-suitable fashion. An illustrative SerDes (serializer-deserializer) communications method embodiment may include a transceiver: selecting one of multiple registers to specify initial pre-equalizer coefficient values; updating the initial pre-equalizer coefficient values during a training phase; and using the updated pre-equalizer coefficient values to convey a transmit data stream.

[0004] In an illustrative embodiment of a chip-to-module communications link, a port connector

couples a port transceiver to a pluggable module transceiver, the pluggable module transceiver including: one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to the port transceiver; and a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values, the controller using one of the registers to set initial coefficient values for the one or more transmit filters.

[0005] Each of the foregoing embodiments may be implemented individually or in combination, and may be implemented with any one or more of the following features in any suitable combination: 1. each of the multiple registers corresponds to a different channel model. 2. at least some of the different channel models are for chip-to-module (C2M) channels with different insertion loss and package loss characteristics. 3. at least some of the different channel models presume different types of receiver equalization. 4. said selecting includes using the initial pre-equalizer coefficient values to determine a performance characteristic for each of the multiple registers. 5. the performance characteristic is an error signal energy. 6. the performance characteristic is a bit error rate. 7. updating the selected register with the updated pre-equalizer coefficient values. 8. one of the registers is selected by the port transceiver to specify the initial coefficient values. 9. the port transceiver iteratively selects different ones of the multiple registers and determines a performance characteristic for each. 10. the port transceiver generates updates for the coefficient values of the one or more transmit filters. 11. the controller saves updated coefficient values in one of the registers. 12. performing simultaneous updates of multiple coefficients values. 13. performing coarse updates before performing fine updates of coefficient values.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In the drawings:

[0007] Fig. 1 shows an illustrative communications network.

[0008] Fig. 2 is a diagram of an illustrative multi-lane communications link model.

[0009] Fig. 3 is a block diagram of an illustrative communications link.

[0010] Fig. 4 is a block diagram of a transmit chain in an illustrative multi-lane transceiver.

[0011] Fig. 5 is a block diagram of a receive chain in an illustrative multi-lane transceiver.

[0012] Figs. 6A-6C show fields of an illustrative training frame.

[0013] Fig. 7A shows sets of grouped alignment markers in an illustrative multi-lane data stream.

[0014] Fig. 7B shows a first data stream embodiment having hidden backchannel fields.

[0015] Fig. 7C shows a second data stream embodiment having hidden backchannel fields.

[0016] Fig. 7D shows a third data stream embodiment having hidden backchannel fields.

[0017] Fig. 8 is a flowchart of an illustrative multi-lane communications method.

[0018] Fig. 9 is a block diagram of an illustrative pluggable module.

[0019] It should be understood, however, that the specific embodiments given in the drawings and detailed description do not limit the disclosure. On the contrary, they provide the foundation for one of ordinary skill to discern the alternative forms, equivalents, and modifications that are encompassed in the scope of the appended claims.

DETAILED DESCRIPTION

[0020] The disclosed apparatus and methods are best understood in the context of the larger environments in which they operate. Accordingly, Fig. 1 shows an illustrative communications network 100 including mobile devices 102 and computer systems 104A-C coupled via a routing network 106. The routing network 106 may be or include, for example, the Internet, a wide area network, or a local area network. In Fig. 1, the routing network 106 includes a network of equipment items 108, such as switches, routers, and the like. The equipment items 108 are connected to one another, and to the computer systems 104A-C, via point-to-point communication links 110 that transport data between the various network components. At least some of the links 110 in network 106 are high-speed multi-lane links such as Ethernet links operating in compliance with the IEEE Std 802.3-2015 (or later) at 10 Gb/s or more.

[0021] Fig. 2 shows a communications link between two nodes 202, 204, that operate in accordance with the ISO/IEC Model for Open Systems Interconnection (See ISO/IEC 7498-1:1994.1) to communicate over a physical medium represented by transmit and receive channels 206. The interconnection reference model employs a hierarchy of layers with defined functions and interfaces to facilitate the design and implementation of compatible systems by different

teams or vendors. While it is not a requirement, it is expected that the higher layers in the hierarchy will be implemented primarily by software or firmware operating on programmable processors while the lower layers may be implemented as application-specific hardware.

[0022] The Application Layer 208 is the uppermost layer in the model, and it represents the user applications or other software operating on different systems (e.g., equipment 108), which need a facility for communicating messages or data. The Presentation Layer 210 provides such applications with a set of application programming interfaces (APIs) that provide formal syntax, along with services for data transformations (e.g., compression), establishing communication sessions, connectionless communication mode, and negotiation to enable the application software to identify the available service options and select therefrom. The Session Layer 212 provides services for coordinating data exchange including: session synchronization, token management, full- or half-duplex mode implementation, and establishing, managing, and releasing a session connection. In connectionless mode, the Session Layer may merely map between session addresses and transport addresses.

[0023] The Transport Layer 214 provides services for multiplexing, end-to-end sequence control, error detection, segmenting, blocking, concatenation, flow control on individual connections (including suspend/resume), and implementing end-to-end service quality specifications. The focus of the Transport Layer 214 is end-to-end performance/behavior. The Network Layer 216 provides a routing service, determining the links used to make the end-to-end connection and when necessary acting as a relay service to couple together such links. The Data link layer 218 serves as the interface to physical connections, providing delimiting, synchronization, sequence and flow control across the physical connection. It may also detect and optionally correct errors that occur across the physical connection. The Physical layer 222 provides the mechanical, electrical, functional, and procedural means to activate, maintain, and deactivate channels 206, and to use the channels 206 for transmission of bits across the physical media.

[0024] The Data Link Layer 218 and Physical Layer 222 are subdivided and modified slightly by IEEE Std 802.3-2015, which provides a Media Access Control (MAC) Sublayer 220 in the Data Link Layer 218 to define the interface with the Physical Layer 222, including a frame structure and transfer syntax. Within the Physical Layer 222, the standard provides a variety of possible

subdivisions such as the one illustrated in Fig. 2, which includes an optional Reconciliation Sublayer 224, a Physical Coding Sublayer (PCS) 226, a Forward Error Correction (FEC) Sublayer 228, a Physical Media Attachment (PMA) Sublayer 230, and a Physical Medium Dependent (PMD) Sublayer 232.

[0025] The optional Reconciliation Sublayer 224 merely maps between interfaces defined for the MAC Sublayer 220 and the PCS Sublayer 226. The PCS Sublayer 226 provides scrambling/descrambling, data encoding/decoding (with a transmission code that enables clock recovery and bit error detection), block and symbol redistribution, PCS alignment marker insertion/removal, and block-level lane synchronization and deskew. To enable bit error rate estimation by components of the Physical Layer 222, the PCS alignment markers typically include Bit-Interleaved-Parity (BIP) values derived from the preceding bits in the lane up to and including the preceding PCS alignment marker.

[0026] The FEC Sublayer 228 provides, e.g., Reed-Solomon coding/decoding that distributes data blocks with controlled redundancy across the lanes to enable error correction. In some embodiments (e.g., in accordance with Article 91 or proposed Article 134 for the IEEE Std 802.3), the FEC Sublayer 228 modifies the number of lanes. For example, under proposed Article 134, a four-lane outgoing data stream (including PCS alignment markers) may be converted into a two-lane transmit data stream. Conversely, the FEC Sublayer 228 may convert a two-lane receive data stream into a four-lane incoming data stream. In both directions, the PCS alignment markers may be preserved, yielding pairs (or more generally, "sets") of grouped PCS alignment markers in the multi-lane data streams being communicated to and from the PMA Sublayer 230. (Article 91 provides for a 20-to-4 lane conversion, yielding sets of 5 grouped PCS alignment markers in each lane of the data streams communicated between the FEC and PMA sublayers.)

[0027] The PMA Sublayer 230 provides lane remapping, symbol encoding/decoding, framing, and octet/symbol synchronization. In at least some contemplated embodiments, the multi-lane data stream 231 communicated to and from the PMA Sublayer 230 complies with the attachment unit interface (AUI) requirements of the IEEE standard. Several varieties of the AUI requirements exist and are named based on the nominal bit rate and the number of lanes. For example, Annexes 120E and 135G to the IEEE standard provide requirements for 50GAUI-1, 100GAUI-2,

200GAUI-4, and 400GAUI-8, which respectively employ 1, 2, 4, and 8 lanes of NRZ signaling at a per-lane symbol rate of 53.125 GBd. Recently proposed extensions provide requirements for 100GAUI-1, 200GAUI-2, 400GAUI-4, and 800GAUI-8, which respectively employ 1, 2, 4, and 8 lanes of PAM4 signaling at per-lane symbol rates of 53.125 GBd.

[0028] The PMD Sublayer 232 specifies the transceiver conversions between transmitted/received channel signals and the corresponding AUI-compliant bit (or digital symbol) streams. The PMD Sublayer also implements an initial start-up of the communications channels 206, optionally conducting an auto-negotiation phase and a link-training phase before entering a normal operating phase. The auto-negotiation phase enables the end nodes to exchange information about their capabilities, and the training phase enables the end nodes to adapt both transmit-side and receive-side equalization filters in a fashion that combats the channel non-idealities

[0029] More information regarding the operation of the sublayers, as well as the electrical and physical specifications of the connections between the nodes and the communications medium (e.g., pin layouts, line impedances, signal voltages & timing), arrangements of the communications medium (e.g., the network topology), and the electrical and physical specifications for the communications medium itself (e.g., conductor arrangements in copper or fiber optic cable, limitations on attenuation, propagation delay, signal skew), can be found in the standard, and any such details should be considered to be well within the knowledge of those having ordinary skill in the art. The discussion below focuses on modifications specific to the present disclosure.

[0030] Fig. 3 provides a block diagram of those portions of nodes 202, 204, that may implement the Data Link Layer 218 and Physical Layer 222. Transceivers 302 for multiple transmit and receive channels are coupled to a host interface 304. The transceivers 302 and host interface 304 may be, e.g., part of a network interface peripheral coupled to the I/O bus of a personal computer, server, network switch, or other network-connected electronic system. The host interface 304 may implement the MAC Sublayer, optional Reconciliation Sublayer, and PCS Sublayer, and elements of the FEC, PMA, and PMD Sublayers, as application-specific integrated circuitry to enable high-rate processing and data transmission. The illustrated transceivers 302, preferably

embodied as application-specific integrated circuitry for very high-rate serial data transmission and reception, include multiple pairs of a receiver 306 and transmitter 308, each pair coupled to two unidirectional channels (a receive channel and a transmit channel) to implement one lane of a multi-lane physical connection. The physical connection thus accepts from each node transmit channel signals representing a multi-lane transmit stream and conveys the signals to the other node, delivering them as receive channel signals representing a multi-lane receive data stream. The receive signals may be degraded due to the physical channel's introduction of noise, attenuation, and signal dispersion.

[0031] Note that while the following discussion glosses over the traces conveying AUI-compliant multi-lane stream 231 between the PMA Sublayer 230 and the PMD Sublayer 232, focusing instead on communication channels 206, the disclosed principles are also applicable to this so-called "chip-to-module" (C2M) link, which will receive more detailed consideration after the description of Figs. 4-5.

[0032] Figs. 4 and 5 provide a more detailed block diagram of illustrative transmit and receive chains in the sublayers below the PCS. The transmit chain in Fig. 4 accepts a four-lane data stream from the PCS. Pursuant to the standard, the PCS data stream is already encoded with a transmission code that provides DC balance and enables timing recovery. The PCS data stream lanes further include PCS alignment markers for synchronizing the lanes with each other. Once the data stream lanes are aligned, an alignment marker removal module 402 removes the alignment markers from each lane, passing them to a downstream alignment marker insertion module 406. A transcoding module 404 modifies the transmission code from a 64b/66b code to a 256b/257b code more appropriate for use with the Reed-Solomon encoder. By repeatedly transcoding four 66-bit blocks taken in parallel from the four incoming lanes into individual 257-bit blocks, the transcoding module may essentially convert the four lanes into a single lane data stream.

[0033] The previously-mentioned alignment marker insertion module 406 accepts the PCS alignment marker information from removal module 402 and the single-lane data stream from transcoding module 404. The insertion module 406 combines the alignment marker information from the four lanes in a manner discussed further below to form a set of grouped alignment

markers in a 257-bit block and, accounting for the operation of the transcoding module 404, inserts the alignment block in a fashion that preserves its location relative to the other data in the data stream 407. As described further with respect to Figs. 7A-7C, the alignment block is designed to account for the operation of the encoder module 408 and symbol distribution modules 409 such that the alignment markers appear essentially intact and in order in the two-lane transmit data stream crossing boundary 410.

[0034] A Reed-Solomon (RS) encoder module 408 operates on 10-bit "symbol" blocks of the data stream 407 from the insertion module 406, adding redundancy to enable downstream correction of symbol errors. Typically, the encoder module 408 operates to preserve the original data stream content while appending so-called "parity" information, e.g., 30 parity symbol blocks appended to 514 data symbol blocks to form a complete code word block. Thus the alignment blocks inserted by module 406 will remain present in the output data-stream from the encoder module. A symbol distribution module 409 distributes code word symbols across multiple transmission lanes in round-robin fashion, directing each lane to a corresponding transmitter. Boundary 410 may be considered as the boundary between the FEC sublayer 228 and the PMA sublayer 230. Where it is desired to maintain this boundary as strongly as possible, the PMA sublayer may include an alignment marker detection module 411A (and 411B) for each lane of the transmit data stream to detect the alignment markers inserted by module 406 with suitable data buffering. Alternatively, this boundary can be relaxed and the alignment marker detection modules 411A, 411B omitted in favor of appropriate direct signaling from the alignment marker insertion module 406. In either case, the training control modules 420A, 420B control the multiplexers 412A, 412B in each lane, based at least in part on detection signals indicating the presence of the alignment markers.

[0035] Multiplexers 412A, 412B forward the encoded data streams to serializer modules 414A, 414B during normal operations and in the absence of alignment markers. During auto-negotiation and training phases, the multiplexers supply negotiation and training data streams from the training control modules 420A, 420B to the serializers. During normal operations in the presence of alignment markers, the multiplexers 412A, 412B (acting as alignment marker replacement modules) supply the serializer modules with modified alignment markers as

discussed further below. The serializers 414A, 414B, each accept a stream of transmit data blocks and convert the stream of blocks into a (higher-rate) stream of channel symbols. Where, for example, a 4-PAM signal constellation is used, each serializer may produce a stream of two-bit symbols.

[0036] Each stream of channel symbols is filtered by a pre-equalizer module 416A, 416B to produce a transmit signal, which is amplified and supplied to the transmit channel by a driver 418A, 418B. The pre-equalizer modules compensate for at least some of the channel dispersion, reducing or eliminating the need for receiver-side equalization. Such pre-equalization may be advantageous in that it avoids the noise enhancement often associated with receiver-side equalization and enables digital filtering with a reduced bit-width. The bit width reduction directly reduces power consumption by requiring a less complex filter, but may further reduce power consumption by obviating the parallelization that a more complex filter might require to operate at the required bandwidth. However, pre-equalization generally requires knowledge of the channel.

[0037] One or more training controllers 420A, 420B, operate to characterize the channel after conducting an initial auto-negotiation phase. During the auto-negotiation phase, at least one training controller generates a sequence of auto-negotiation frames conveying capabilities of the local node to the remote node and negotiating to select a combination of features to be used for subsequent communications. When the auto-negotiation phase is complete, each training controller generates a sequence of training frames, so that training is carried out independently on each of the lanes.

[0038] An illustrative training frame 602 is now described with reference to Figs. 6A-6C. The training frame 602 begins with a frame marker 604 indicating the start of the training frame. The frame marker 604 is followed by a coefficient update field 606, a status report field 608, and a training pattern 610. Unlike the training pattern, which provides a spectrally-dense channel symbol sequence to facilitate training, the preceding fields are sent using differential Manchester encoding to facilitate timing recovery and ensure reliable communication even with untrained equalizers.

[0039] Fig. 6B shows an illustrative coefficient update field 606, having a two-bit request field

612 to indicate whether a selected coefficient should be incremented, decremented, maintained at the present value, or disabled; a six-bit selection field 614 to select one of up to 64 pre-equalizer coefficients; a two-bit modulation field 616 to select a desired modulation scheme (e.g., 2-PAM, 4-PAM, with or without precoding); a one-bit filter length field 618 to indicate whether the pre-equalization filter should be short (no more than four coefficients) or long (more than four coefficients); and a two-bit initialization request field 620 to select a pre-programmed set of pre-equalization coefficient values. The unlabeled fields may be reserved for future use. The training controller(s) may use the coefficient update field 606 to convey backchannel information, i.e., adjustments to the pre-equalization filter coefficients of the remote transmitter.

[0040] Fig. 6C shows an illustrative status report field 608, having a three-bit coefficient status field 622 to report a successful update to a coefficient, an unsuccessful update, or an error condition (e.g., coefficient not supported, maximum voltage or coefficient limit reached); a one-bit and five-bit (totaling six bit) coefficient selection echo field 624 to echo back the coefficient selection from the remote node; a one bit initial condition status field 626 to report successful or unsuccessful setting of the coefficient values to an initial set of preprogrammed values; a one-bit lock status field 628 to indicate whether the receiver has achieved frame lock; a modulation status field 630 to report which modulation scheme is being employed by the transmitter; and a one-bit receiver ready field 632 to indicate whether the local node has finished training and is ready to begin data transmission. The training controller(s) may use the status report field 608 to convey confirmations and other local status information to the remote node.

[0041] Returning to Fig. 4, the one or more training controllers 420A, B, receive backchannel information extracted by the receiver from the received data stream and use the backchannel information to adjust the coefficients of the pre-equalization filters. The controllers further receive "remote info", which includes locally-generated information for adapting the coefficients of the pre-equalization filter in the remote node. Based on this information the controllers populate the coefficient selection field 614 and request field 612 of the training frames to provide backchannel information to the remote node. As training frames are employed only during the training phase, and as it may be desirable to continue updating the pre-equalization filter during normal operations, the training controller(s) 420 may include similar backchannel information in

or with the modified alignment markers supplied via multiplexers 412A, 412B during normal operations.

[0042] Though shown as a single lane, the 10-bit symbol blocks of data stream 407 can conceptually be arranged into two lanes in anticipation of the operation of symbol distribution module 409, which places adjacent symbol blocks in alternate lanes. Fig. 7A shows a 514 symbol message word 702 (corresponding to the length of twenty 257-bit blocks from transcoding module 404) in this fashion, with broken outline for the 30 parity symbols 719 to be appended by the Reed-Solomon encoder 408 to form a complete 544 symbol code word. The spacing of the alignment markers in the four-lane PCS data stream is such that when a set of grouped alignment markers are inserted in the data stream 407, the grouped alignment markers form the first 257 bits of a message word 702 (and also the first 257 bits of the resulting Reed-Solomon codeword) while data blocks 718 occupy the remainder of the message word. Within these 257 bits, the information from the four PCS data stream alignment markers are arranged in alternating 10-bit symbol blocks so that within each lane the information appears, in order, and as essentially intact PCS alignment markers 704, 706, 708, and 710. As the four 64-bit alignment markers fall one bit short of the 257-bit length of blocks put out by the transcoding module, a one-bit pad 714 is appended to the grouped alignment markers. Moreover, within these first 257 bits of the message word 702, the alignment markers don't align well with the 10-bit symbol block boundaries. To fill out a full 10-bit symbol in lane 0, a 2-bit portion of marker 710 is excerpted from position 712.

[0043] The alignment markers in the four lane PCS data stream carry bit-interleaved parity values (A, B, C, D in inverted and non-inverted versions) and employ unique marker (UM) patterns that are lane specific. The alignment insertion module 406 modifies the pattern of alignment marker 706 to agree with that of alignment marker 704, so that they share a common marker (CM) pattern to facilitate detection and synchronization of the two lanes at the receiver. The BIP values are preserved. While alignment makers 708, 710 could in theory be used to make the synchronization process more robust, their presence is only necessary for identifying lanes at the beginning of the communications process and thereafter only to convey the contents of their BIP fields. Once the lanes have been identified, the lane-specific patterns for markers 708, 710 are

redundant and these patterns may be omitted to make room for backchannel information. Thus multiplexers 412A, 412B, optionally with the support of alignment marker detection modules 411A, 411B, may replace the sets of grouped alignment markers with modified versions as shown in Figs. 7B-7D.

[0044] In some embodiments, the replacements begin only after a "settling period" (e.g., for one second after the multi-lane communications begin) or after a predetermined number (e.g., 100) of grouped alignment markers have been sent, with all sets of grouped alignment markers being modified thereafter. In other embodiments, the replacements occur periodically, with 1 out of every 2 sets being replaced, or 2 out of 3, or (N-1) out of N, with N potentially ranging as high as 10^5 to provide at least one unmodified set on the order of once per second. In still other embodiments, the replacement may occur on an as-needed basis, e.g., when degradation or drift is observed in the performance of the equalizers. In these as-needed embodiments, the replacements may begin upon detection of the reduced performance and continue until training convergence is achieved.

[0045] In Fig. 7B the UM alignment markers 708 and 710 are replaced in their entireties by a backchannel adaptation field 722 having 66 bits and a backchannel status field 724 having 63 bits (including the former pad bit 714). At the receiver, the backchannel information is extracted and the alignment markers 708, 710 restored with placeholders for the lost BIP (inverted and non-inverted) values. With SerDes systems employing forward error correction, the BIP values are no longer essential for determining bit error rates, and in this implementation the BIP values are sacrificed for additional backchannel bandwidth that will not substantively impact the operation or throughput of the higher sublayers and layers.

[0046] Nevertheless, different implementations may be employed to prevent the loss of BIP values in the restored alignment markers. In Fig. 7C, the UM patterns and inverted BIP values are dropped from alignment markers 708, 710 while the non-inverted BIP values are left in place. The UM patterns and inverted BIP values are replaced by an adaptation field 732A, 732B (for marker 708) and a status field 734A, 734B. This approach preserves alignment markers 704 and 706 unchanged from the markers inserted by module 406 while reallocating 56 bits from each of markers 708, 710 for hidden backchannel fields 732, 734. At the receiver, the backchannel

information is extracted and the alignment markers 708, 710 restored (and the BIP values preserved) without impact on the operation or throughput of the higher sublayers and layers.

[0047] In Fig. 7D, alignment markers 704, 706 are modified to replace their inverted BIP values with the non-inverted BIP values from alignment markers 708, 710. Their CM patterns remain unaffected so that the standard synchronization process still functions. Meanwhile, additional space is made available for backchannel information. As in Fig. 7B, backchannel adaptation field 722 has 66 bits while backchannel status field 724 has 63 bits (including the former pad bit 714). At the receiver, the backchannel information is extracted and the alignment markers 704, 706, 708, 710 are fully restored (and the BIP values preserved) without impact on the operation or throughput of the higher sublayers and layers.

[0048] As with the training frame, the backchannel information field(s) of the modified alignment markers may provide a six-bit field for selecting pre-equalization filter coefficients; a two-bit field for specifying that the selected coefficient should be incremented, decremented, maintained, or disabled; and perhaps a one-bit field for indicating whether the backchannel information field contains a valid command or should be ignored. The backchannel information field(s) may further provide a status report, with a six-bit field for echoing a filter coefficient selection; a two-bit field for indicating whether the coefficient has been updated, not updated, is at its limit, or is not supported; and perhaps a one-bit field for indicating that the receiver has obtained a lock on the lane alignments.

[0049] In an alternative embodiment, each coefficient of the pre-equalization filter may have a bit pair allocated within the modified alignment markers to indicate (in the adaptation field) whether that coefficient should be incremented, decremented, maintained, or disabled; or (in the status field) to indicate whether that coefficient is maximized, minimized, updated, or not updated.

[0050] As with the training frame, the backchannel information fields of the modified alignment markers may be encoded using differential Manchester encoding to ensure reliable delivery. Additionally or alternatively, reliability of the backchannel information field delivery may be enhanced using other techniques. For example, the backchannel information field may be sent redundantly, using multiple copies of a field to enable error detection and (for three or more

copies) voting-based error correction. (Notably, a standards-compliant alignment marker includes a bitwise-inverted duplication of each element, which can be extended to include the backchannel information field. If an odd number of copies is desired, the last field may be partly inverted.) A parity check or short FEC code may also provide controlled redundancy enabling the detection and possible correction of bit errors.

[0051] Having discussed the transmit chain and the fields (including hidden fields 722-724 or 732-734) potentially employed to communicate backchannel information during the training and normal operations phases, we turn now to the operation of an illustrative receive chain such as that shown in Fig. 5. The receive chain obtains analog electrical signals from different receive channels (indicated by Lane0-rx and Lane1-rx). These may be obtained directly from electrical conductors, if the physical medium is an electrical bus or cable, or indirectly via transducers if the physical medium is wireless. Low noise amplifiers (LNA) 502A,B, each provide a high input impedance to minimize channel loading and amplifies the receive signal to drive the input of a continuous time linear equalizer (CTLE) filter 504A,B.

[0052] CTLE filters 504A,B provide continuous time filtering to shape the receive signal spectrum in an adaptive fashion to reduce the length of the channel impulse response while minimizing leading inter-symbol interference (ISI). Decision feedback equalizers (DFE) 506A,B operate on the filtered signals to correct for trailing ISI and detect each transmitted channel bit or symbol, thereby producing a demodulated digital data stream. Some embodiments employ oversampling. Clock recovery and adaptation modules 508A,B derive a sampling clock signal from the input and/or output of the DFE's decision element and supply it back to the DFE to control timing of the symbol detection. The adaptation modules 508A,B further derive an error signal of the DFE decision element's input relative to the output or (during the training phase) to a known training pattern, and use the error signal to adapt the DFE coefficient(s) and the response of the CTLE filters. The adaptation modules still further use the error signal to generate "remote info", i.e., adaptation information for the remote pre-equalizers. This remote info is supplied to the training controller(s) 420 (Fig. 4).

[0053] Deserializers 509A,B group the digital receive data stream bits or symbols into blocks to enable the use of lower clock rates for subsequent on-chip operations. Alignment marker

detection modules 510A, 510B monitor the receive data stream to detect the CM pattern of the alignment markers and achieve alignment marker lock during normal operations, or during training operations to detect the training frame markers and achieve lock thereto. The backchannel information extraction modules 511A, 511B extract the backchannel information from the appropriate portions of the training frames and alignment markers, providing the pre-equalizer adaptation information and status report information to the training controller(s) 420. During normal operations, the multiplexers 512A, 512B, operating under control of the extraction modules 511A, 511B, replace the modified alignment markers with sets of grouped PCS alignment markers, thereby hiding the backchannel information fields from the higher layers. As with the transmit chain, the receive chain may impose a hard boundary 526 between the PMA sublayer and the FEC sublayer, or alternatively, the alignment marker detection information may be communicated to the FEC lane deskew module 513.

[0054] During normal operations, the receive data streams from the deserializers are aligned by an FEC lane deskew module 513. If the FEC lanes have somehow gotten switched, an FEC lane reordering module 514 detects the switch based on the contents of the alignment markers and compensates for the switch as the two lanes are multiplexed on a symbol-block basis into a single lane. An RS decoder module 516 operates on the single lane data stream to detect and correct any symbol errors, removing the FEC coding redundancy (parity symbols) during the decoding process.

[0055] A transcoding module 520 converts the 256b/257b transmission code words into blocks of four 64b/66b transmission code words distributing the 66-bit code word blocks across four PCS lanes. An alignment marker insertion module 524 converts the sets of grouped alignment markers into individual alignment markers having lane-specific UM patterns, and inserts the individual alignment markers at appropriate positions in the four lanes, accounting for the operation of the transcoding module 520. The four lane PCS data stream is provided to the higher hierarchy layers of the node for eventual communication of the conveyed data to the destination application.

[0056] With a sufficiently long pre-equalization filter, the DFE feedback filter may be kept quite short, at say 1 or 2 taps, and even when the channel has a relatively lengthy channel response,

the pre-equalization filter may obviate any need for a digital feed forward equalizer (FFE) filter. In this case, the power savings associated with this architecture is expected to be substantial. With temperature changes and general evolution of the channel, however, ongoing adaptation of the pre-equalization filter (i.e., during the normal operations phase) is expected to be necessary.

[0057] Returning now to the C2M link, the PMD Sublayer 232 may often be implemented in the form of a pluggable module (e.g., a small form-factor pluggable (SFP) or one of its many variations including SFP+, cSFP, SFP-DD, QSFP, QSPF+, QSFP14, QSFP28, QSFP56, etc.) that is inserted into a port in a host such as a switch or a router. The pluggable module may be essentially a concatenation of the PMA Sublayer and transceiver components set forth in Figs. 4-5 to support bi-directional communications between the AUI lanes and the communication channels with or without the accompanying FEC encoding/decoding elements, as shown in Fig. 9. (The "Link Ctl" elements are each an aggregation of blocks 420, 508, and 511.) The stream 231 being communicated between the PMA and PMD sublayers may be transmitted from a packaged integrated circuit mounted to a printed circuit board (PCB) in the host, through traces on the PCB, through a "mated connector" (i.e., a receptacle with plug inserted to provide electrical contact between respective pins), through a capacitance, through traces on the PCB in the module, to a packaged integrated circuit mounted to the PCB module. The stream also includes signals traveling the opposite direction. At the contemplated signaling rates (26.5625 GBd or 53.125 GBd), the C2M link model includes up to 20 dB of signal attenuation (up to 4dB host package, up to 11.5dB host side trace, about 2.5 db module side trace, and about 2 dB module package).

[0058] The pluggable module should be usable with the widest possible range of host ports. Even though each port may be advertised as being compliant with the standard, different host manufacturers may employ different integrated circuit packages and different PCB layouts to connect the packaged ICs to the ports, causing the equivalent C2M link model to vary significantly between manufacturers or even between different products of a given manufacturer. To a limited extent, the host transceivers could be equipped with transmit-side and receive-side equalization that at least partly compensates for such variation; however there are severe limitations on the area, complexity, and power available on the host side of the link. A better

option is to provide the pluggable module with flexibility to adapt to the different C2M link characteristics.

[0059] Accordingly, the manufacturer of the pluggable module may formulate a range of C2M link models using different assumptions based on known or predicted layouts and link characteristics, including "reference" transceivers. For example, the host-side receivers might be presumed to employ a continuous time linear equalizer (CTLE) in combination with any one of: (a) a four-tap DFE with a maximum first post-cursor tap coefficient of 0.5; (b) a four-tap DFE with a maximum first post-cursor tap coefficient of 0.2; (c) a four-tap DFE with a maximum first post-cursor tap coefficient of 0.0; (d) a five-tap linear equalizer with a one-tap DFE; (e) a five-tap linear equalizer with no DFE. These receiver assumptions, combined with different host-side trace lengths and package losses, may give rise to a reasonable number of potential C2M link models categories.

[0060] With the foregoing context, we now turn to certain variations offering more efficient training and adaptation of the pre-equalization implemented by the transmitter-side feed forward equalizer (FFE), suitable for a standard interface. As an initial matter, we may specify a maximum number of FFE coefficients for the pre-equalizer, e.g., 64 coefficients. We may further specify a minimum range for each coefficient and a minimum resolution such as, e.g., 1/64 or 1/128 of full swing. The drivers 418 (Fig. 4) operate as digital to analog converters, which we may require to provide a minimum equivalent number of bits (ENOB), e.g., 5 bits. The resulting combinatorial range of potential FFE coefficient values may be impractically large for a naïve training approach.

[0061] However, there are certain constraints, such as the reasonable number of C2M link model categories, that may be taken into account to improve the efficiency of the training and adaptation process. For the communication channels, we may require the channels to satisfy certain minimum qualification thresholds for, e.g., copper wire cabling or printed circuit board traces, which can be modeled. These models enable the design of "default" pre-equalizer coefficients for each case, e.g., minimum-quality channels, typical quality channels, and predictable variations thereof. The models, or at least the minimum qualification thresholds, may be chosen to require that the bulk of the pre-equalizer coefficient energy be concentrated at

three or four major taps near the cursor (i.e., the FFE tap with nominally zero delay). The remainder of the coefficient taps may then be employed for reflection ("echo") reduction.

[0062] As another constraint, the transmitter FFE is expected to be limited in terms of power and/or maximum permitted voltage swing, such that the sum total of the coefficient values (including the sum of their absolute values) can be no greater than a predetermined limit. Once the limit is reached, the increase in magnitude of one coefficient value may need to be offset by the reduction in magnitude of at least one other coefficient value.

[0063] With the foregoing constraints, the "reasonable number" of channel model categories may be on the order of 16 or 32. Accordingly, we may provide a set of, e.g., 16 or 32 registers for the training controllers 420 (Fig. 4) or link controllers (Fig. 9) to store default coefficient values. A first register may store a vector of coefficient values suitable for a first channel response (e.g., a minimum-quality channel); a second register may store a vector of coefficient values suitable for a second channel response (e.g., a near-minimum quality channel with reduced dispersion); and so on. In some contemplated embodiments, the default coefficient values for each register, or at least some of the registers, would be set by the standard based on different channel loss profiles, while others of the registers may be reserved for configuration by customers of the original equipment manufacturer (OEM). In any case, at least some of the default coefficient values are preferably capable of being overwritten by the system controller or as part of the operating protocol to remember previous solutions and provide faster start-ups or failure recoveries. As part of the negotiating phase or training process, the coefficient values in each register may be communicated between the transmitter and receiver.

[0064] As previously mentioned, the channel qualification requirements are expected to enable pre-equalizer coefficient energy to be concentrated at the first three to four FFE taps, and thus in at least some contemplated embodiments the default coefficient values specified by the standard may be potentially nonzero for only the first four taps and may be zero for all higher taps. (In embodiments permitting the default coefficient values to be overwritten, this constraint may be omitted at least with respect to the replacement values.) To allow for fine-tuning of the default coefficient values, the standard may constrain the sum of the absolute value of the default coefficients to no more than certain percentage, e.g. 80%, of the predetermined limit for

pre-equalizer. At least one of the default coefficient value registers is expected to provide a good starting point for training/adaptation, i.e., by providing an open decision eye at the input to the decision element if the receiver design is close to the reference receiver provided by the standard. With this starting point, the percentage constraint leaves room for convex optimization via known filter adaptation procedures such as, e.g., least mean squares (LMS) adaptation, or recursive least squares (RLS) adaptation. (The coefficient adaptations can be conveyed via the backchannel or via the management interface as discussed previously.) The reserved percentage (e.g., 20%) can thus be used to cancel reflections or increase signal swing as provided by the adaptation procedure.

[0065] Preferably, the predetermined limit on the sum of coefficient values is enforced (at least for the default coefficient values) by either the transmitter's training controller, or by the adaptation procedure which may be implemented at the receiver. If the limit is exceeded, the coefficient values for at least the major FFE taps, which may alternatively characterized as the first four taps or the largest coefficient magnitudes (though these are not necessarily the same), may be proportionally reduced to make room for further optimization.

[0066] Thus the pre-equalizer training/adaption process may proceed in stages. In a first stage, the default coefficient values are determined and stored in a set of registers. The default values may be set by the standard, and overwriting of the values by manufacturers, by system vendors, or alternatively by system controllers in the course of normal operations, may be permitted. In a second stage, the default coefficient values are communicated between the transmitter to the receiver, e.g., as the result of a register scan requested by the receiver during the auto-negotiation and/or training process when the channel is enabled or is recovering from failure. The receiver may select the starting point for the pre-equalizer optimization process by selecting one of the registers. In the third stage, as the training phase progresses, the receiver may communicate pre-equalization coefficient updates to the transmitter to reduce the bit error rate (BER). Such updates may also be communicated via the hidden backchannel discussed previously, or via a management interface, during the ongoing operation of the channel.

[0067] At least some system embodiments will support simultaneous updating of multiple pre-equalizer coefficient values. In at least some implementations, these systems will also support

coarse adaptation and fine adaptation steps to accelerate the training process. The training controller may maintain status registers with fields for the sum of absolute values of current coefficient values, the total margin (i.e., difference between the sum and the predetermined limit), and the margin for each coefficient (i.e., how far the current value is from the maximum or minimum value, whichever is nearest. The fields may be bit-limited without rollover, i.e., the maximum value also represents all larger values. For example the total margin field may have four bits, while the margin field for each coefficient might have only two bits.

[0068] Fig. 8 is a flow diagram of the an illustrative communications method. As the link is first established, which may happen, e.g., during automated testing as part of the manufacturing process, when a module is inserted into a port, and/or when a cable connector is inserted into a module the training controller or link controller (hereafter, just "controller") employs an autonegotiation or backchannel communication process in block 802 to determine whether the remote transmitter has a set of preset coefficient registers. A check is made in block 804 to determine whether any such registers remain untried. If so, in block 806, the controller selects the first remaining untried register by instructing the remote transmitter to program the transmit pre-equalizer in each lane with the preset coefficient values from that register. The remote transmitter uses the pre-equalizers to transmit data, and in block 808 the receiver demodulates the multiple receive signals, e.g., with a DFE, to estimate or measure error signals (the difference between the equalized receive signals and an idealized receive signal). For training patterns, the idealized receive signal is known, whereas for transmitted data, the idealized receive signal may be estimated. The energy or average amplitude of the difference is determined in block 810 to serve as an indicator of how well the selected preset coefficient values are performing.

[0069] Blocks 804-810 are repeated until the performance of each of the preset coefficients in each register have been evaluated. Then, in block 812, the best register is selected, with the remote transmitter being instructed to use those preset coefficients as a starting point for the next phase. The remote transmitter programs the pre-equalizer with the preset coefficients from the selected register and transmits a training pattern and/or data. In block 818, the receiver demodulates the receive signals, again obtaining error signals. The demodulated data streams are later combined to form a multi-lane data stream carrying user data to a destination

application. In block 820 the controller uses the error signals to derive adaptation information for the local receive equalizers and the remote transmit equalizers, using any applicable adaptation algorithm that may be found in the open literature. The adaptation information may be applicable to the CTLE filter, any FFE filter that may be present, and the feedback filter of the DFE (referred to herein as "local" adaptation info), as well as to the pre-equalization filter of the remote node (referred to herein as "remote" adaptation info).

[0070] In block 822, the remote adaptation information is communicated to the remote transmitter, optionally in the form of modified alignment markers having backchannel information fields for conveying the remote adaptation info. In block 824, the backchannel information from the remote transmitter is obtained, optionally by extracting the contents of the backchannel information field from the received (modified) alignment markers, yielding adaptation information for the local pre-equalizer. The modified alignment markers are then replaced with reconstructed sets of grouped PCS alignment markers. In block 826, the local adaptation information and the backchannel information are used to adjust the receive equalizers (CTLE, DFE, and FFE if any) and the local transmit pre-equalizer.

[0071] Numerous alternative forms, equivalents, and modifications will become apparent to those skilled in the art once the above disclosure is fully appreciated. For example, the foregoing description suggests specific locations and bit-widths for fields, yet any suitable location and width that can be standardized and agreed upon may be employed. For example, adaptation and status information fields may be present in each lane rather than limiting the adaption information to one lane and the status information to the other. It is intended that the claims be interpreted to embrace all such alternative forms, equivalents, and modifications that are encompassed in the scope of the appended claims.

CLAIMS

What is claimed is:

1. A SerDes communications method that comprises, in a transceiver:

selecting one of multiple registers to specify initial pre-equalizer coefficient values;

updating the initial pre-equalizer coefficient values during a training phase; and

using the updated pre-equalizer coefficient values to convey a transmit data stream.

2. The method of claim 1, wherein each of the multiple registers corresponds to a different channel model.

3. The method of claim 2, wherein at least some of the different channel models are for chip-to-module (C2M) channels with different insertion loss and package loss characteristics.

4. The method of claim 2, wherein at least some of the different channel models presume different types of receiver equalization.

5. The method of claim 1, wherein said selecting includes using the initial pre-equalizer coefficient values to determine a performance characteristic for each of the multiple registers.

6. The method of claim 1, wherein the performance characteristic is an error signal energy.

7. The method of claim 1, wherein the performance characteristic is a bit error rate.

8. The method of claim 1, further comprising updating the selected register with the updated pre-equalizer coefficient values.

9. A chip-to-module communications link that comprises a port connector coupling a port transceiver to a pluggable module transceiver, the pluggable module transceiver including:

one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to the port transceiver; and

a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values, the controller using one of the registers to set initial coefficient values for the one or more transmit filters.

10. The communications link of claim 9, wherein said one of the registers is selected by the port transceiver to specify the initial coefficient values.

11. The communications link of claim 10, wherein the port transceiver iteratively selects

different ones of the multiple registers and determines a performance characteristic for each.

12. The communications link of claim 11, wherein the performance characteristic is an error signal energy.

13. The communications link of claim 11, wherein the performance characteristic is a bit error rate.

14. The communications link of claim 9, wherein each of the multiple registers corresponds to a different channel model.

15. The communications link of claim 14, wherein at least some of the different channel models are for chip-to-module (C2M) channels with different insertion loss and package loss characteristics.

16. The communications link of claim 14, wherein at least some of the different channel models presume different types of receiver equalization.

17. The communications link of claim 9, wherein the port transceiver generates updates for the coefficient values of the one or more transmit filters.

18. The communications link of claim 17, wherein the controller saves updated coefficient values in one of the registers.

19. A pluggable module transceiver including:

one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to a port transceiver; and

a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values, the controller using one of the registers to set initial coefficient values for the one or more transmit filters.

20. The transceiver of claim 19, wherein each of the multiple registers corresponds to a different channel model.

ABSTRACT

An illustrative SerDes (serializer-deserializer) communications method embodiment may include a transceiver: selecting one of multiple registers to specify initial pre-equalizer coefficient values; updating the initial pre-equalizer coefficient values during a training phase; and using the updated pre-equalizer coefficient values to convey a transmit data stream. In an illustrative embodiment of a chip-to-module communications link, a port connector couples a port transceiver to a pluggable module transceiver, the pluggable module transceiver including: one or more transmit filters to each pre-equalize a corresponding serial symbol stream being transmitted to the port transceiver; and a controller having multiple registers, each of the multiple registers containing a set of initial coefficient values, the controller using one of the registers to set initial coefficient values for the one or more transmit filters.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	SERDES PRE-EQUALIZER HAVING ADAPTABLE PRESET COEFFICIENT REGISTERS
First Named Inventor/Applicant Name:	Junqing SUN
Filer:	Daniel Joseph Krueger/Theresa Evenbly
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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	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
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Miscellaneous:				
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1	Application Data Sheet	Credo31_ADS-aia0014.pdf	1256079 b430366d0069decbeec70144b2e670d6de732605	no	8
Warnings:					
Information:					
2	Drawings-only black and white line drawings	C0031NPdrwV1.pdf	454594 e630638c7ec20859f5c3c710f97fb6cb3c7b047d	no	7
Warnings:					
Information:					
3		C0031NPspecV2pre-eq_training.pdf	230031 e8c58d08139bb49db3a231649308a1e0573e1b79	yes	24
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	21	
	Claims		22	23	
	Abstract		24	24	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	37480 9bdf97b74fceea7de6af039ac0f46050f82b7cb8	no	2
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New International Application Filed with the USPTO as a Receiving Office

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