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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/122,365	05/05/2005	John M. Cioffi	8241P013

Adaptive Spectrum and Signal Alignment, Inc.
333 Twin Dolphin Drive
Redwood City, CA 94065-1417

CONFIRMATION NO. 5593
POWER OF ATTORNEY NOTICE



OC000000089952726

Date Mailed: 03/16/2017

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/08/2017.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71.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

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

/megga/



UNITED STATES PATENT AND TRADEMARK OFFICE

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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/122,365	05/05/2005	John M. Cioffi	20145-013

146571
North Weber & Baugh LLP - ASSIA
3260 Hillview Avenue
Palo Alto, CA 94304

CONFIRMATION NO. 5593
POA ACCEPTANCE LETTER



Date Mailed: 03/16/2017

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/08/2017.

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.

/megga/

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) 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	11/122,365
Filing Date	05 MAY 2005
First Named Inventor	John M. Cioffi
Title	FEXT DETERMINATION SYSTEM
Art Unit	
Examiner Name	
Attorney Docket Number	20145-013

SIGNATURE of Applicant or Patent Practitioner

Signature	/Michael V. North/	Date (Optional)	8 MAR 2017
Name	Michael V. North	Registration Number	46,963
Title (if Applicant is a juristic entity)	Attorney		
Applicant Name (if Applicant is a juristic entity)	ASSIA SPE LLC, C/O THE CORPORATION TRUST COMPANY		

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 1 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.**

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

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:

146571

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:

☒ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

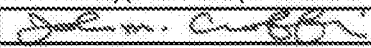
I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

ASSIA SPE LLC, C/O THE CORPORATION TRUST COMPANY

- ☐ 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)	3-6-17
Name	John M. Cloffi		
Title	CEO		

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 1 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.

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

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

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: ASSIA SPE LLC, C/O THE CORPORATION TRUST COMPANYApplication No./Patent No.: 7,593,458 Filed/Issue Date: 09-22-2009Titled: FEXT DETERMINATION SYSTEMASSIA SPE LLC, C/O THE CORPORATION TRUST COMPANY, 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: John M. Cioffi To: ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC.The document was recorded in the United States Patent and Trademark Office at
Reel 016879, Frame 0668, or for which a copy thereof is attached.2. From: ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC. To: ASSIA SPE LLC, C/O THE CORPORATION TRUST COMPANYThe document was recorded in the United States Patent and Trademark Office at
Reel 040631, Frame 0088, or for which a copy thereof is attached.

[Page 1 of 2]

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.

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.

/Michael North/

Signature

Michael North

Printed or Typed Name

2017-03-08

Date

46,963

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.

Electronic Acknowledgement Receipt	
EFS ID:	28574140
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT DETERMINATION SYSTEM
First Named Inventor/Applicant Name:	John M. Cioffi
Correspondence Address:	Adaptive Spectrum and Signal Alignment, Inc. - 333 Twin Dolphin Drive - Redwood City CA 94065-1417 US 6506543400 -
Filer:	Michael V. North
Filer Authorized By:	
Attorney Docket Number:	8241P013
Receipt Date:	08-MAR-2017
Filing Date:	05-MAY-2005
Time Stamp:	19:24:11
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	Power of Attorney	013_POA.pdf	1837140	no	2
			a58f40f15c03ab4727c9479adc86282d48ac575d		
Warnings:					
Information:					
2	Assignee showing of ownership per 37 CFR 3.73	013_373c.pdf	121031	no	3
			cb06bcf1f5515c8c5dd021939de55b13c3486f79		
Warnings:					
Information:					
Total Files Size (in bytes):			1958171		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

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

CHANGE OF CORRESPONDENCE ADDRESS *Patent*

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

Patent Number	7,593,458
Issue Date	09-22-2009
Application Number	11/122,365
Filing Date	05-05-2005
First Named Inventor	John M. Cioffi
Attorney Docket Number	8241P013

Please change the Correspondence Address for the above-identified patent to:

☐

The address associated with Customer Number:

OR



**Firm or
Individual Name**

Adaptive Spectrum and Signal Alignment, Inc.

333 Twin Dolphin Drive

Address

City Redwood City

State CA

ZIP 94065-1417

Country

Telephone 650-654-3400

Email

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

This form will not affect any "fee address" provided for the above-identified patent. To change a "fee address" use the "Fee Address Indication Form" (PTO/SB/47).

I am the:

☐

Patentee.

☐

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

☒

Attorney or agent of record. Registration Number 39,926.

Signature

/Gregory D. Caldwell/

**Typed or
Printed Name**

Gregory D. Caldwell

Date

December 1, 2015

Telephone 503-439-8778

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

☐

*Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.33. 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: Mail Stop Post Issue, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Acknowledgement Receipt

EFS ID:	24227501
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT DETERMINATION SYSTEM
First Named Inventor/Applicant Name:	John M. Cioffi
Customer Number:	8791
Filer:	Gregory D. Caldwell/Lisa Bennett
Filer Authorized By:	Gregory D. Caldwell
Attorney Docket Number:	8241P013
Receipt Date:	01-DEC-2015
Filing Date:	05-MAY-2005
Time Stamp:	17:21:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	8241P013_COCA.pdf	32580 17df8b4f198c0c9ce1631da0a8ef2042ed3182e7	no	1

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,593,458 B2
APPLICATION NO. : 11/122365
DATED : September 22, 2009
INVENTOR(S) : John M. Cioffi

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

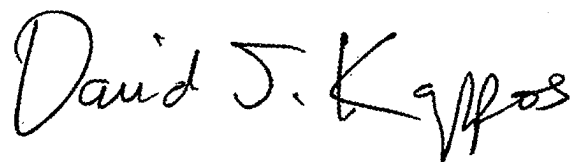
On the Title Page:

The first or sole Notice should read --

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b)
by 1149 days.

Signed and Sealed this

Twenty-first Day of September, 2010

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive, flowing style.

David J. Kappos
Director of the United States Patent and Trademark Office



UNITED STATES PATENT AND TRADEMARK OFFICE

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

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

Mail Date: 04/28/2010

Applicant	: John M. Cioffi	: DECISION ON REQUEST FOR
Patent Number	: 7593458	: RECALCULATION of PATENT
Issue Date	: 09/22/2009	: TERM ADJUSTMENT IN VIEW
Application No	: 11/122,365	: OF WYETH AND NOTICE OF INTENT TO
Filed	: 05/05/2005	: ISSUE CERTIFICATE OF CORRECTION
		:

The Request for Recalculation is **GRANTED** to the extent indicated.

The patent term adjustment has been determined to be **1149** days. The USPTO will *sua sponte* issue a certificate of correction reflecting the amount of PTA days determined by the recalculation.

Prior to the issuance of the certificate of correction, the USPTO will afford patentee an opportunity to be heard and request reconsideration. Accordingly, patentee has **one month or thirty (30) days**, whichever is longer, to file a request for reconsideration of this patent term adjustment calculation. See 35 U.S.C. 154(b)(3)(B)(ii) and 37 CFR 1.322(a)(4). No extensions of time will be granted under 37 CFR 1.136.

Patentee should use document code PET.OP if electronically filing a request for reconsideration of this patent term adjustment calculation. The patentee must also include the information required by 37 CFR 1.705(b)(2) and the fee required by 37 CFR 1.18(e). If patentee does not file a timely request for reconsideration of this patent term adjustment calculation including the information required by 37 CFR 1.705(b)(2) and the fee required by 37 CFR 1.18(e), the USPTO will issue a certificate of correction reflecting the PTA determination noted above.

Patentee should be aware that in order to preserve the right to review in the United States District Court for the District of Columbia of the USPTO patent term adjustment determination, patentee must ensure that he or she also take the steps required under 35 U.S.C. 154(b)(4)(A) in a timely manner. Nothing in the request for recalculation should be construed as providing an alternative time frame for commencing a civil action under 35 U.S.C. 154(b)(4)(A).

Any questions concerning this decision should be directed to the Office of Patent Legal Administration at 571-272-7702.

REQUEST FOR RECALCULATION OF PATENT TERM ADJUSTMENT IN VIEW OF *WYETH**

Attorney Docket Number: 8241P013	Patent Number: 7,593,458
Filing Date (or 371(b) or (f) Date): May 5, 2005	Issue Date: September 22, 2009
First Named Inventor: John Cioffi	
Title: FEXT-determination System	
PATENTEE HEREBY REQUESTS RECALCULATION OF THE PATENT TERM ADJUSTMENT (PTA) UNDER 35 USC 154(b) INDICATED ON THE ABOVE-IDENTIFIED PATENT. THE PATENTEE'S SOLE BASIS FOR REQUESTING THE RECALCULATION IS THE USPTO'S PRE-<i>WYETH</i> INTERPRETATION OF 35 U.S.C. 154(b)(2)(A). Note: This form is only for requesting a recalculation of PTA for patents issued before March 2, 2010, if the sole basis for requesting the recalculation is the USPTO's pre-<i>Wyeth</i> interpretation of 35 U.S.C. 154(b)(2)(A). See Instruction Sheet on page 2 for more information. Patentees are reminded that to preserve the right to review in the United States District Court for the District of Columbia of the USPTO's patent term adjustment determination, a patentee must ensure that he or she also takes the steps required under 35 U.S.C. 154(b)(3) and (b)(4) and 37 CFR 1.705 in a timely manner. <i>*Wyeth v. Kappos</i>, No. 2009-1120 (Fed. Cir., Jan. 7, 2010).	

Signature /Gregory D. Caldwell/	Date March 19, 2010
Name (Print/Typed) Gregory D. Caldwell	Registration Number 39,926
Note: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below*.	
☐ *Total of _____ forms are submitted.	

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 hours 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.

**Instruction Sheet for:
REQUEST FOR RECALCULATION OF PATENT TERM ADJUSTMENT
IN VIEW OF *WYETH****
(Not to be Submitted to the USPTO)

This form is only for requesting a recalculation of PTA for patents issued before March 2, 2010, if the sole basis for requesting the recalculation is the USPTO's pre-*Wyeth* interpretation of 35 U.S.C. 154(b)(2)(A).

This form must be filed within 180 days of the day the patent was granted, with the following exception:

Patentees who received a decision from the USPTO under the USPTO's pre-*Wyeth* interpretation of 35 U.S.C. 154(b)(2)(A) may file a request for reconsideration of that decision if such a request for reconsideration is filed within **two months** of the date of the decision (37 CFR 1.181(f)). If the patentee's sole basis for requesting reconsideration of the decision is the USPTO's pre-*Wyeth* interpretation of 35 U.S.C. 154(b)(2)(A), the request for reconsideration need only state that reconsideration is being requested in view of *Wyeth* (this form may be used for this purpose if it is filed within **two months** of the date of the decision from the USPTO).

Do not use this form if the application has been allowed, but not yet issued as a patent.

- 1. For patents issued before March 2, 2010:** A request for reconsideration under 37 CFR 1.705(d) and the fee set forth in 37 CFR 1.18(e) are not required, provided that the patentee's sole basis for requesting recalculation of the PTA in the patent is the USPTO's pre-*Wyeth* interpretation of 35 U.S.C. 154(b)(2)(A) and this form is filed within 180 days of the day the patent was granted.
- 2. For patents issued on or after March 2, 2010 (do not use this form):** Patentees seeking a revised PTA in a patent issued on or after March 2, 2010, must file a request for reconsideration under 37 CFR 1.705(d) that complies with the requirements of 37 CFR 1.705(b)(1) and (b)(2) within two months of the day the patent issued.

For more information, see "Notice Concerning Calculation of the Patent Term Adjustment With Respect to the Overlapping Delay Provision of 35 U.S.C. 154(b)(2)(A)" available on the USPTO Web site at <http://www.uspto.gov/patents/law/notices/2010.jsp>.

**Wyeth v. Kappos*, No. 2009-1120 (Fed. Cir., Jan. 7, 2010).

Privacy Act Statement

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

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

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

Electronic Acknowledgement Receipt

EFS ID:	7250090
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT DETERMINATION SYSTEM
First Named Inventor/Applicant Name:	John M. Cioffi
Customer Number:	08791
Filer:	Gregory D. Caldwell/Natasha French
Filer Authorized By:	Gregory D. Caldwell
Attorney Docket Number:	8241P013
Receipt Date:	19-MAR-2010
Filing Date:	05-MAY-2005
Time Stamp:	20:00:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	8241P013_sb0131_PTA-wyeth.pdf	158239 4867ab0997f176bf099f3554069f5123f213392f	no	3

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/122,365	09/22/2009	7593458	8241P013	5593

8791 7590 09/02/2009

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

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 644 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

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

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

John M. Cioffi, Atherton, CA;



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



Bib Data Sheet

CONFIRMATION NO. 5593

SERIAL NUMBER 11/122,365	FILING OR 371(c) DATE 05/05/2005 RULE	CLASS 375	GROUP ART UNIT 2611	ATTORNEY DOCKET NO. 8241P013
APPLICANTS John M. Cioffi, Atherton, CA;				
** CONTINUING DATA ***** This appln claims benefit of 60/572,051 05/18/2004				
** FOREIGN APPLICATIONS *****				
IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 06/09/2005				
Foreign Priority claimed ☐ yes ☐ no 35 USC 119 (a-d) conditions ☐ yes ☐ no ☐ Met after met Allowance Verified and Acknowledged Examiner's Signature _____ Initials _____		STATE OR COUNTRY CA	SHEETS DRAWING 9	TOTAL CLAIMS 46
INDEPENDENT CLAIMS 9				
ADDRESS 8791				
TITLE TEXT DETERMINATION SYSTEM				
FILING FEE RECEIVED 2050	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	

PART B - FEE(S) TRANSMITTAL

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

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

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

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.

8791 7590 05/20/2009

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

Certificate of Mailing or Transmission

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

Christina Rainey	(Depositor's name)
/Christina Rainey/	(Signature)
August 12, 2009	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/122,365	05/05/2005	John M. Cioffi	8241P013	5593

TITLE OF INVENTION: FEXT DETERMINATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	~~\$755~~ \$1510	\$300	\$0	~~\$1055~~ \$1810	08/20/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
PERILLA, JASON M	2611	375-222000

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

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

2. For printing on the patent front page, list

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

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 has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

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

ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC. REDWOOD CITY, CA

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

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

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

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

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 022666 (enclose an extra copy of this form).

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

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

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

Authorized Signature /Gregory D. Caldwell/

Date August 11 2009

Typed or printed name Gregory D. Caldwell

Registration No. 39,926

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

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

Electronic Patent Application Fee Transmittal				
Application Number:		11122365		
Filing Date:		05-May-2005		
Title of Invention:		FEXT DETERMINATION SYSTEM		
First Named Inventor/Applicant Name:		John M. Cioffi		
Filer:		Gregory D. Caldwell		
Attorney Docket Number:		8241P013		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	1501	1	1510	1510
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1810

Electronic Acknowledgement Receipt

EFS ID:	5866379
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT DETERMINATION SYSTEM
First Named Inventor/Applicant Name:	John M. Cioffi
Customer Number:	08791
Filer:	Gregory D. Caldwell/Christina Rainey
Filer Authorized By:	Gregory D. Caldwell
Attorney Docket Number:	8241P013
Receipt Date:	12-AUG-2009
Filing Date:	05-MAY-2005
Time Stamp:	17:32:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 1810
RAM confirmation Number	3555
Deposit Account	022666
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

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)	8241P013_Issue_Fee_Transmittal_8-12-09.pdf	226523 490d92564556ae7b16492dddfefef7f2a9ba6428	no	1

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	31900 f44c9943018e9e3cf6781bc3de41d8a4b7e68d3f	no	2
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Warnings:

Information:

Total Files Size (in bytes):			258423
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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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	Complete if Known	
	Application Number	11/122,365
	Filing Date	May 5, 2005
	First Named Inventor	Cioffi, John
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 1	Attorney Docket No: 8241P013	

US PATENT DOCUMENTS					
Examiner Initial *	Cite No ¹	USP Document Number	Publication or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6,870,901 03	05/22/2005	Gudmundsson, Thorkell, et al.	
		US-6,990,196	01/24/2006	Zeng, Chaohuang, et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No ¹	Foreign Patent Document Country Code/Number/Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ²

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No ¹	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		ALDANA, CARLOS, "Interference Estimation for Multicarrier Systems". 2005	
		ZENG, CHAOHUANG, "Crosstalk Identification and Cancellation In DSL Systems", (7/2001).	

EXAMINER

/Jason Perilla/

DATE CONSIDERED

05/19/2009

Based on PTO/SB/06A(09-06) - Substitute Disclosure Statement Form (PTO-1449) as modified by BSTZ 03/26/07
 * EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.P./



UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

8791 7590 05/20/2009

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER

PERILLA, JASON M

ART UNIT

PAPER NUMBER

2611

DATE MAILED: 05/20/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/122,365

05/05/2005

John M. Cioffi

8241P013

5593

TITLE OF INVENTION: FEXT DETERMINATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	08/20/2009

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

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

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

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

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

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

If the SMALL ENTITY is shown as NO:

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

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

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

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

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
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05/20/2009

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

Certificate of Mailing or Transmission

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/122,365	05/05/2005	John M. Cioffi	8241P013	5593

TITLE OF INVENTION: FEXT DETERMINATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	08/20/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
PERILLA, JASON M	2611	375-222000

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

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

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

2. For printing on the patent front page, list

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(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 has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

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

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

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

☐ Issue Fee

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☐ A check is enclosed.

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

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

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

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

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Date _____

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/122,365

05/05/2005

John M. Cioffi

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7590

05/20/2009

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER

PERILLA, JASON M

ART UNIT

PAPER NUMBER

2611

DATE MAILED: 05/20/2009

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

The Patent Term Adjustment to date is 644 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 644 day(s).

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

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

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

Notice of Allowability	Application No.	Applicant(s)	
	11/122,365	CIOFFI, JOHN M.	
	Examiner	Art Unit	
	JASON M. PERILLA	2611	

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

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

1. ☒ This communication is responsive to the amendment filed April 14, 2009.
2. ☒ The allowed claim(s) is/are claims 47-57, 59-86 and 88-92 renumbered respectively as claims 1-44.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

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

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

Attachment(s)

- | | |
|---|--|
| 1. ☐ Notice of References Cited (PTO-892) | 5. ☐ Notice of Informal Patent Application |
| 2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date <u>5/4/09</u> . |
| 3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date ____ | 7. ☒ Examiner's Amendment/Comment |
| 4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. ☐ Examiner's Statement of Reasons for Allowance |
| | 9. ☐ Other ____. |

EXAMINER'S AMENDMENT

1. Claims 47-92 are pending in the instant application.
2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Spencer Hunter on May 4, 2009.

The application has been amended as follows wherein the following versions of claims 47, 49, 52-57, 59-64, 66, 69-74, 76, 78, 81-86, and 88-92 replace all prior versions in their entirety and claims 58 and 87 are CANCELLED:

47. A method of evaluating operational characteristics of a multi-line, vectored Digital Subscriber Line (DSL) system having a plurality of crosstalking lines in a common communication channel (channel), the method comprising:
exciting a the plurality of crosstalking lines in the channel with a known sequence of input symbols applied to the crosstalking lines;
acquiring output data from a primary line among the plurality of lines in the channel, the output data comprising the known sequence of input symbols after having ~~propagated through the crosstalking lines and having~~ been affected by crosstalk coupling ~~within~~ among the plurality of crosstalking lines in the channel;
ordering the crosstalking lines based on a comparison between the known sequence of input symbols used to excite the crosstalking lines and ~~based further on~~ the output data acquired from the primary line;
generating a data quantity representative of the crosstalk coupling between the primary line and

each of the crosstalking lines based on the ordering of the crosstalking lines; and sending instructions to one or more modems communicatively interfaced with the plurality of crosstalking lines in the channel based on the data quantity generated.

49. The method of claim 47, further comprising zeroing all inputs ~~into~~ of the crosstalking lines to eliminate other crosstalk among the plurality of lines in the channel prior to exciting the crosstalking lines.

52. The method of claim 51, wherein the DSM-data quantity ~~Xlog(u,n)~~ Xlog(u,n) is a function of a 10-bit unsigned integer ~~m(u,n)~~ m(u,n) such that ~~Xlog(u,n)~~ Xlog(u,n) = $6 - (m(u,n) \cdot m(u,n)/10)$.

53. The method of claim 51, wherein the DSM-data quantity ~~Xlog(u,n)~~ Xlog(u,n) is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.

54. The method of claim 51, wherein the DSM-data quantity ~~Xlog(u,n)~~ Xlog(u,n) is a function of a 10-bit unsigned integer ~~m(u,n)~~ m(u,n) such that ~~Xlog(u,n)~~ Xlog(u,n) = $6 - (m(u,n) \cdot m(u,n)/10)$ and further wherein ~~Xlog(u,n)~~ Xlog(u,n) is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.

55. The method of claim 47, wherein the output data further comprises far-end crosstalk (FEXT) ~~FEXT~~ and/or near-end crosstalk (NEXT) ~~NEXT~~ transfer functions between the primary line and each of the crosstalking lines; and further wherein the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines comprises a Dynamic Spectrum Management data (DSM-data) ~~the DSM-data~~ quantity ~~Xlog(u,n)~~ Xlog(u,n) ~~that~~ is a decibel-magnitude value of the insertion loss equivalent of the ~~acquired~~ FEXT and/or NEXT transfer functions.

56. The method of claim 47, wherein the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines comprises a Dynamic Spectrum Management data (DSM-data) quantity ~~Xlin(u,n)~~ Xlin(u,n) that is ~~a decibel-magnitude~~

value representative of the extent of crosstalk coupling associated with each of the crosstalking lines and the primary line within the channel.

57. The method of claim 56, wherein $X_{lin}(u,n)$ is represented in a linear format by a scale ~~scale(u)~~ factor scale(u) and a normalized complex number ~~a(u,n)~~ a(u,n) + $j*b(u,n)$, where n is a ~~the~~ subcarrier index $n=0, \dots, NSC$, wherein NSC is ~~the~~ a number of carriers used, u is an index of a line transfer function between a one of the crosstalking lines and the primary line, and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and

further wherein the value of ~~$X_{lin}(u,n)$~~ $X_{lin}(u,n)$ is defined as ~~$X_{lin}(u,n)$~~ $X_{lin}(u,n)$ = (~~scale(u)~~ scale(u) / 2^{15}) * ($a(u,n)$ + $j*b(u,n)$) / 2^{15} ; and

~~further wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.~~

58. (CANCELLED) ~~The method of claim 56, wherein the DSM data quantity $X_{lin}(u,n)$ is a linear version of $X_{log}(u,n)$.~~

59. The method of claim 47, ~~wherein the DSL system comprises a multi-line one-sided vectored communication system~~, wherein transmit signals on the plurality of lines are co-generated with a common clock and processor at a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system.

60. The method of claim 47, ~~wherein the DSL system comprises a multi-line double-sided vectored communication system~~, wherein transmit signals on the plurality of lines are co-generated with a common clock and processor at each of a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system and at a Customer Premises Equipment (CPE) end of the DSL system.

61. The method of claim 47, ~~wherein the DSL system comprises a multi-line bonded vectored communication system~~, wherein the plurality of crosstalking lines are allocated to a single customer.

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62. The method of claim 61, wherein generating the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines comprises generating a Dynamic Spectrum Management data (DSM-data) quantity $X_{\log}(u,n)$ for $u=1, \dots, U$, representing line transfer functions between ~~U lines~~ crosstalking line u in the ~~multi-line bonded vectored communication system~~ and the primary line at a subcarrier index n .

63. The method of claim 56, further comprising:
acquiring a value representative of insertion loss including any transmitter and receiver filter effects for the primary line, ~~including any transmitter and receiver filter effects~~; and
assigning the value to index $u=0$ of $X_{\text{lin}}(u,n)$ ~~so that the value is identified as $X_{\text{lin}}(0,n)$~~ .

64. A controller communicably interfaced with a Digital Subscriber Line (DSL) system having a plurality of crosstalking lines in a common communication channel (channel), comprising:

means for exciting a the plurality of crosstalking lines in the channel with a known sequence of input symbols applied to the crosstalking lines;

means for acquiring output data from a primary line among the plurality of lines in the channel, the output data comprising the known sequence of input symbols after having ~~propagated through the crosstalking lines and having been affected by crosstalk coupling within~~ among the plurality of crosstalking lines in the channel;

means for ordering the plurality of crosstalking lines based on a comparison between the known sequence of input symbols used to excite the crosstalking lines and ~~based further on the~~ output data acquired from the primary line;

means for generating a data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines based on the ordering of the crosstalking lines; and

means for sending instructions to one or more modems communicatively interfaced with the plurality of crosstalking lines in the channel based on the data quantity generated.

66. The controller of claim 64, further comprising means for zeroing all inputs ~~into~~ of the crosstalking lines to eliminate other crosstalk among the plurality of lines in the channel

prior to exciting the crosstalking lines.

69. The controller of claim 64, wherein the output data further comprises far-end crosstalk (FEXT) ~~FEXT~~ and/or near-end crosstalk (NEXT) ~~NEXT~~ transfer functions between the primary line and each of the crosstalking lines; and

further wherein the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines is the insertion loss equivalent of the ~~acquired~~ FEXT and/or NEXT transfer functions.

70. The controller of claim 64, wherein the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines comprises at least one of the following:

~~Xlog(u,n)~~ Xlog(u,n), wherein ~~Xlog(u,n)~~ Xlog(u,n) is a decibel-magnitude value representative of crosstalk coupling between the primary line ~~n~~ and each of the crosstalking ~~line~~ lines; and ~~Xlin(u,n)~~ Xlin(u,n), wherein ~~Xlin(u,n)~~ Xlin(u,n) is the linear version of ~~Xlog(u,n)~~ Xlog(u,n).

71. The controller of claim 70, wherein Xlin(u,n) is represented in a linear format by a scale ~~scale(u)~~ factor scale(u) and a normalized complex number $a(u,n) + j*b(u,n)$, where ~~n~~ n is ~~the~~ a subcarrier index $n=0, \dots, \text{NSC}$, wherein NSC is ~~the~~ a number of used carriers, u is an index of a line transfer function between a one of the crosstalking lines and the primary line, further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and further wherein the value of ~~Xlin(u,n)~~ Xlin(u,n) is defined as $\text{Xlin(u,n)} \text{ Xlin(u,n)} = (\text{scale(u)} \text{ scale(u)} / 2^{15}) * (a(u,n) + j*b(u,n)) / 2^{15}$; and wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all ~~n~~ n is equal to $2^{15}-1$.

72. The controller of claim 70, wherein the quantity ~~Xlog(u,n)~~ Xlog(u,n) is a function of a 10-bit unsigned integer ~~m(u,n)~~ m(u,n) such that $\text{Xlog(u,n)} \text{ Xlog(u,n)} = 6 - (m(u,n) \text{ m(u,n)} / 10)$.

73. The controller of claim 70, further comprising:

means for acquiring a value representative of insertion loss including any transmitter and receiver filter effects for the primary line, ~~including any transmitter and receiver filter effects~~; and

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means for assigning the value to index $u=0$ of $X_{lin}(u,n)$ ~~so that the value is identified as $X_{lin}(0,n)$.~~

74. The controller of claim 70, further comprising:

means for acquiring a value representative of insertion loss including any transmitter and receiver filter effects for the primary line, ~~including any transmitter and receiver filter effects~~; and

means for assigning the value to index $u=0$ of $X_{log}(u,n)$ ~~so that the value is identified as $X_{log}(0,n)$.~~

76. A computer-readable medium having executable program code stored thereon that, when executed by a processor in a Digital Subscriber Line (DSL) system having a plurality of crosstalking lines in a common communication channel (channel), the executable program code causes the DSL system to perform a method comprising:

exciting a the plurality of crosstalking lines in the channel with a known sequence of input symbols applied to the crosstalking lines;

acquiring output data from a primary line among the plurality of lines in the channel, the output data comprising the known sequence of input symbols after having ~~propagated through the crosstalking lines and having been affected by crosstalk coupling within~~ among the plurality of crosstalking lines in the channel;

ordering the crosstalking lines based on a comparison between the known sequence of input symbols used to excite the crosstalking lines and ~~based further on~~ the output data acquired from the primary line;

generating a data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines based on the ordering of the crosstalking lines; and

sending instructions to one or more modems communicatively interfaced with the plurality of crosstalking lines in the channel based on the data quantity generated.

78. The computer-readable medium of claim 76, wherein the method further comprises zeroing all inputs ~~into~~ of the plurality of crosstalking lines to eliminate other crosstalk among the plurality of lines in the channel prior to exciting the plurality of crosstalking lines.

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81. The computer-readable medium of claim 80, wherein the DSM-data quantity $X_{\log}(u,n)$ $X_{\log}(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ $m(u,n)$ such that $X_{\log}(u,n)$ $X_{\log}(u,n) = 6 - (m(u,n) m(u,n)/10)$
82. The computer-readable medium of claim 80, wherein the DSM-data quantity $X_{\log}(u,n)$ $X_{\log}(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.
83. The computer-readable medium of claim 80, wherein the DSM-data quantity $X_{\log}(u,n)$ $X_{\log}(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ $m(u,n)$ such that $X_{\log}(u,n)$ $X_{\log}(u,n) = 6 - (m(u,n) m(u,n)/10)$ and further wherein $X_{\log}(u,n)$ $X_{\log}(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.
84. The computer-readable medium of claim 76, wherein the output data further comprises far-end crosstalk (FEXT) FEXT and/or near-end crosstalk (NEXT) NEXT transfer functions between the primary line and each of the crosstalking lines; and further wherein the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines comprises a Dynamic Spectrum Management data (DSM-data) the DSM-data quantity $X_{\log}(u,n)$ that is a decibel-magnitude value of the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.
85. The computer-readable medium of claim 76, wherein the data quantity representative of crosstalk coupling between the primary line and each of the crosstalking lines comprises a Dynamic Spectrum Management data (DSM-data) quantity $X_{\text{lin}}(u,n)$ that is ~~a decibel-magnitude value~~ representative of the extent of crosstalk coupling between the primary line and each of the crosstalking lines and the primary line within the channel.
86. The computer-readable medium of claim 85, wherein $X_{\text{lin}}(u,n)$ is represented in a linear format by a ~~scale~~ scale(u) factor scale(u) and a normalized complex number ~~a(u,n)~~ $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, \text{NSC}$, wherein NSC is ~~the a~~ number of carriers used, u is an index of a line transfer function between a one of the

crosstalking lines and the primary line, and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and further wherein the value of $X_{lin}(u,n)$ $X_{lin}(u,n)$ is defined as $X_{lin}(u,n) = (\text{scale}(u) \cdot \text{scale}(u)/2^{15}) \cdot (a(u,n) + j \cdot b(u,n))/2^{15}$; and wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

87. (CANCELLED) The computer-readable medium of claim 85, wherein the DSM data quantity $X_{lin}(u,n)$ is a linear version of $X_{log}(u,n)$.

88. The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line one-sided vectored communication system, wherein transmit signals on the plurality of lines are co-generated with a common clock and processor at a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system.

89. The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line double-sided vectored communication system, wherein transmit signals on the plurality of lines are co-generated with a common clock and processor at each of a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system and at a Customer Premises Equipment (CPE) end of the DSL system.

90. The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line bonded vectored communication system, wherein the plurality of crosstalking lines are allocated to a single customer.

91. The computer-readable medium of claim 90, wherein generating the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines comprises generating a Dynamic Spectrum Management data (DSM-data) quantity $X_{log}(u,n)$ for $u=1, \dots, U$, representing line transfer functions between U lines crosstalking line u in the multi-line bonded vectored communication system and the primary line at a subcarrier index n .

92. The computer-readable medium of claim 85, wherein the method further comprises:

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acquiring a value representative of insertion loss including any transmitter and receiver filter effects for the primary line, ~~including any transmitter and receiver filter effects~~; and assigning the value to index $u=0$ of $X_{lin}(u,n)$ so that the value is identified as $X_{lin}(0,n)$.

Claims 47-57, 59-86 and 88-92 are renumbered respectively as claims 1-44 and the claim dependency is renumbered accordingly.

Allowable Subject Matter

3. Claims 47-57, 59-86 and 88-92 renumbered respectively as claims 1-44 are allowed.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON M. PERILLA whose telephone number is (571)272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. 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.

Art Unit: 2611

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

/Jason M Perilla/
Primary Examiner, Art Unit 2611
May 5, 2009

/jmp/

Search Notes 	Application/Control No. 11122365	Applicant(s)/Patent Under Reexamination CIOFFI, JOHN M.
	Examiner Jason M. Perilla	Art Unit 2611

SEARCHED			
Class	Subclass	Date	Examiner
375	222	5/4/09	JP
	316	5/4/09	JP
	295	5/4/09	JP
	346	5/4/09	JP
	348	5/4/09	JP

SEARCH NOTES		
Search Notes	Date	Examiner
East; USPAT, USPGPUB	5/4/09	JP
Inventor Name Search; EAST, EDAN	5/4/09	JP

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
375	222	5/4/09	JP
	346	5/4/09	JP

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Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	Complete if Known	
	Application Number	11/122,365
	Filing Date	May 5, 2005
	First Named Inventor	Cioffi, John
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 1		Attorney Docket No: 8241P013

US PATENT DOCUMENTS					
Examiner Initial *	Cite No ¹	USP Document Number	Publication or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6,870,901	05/22/2005	Gudmundsson, Thorkell , et al.	
		US-6,990,196	01/24/2006	Zeng, Chaohuang , et al.	

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Examiner Initials*	Cite No ¹	Foreign Patent Document Country Code/Number/Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ²

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No ¹	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		ALDANA, CARLOS , "Interference Estimation for Multicarrier Systems". 2005	
		ZENG, CHAOHUANG , "Crosstalk Identification and Cancellation In DSL Systems", (7/2001).	

EXAMINER

/Jason Perilla/

DATE CONSIDERED

05/19/2009

Based on PTO/SB/06A(09-06) - Substitute Disclosure Statement Form (PTO-1449) as modified by BSTZ 03/26/07
 * EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.¹ Applicant's unique citation designation number (optional) ² Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH

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original

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EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2625	375/222.CCLS.	US-PGPUB; USPAT	OR	ON	2009/05/06 08:08
L2	2277	375/340.CCLS.	US-PGPUB; USPAT	OR	ON	2009/05/06 08:08
L3	993	375/344.CCLS.	US-PGPUB; USPAT	OR	ON	2009/05/06 08:09
L4	2223	375/346.CCLS.	US-PGPUB; USPAT	OR	ON	2009/05/06 08:09
L5	610	375/348.CCLS.	US-PGPUB; USPAT	OR	ON	2009/05/06 08:09
L6	2186	375/316.CCLS.	US-PGPUB; USPAT	OR	ON	2009/05/06 08:09
L7	78	CIOFFI.IN. AND JOHN.IN.	US-PGPUB; USPAT	OR	ON	2009/05/06 08:09
S1	3	\$DSL AND Xlog\$	US-PGPUB; USPAT	OR	ON	2008/03/26 09:02
S2	7	\$DSL AND Hlog\$	US-PGPUB; USPAT	OR	ON	2008/03/26 09:02
S3	1157	\$DSL AND crosstalk	US-PGPUB; USPAT	OR	ON	2008/03/28 06:34
S4	848	S3 AND @ad<"20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 06:36
S5	134	S4 AND sort\$	US-PGPUB; USPAT	OR	ON	2008/03/28 06:39
S6	743	S4 AND order\$	US-PGPUB; USPAT	OR	ON	2008/03/28 06:39
S7	714	S4 NOT S5	US-PGPUB; USPAT	OR	ON	2008/03/28 08:37
S8	444	S7 AND "twisted pair"	US-PGPUB; USPAT	OR	ON	2008/03/28 08:45
S9	26	S8 AND ordering	US-PGPUB; USPAT	OR	ON	2008/03/28 08:45
S10	33	crosstalker	US-PGPUB; USPAT	OR	ON	2008/03/28 08:48
S11	23	S10 AND @ad<"20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 08:49
S12	3	S8 AND ((order OR sort) NEAR crosstalk\$)	US-PGPUB; USPAT	OR	ON	2008/03/28 09:37
S13	2417	375/222.CCLS.	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39

S14	36016	crosstalk	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S15	2451	S14 AND "twisted pair"	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S16	127	S14 AND ((order OR sort) NEAR crosstalk\$)	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S17	124	S16 NOT S12	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S18	2	S17 AND \$DSL	US-PGPUB; USPAT	OR	ON	2008/03/28 09:40
S19	90	S16 AND @ad< "20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 09:41
S20	165	crosstalking	US-PGPUB; USPAT	OR	ON	2008/03/28 10:31
S21	118	S20 AND @ad< "20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 10:31
S22	15	S21 AND \$DSL	US-PGPUB; USPAT	OR	ON	2008/03/28 10:31
S23	5831	vector\$ AND \$DSL	US-PGPUB; USPAT	OR	ON	2008/03/28 11:18
S24	72	vectored AND \$DSL	US-PGPUB; USPAT	OR	ON	2008/03/28 11:34
S25	33	S24 AND @ad< "20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 11:35
S26	17	("20010026602" "20010028692" "20020027985" "20020054610" "20020149484" "20020172166" "20030117995" "5471647" "5843139" "5887034" "6014412" "6404830" "6449324" "6456673" "6470047" "6498820" "6873653"). PN.	US-PGPUB; USPAT; USOCR	OR	ON	2008/03/28 11:45
S27	3	("7158563").URPN.	USPAT	OR	ON	2008/03/28 11:51
S28	69	CIOFFI.IN. AND JOHN.IN.	US-PGPUB; USPAT	OR	ON	2008/04/02 07:58
S29	1	"6956906".pn.	USPAT	OR	OFF	2008/07/24 07:20
S30	0	(decibel WITH magnitude WITH crosstalk)	USPAT	OR	OFF	2008/07/24 07:27
S31	0	(decibel-magnitude WITH crosstalk)	USPAT	OR	OFF	2008/07/24 07:28

S32	408	(magnitude WITH crosstalk)	USPAT	OR	OFF	2008/07/24 07:28
S33	12	(decibel WITH crosstalk)	USPAT	OR	OFF	2008/07/24 07:28
S34	1	"20020041565"	USPAT	OR	OFF	2008/07/24 08:10
S35	2	"20020041565"	US-PGPUB; USPAT	OR	OFF	2008/07/24 08:10
S36	1	"6052420".pn.	US-PGPUB; USPAT	OR	OFF	2008/07/24 09:07
S37	1	"20050259725"	US-PGPUB; USPAT	OR	OFF	2008/07/24 09:28
S38	1	"6956906".pn.	USPAT	OR	OFF	2009/04/27 08:10
S39	1	"7394752".pn.	USPAT	OR	OFF	2009/04/27 09:48
S40	9	("20010004383" "5181198" "5887032" "6236645" "6304598" "6839429" "6975677" "7016822" "7023910"). PN. OR ("7394752"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/27 09:48
S41	21	("20020001340" "20020078247" "20030091053" "4024359" "4024360" "4173714" "4733389" "5304940" "5555274" "5901205" "5978373" "6147963" "6295323" "6411657" "6466588" "6507608" "6519291" "6690666").PN. OR ("7023910").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/27 10:08
S42	17	(vector\$ WITH DSL)	USPAT	OR	OFF	2009/04/27 10:19
S43	4	("20050053097" "20050195892" "6894989" "7042934"). PN. OR ("7499487"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/27 10:23
S44	4	("20050053097" "20050195892" "6894989" "7042934"). PN. OR ("7499487"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/27 10:23

S45	2081	"crosstalk" AND ethernet	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/27 11:15
S46	1165	S45 AND @ad< "20040518"	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/27 11:15
S47	235	S46 AND training	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/27 11:15
S48	1	"20050259725"	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/28 08:30
S49	2	"20040095921"	US-PGPUB; USPAT	OR	ON	2009/05/05 12:12

5/ 6/ 2009 8:09:39 AM

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Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	Complete if Known	
	Application Number	11/122,365
	Filing Date	May 5, 2005
	First Named Inventor	Cioffi, John
	Group Art Unit	2611
	Examiner Name	Perilla, Jason
Sheet 1 of 1		Attorney Docket No: 8241P013

US PATENT DOCUMENTS					
Examiner Initial *	Cite No ¹	USP Document Number	Publication or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2004/0095921	05/20/2004	Kerpez	

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Examiner Initials*	Cite No ¹	Foreign Patent Document Country Code/Number/Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ²

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS						
Examiner Initials*	Cite No ¹	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, page(s), volume-issue number(s), publisher, city and/or country where published.				T ²
		International Search Report and Written Opinion from PCT/IB2005/001544 (Attorney Docket No. 8241.P013PCT) mailed July 27, 2005, 11 pgs.				
		CIOFFI, JOHN , et al., "Example of Improvements of Dynamic Spectrum Management", T1E1, (2/19/01)				
		EUROPEAN PATENT OFFICE, "Examination Report", Application No. 05741016.9, Attorney Docket No. 8241P013EP, (5/2/08).				
		GINIS, GEORGE, et al., "Vectored-DMT: a FEXT canceling modulation scheme for coordinating users", IEEE International Conference on Communications, New York, NY, US, vol. 1 of 10., (6/11/01), pgs. 305-309.				
		YU, W, et al., "An Adaptive Multiuser Power Control Algorithm for VSDL", IEEE Global Communications Conference, New York, NY, vol. 1 of 6., (11/25/01), pgs. 394-98.				

EXAMINER

/Jason Perilla/

DATE CONSIDERED

05/05/2009

Based on PTO/SB/06A(09-06) - Substitute Disclosure Statement Form (PTO-1449) as modified by BSTZ 03/26/07
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PR202510P192

Petitioners' Exhibit 1004

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Cioffi	Confirmation No.:	5593
Serial No.:	11/122,365	Examiner:	Perilla, Jason M.
Filed:	May 5, 2005	Art Unit:	2611
For:	FEXT DETERMINATION SYSTEM		
Docket No.:	8241.P013		

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

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.111

Dear Examiner:

This amendment is submitted in response to the Office Action mailed January 14, 2009,
for the above-noted patent application.

Applicant respectfully requests the Examiner to:

1. Please enter the amendments to the claims in section I, beginning on page 2.
2. Please consider the amendments to the claims in section I in view of the remarks

in section II, beginning on page 14.

I hereby certify that this correspondence is being deposited via
EFS Web on the date below:

April 14, 2009

Date of Deposit

/Christina M. Rainey/

SECTION I—CLAIMS

Amendment to the Claims:

This listing of the claims will replace all prior versions and listings of claims in the application. Claims 47, 49-51, 55-56, 59-64, 66-76, 78-80, 84-86, and 88-92 are amended herein. Claims 1-46 remain canceled herein without prejudice. No new claims are added. Claims 47-92 remain pending in the application.

Listing of Claims:

1-46. (Canceled).

47. (Currently amended) A method of evaluating operational characteristics of a multi-line, vectored Digital Subscriber Line (DSL) system having a plurality of lines in a common communication channel (channel), the method comprising:

exciting a plurality of crosstalking lines in the channel ~~of the DSL system~~ with a known sequence of input symbols applied to the crosstalking lines;

acquiring output data from ~~one or more~~ a primary line[[s]] among the plurality of lines in the channel, of the DSL system, the output data comprising the known sequence of input symbols after having propagated through the crosstalking lines ~~each respective line~~ and having been affected by crosstalk coupling within the plurality of crosstalking lines in the channel; ~~within a communications channel common to the plurality of lines~~;

ordering the ~~plurality of~~ crosstalking lines based on a comparison between the known sequence of input symbols ~~as applied to the respective line~~ used to excite the crosstalking lines and based further on the output data acquired from the ~~one or more~~ primary line[[s]];

generating, ~~for each of the lines,~~ a data quantity representative of the ~~lines excited with the~~
~~known sequence of input symbols, determined to have been most affected by crosstalk~~
~~coupling within the communications channel~~ crosstalk coupling between the primary line
and each of the crosstalking lines based on the ordering of the ~~plurality~~ crosstalking lines;
and

sending instructions to one or more modems communicatively interfaced with the plurality of
lines in the channel ~~DSL system~~ based on the data quantity generated.

48. (Previously presented) The method of claim 47, wherein the instructions sent to the one or
more modems comprise instructions to implement: operational condition values, a
maximum data rate limit, upstream transmission frequency band limits, transmit power
levels, and coding/latency requirements.

49. (Currently amended) The method of claim 47, further comprising zeroing all inputs into the
~~plurality of crosstalking lines of the DSL system~~ to eliminate other crosstalk among the
plurality of lines in the channel prior to exciting the crosstalking lines.

50. (Currently amended) The method of claim 47, wherein the output data from the primary line
~~one or more primary lines of the DSL system~~ is collected over time on a periodic basis.

51. (Currently amended) The method of claim 47, wherein the data quantity representative of the
crosstalk coupling between the primary line and each of the crosstalking lines ~~determined~~
~~to have been most affected by crosstalk coupling within the communications channel~~
comprises a Dynamic Spectrum Management data (DSM-data) quantity $X_{log}(u,n)$ that is
a decibel-magnitude value representative of the extent of crosstalk coupling associated
with each of the crosstalking lines and the primary line ~~respective line~~ within the
~~communications~~ channel.

52. (Previously presented) The method of claim 51, wherein the DSM-data quantity $Xlog(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$.
53. (Previously presented) The method of claim 51, wherein the DSM-data quantity $Xlog(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.
54. (Previously presented) The method of claim 51, wherein the DSM-data quantity $Xlog(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$ and further wherein $Xlog(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.
55. (Currently amended) The method of claim 47, wherein the output data further comprises FEXT and/or NEXT transfer functions between the ~~one or more~~ primary line[[s]] and each of the ~~plurality of~~ crosstalking lines; and further wherein the DSM-data quantity $Xlog(u,n)$ is a decibel-magnitude value of the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.
56. (Currently amended) The method of claim 47, wherein the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines ~~determined to have been most affected by crosstalk coupling within the communications channel~~ comprises a Dynamic Spectrum Management data (DSM-data) quantity $Xlin(u,n)$ that is a decibel-magnitude value representative of the extent of crosstalk coupling associated with each of the crosstalking lines ~~respective line~~ within the ~~communications~~ channel.
57. (Previously presented) The method of claim 56, wherein $Xlin(u,n)$ is represented in a linear format by a scale(u) factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, NSC$, wherein NSC is the number of carriers used and

further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and further wherein the value of $X_{lin}(u,n)$ is defined as $X_{lin}(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) +$

$j * b(u,n)) / 2^{15}$; and

further wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

58. (Previously presented) The method of claim 56, wherein the DSM-data quantity $X_{lin}(u,n)$ is a linear version of $X_{log}(u,n)$.

59. (Currently amended) The method of claim 47, wherein the DSL system comprises a multi-line one-sided vectored communication system, wherein transmit signals on ~~multiple the~~ plurality of lines are co-generated with a common clock and processor at a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system.

60. (Currently amended) The method of claim 47, wherein the DSL system comprises a multi-line double-sided vectored communication system, wherein transmit signals on ~~multiple the~~ plurality of lines are co-generated with a common clock and processor at each of a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system and at a Customer Premises Equipment (CPE) end of the DSL system.

61. (Currently amended) The method of claim 47, wherein the DSL system comprises a multi-line bonded vectored communication system, wherein ~~multiple the~~ plurality of lines are allocated to a single customer.

62. (Currently amended) The method of claim 61, wherein generating the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines ~~determined to have been most affected by crosstalk coupling within the communications channel~~ comprises generating a Dynamic Spectrum Management data

(DSM-data) quantity $X_{\log}(u,n)$ for $u=1, \dots, U, \text{ } \cancel{2n-1}$, representing line transfer[[s]]
functions between U among n lines in the multi-line bonded vectored communication
system and the primary line at subcarrier index n.

63. (Currently amended) The method of claim 56, further comprising:

acquiring a value representative of insertion loss for ~~the each of the one or more~~ primary

line[[s]], including any transmitter and receiver filter effects; and

assigning the value to index $u=0$ so that the value is identified as $X_{\text{lin}}(0,n)$.

64. (Currently amended) A controller communicably interfaced with a Digital Subscriber Line

(DSL) system having a plurality of lines in a common communication channel (channel),
comprising:

means for exciting a plurality of crosstalking lines in the channel ~~of the DSL system~~ with a

known sequence of input symbols applied to the crosstalking lines;

means for acquiring output data from ~~one or more~~ a primary line[[s]] among the plurality of lines

in the channel, of the DSL system, the output data comprising the known sequence of

input symbols after having propagated through the crosstalking lines ~~each respective line~~

and having been affected by crosstalk coupling within the plurality of crosstalking lines

in the channel; ~~within a communications channel common to the plurality of lines;~~

means for ordering the ~~plurality of~~ crosstalking lines based on a comparison between the known

sequence of input symbols ~~as applied to the respective line~~ used to excite the crosstalking

lines and based further on the output data acquired from the ~~one or more~~ primary

line[[s]];

means for generating, ~~for each of the lines,~~ a data quantity representative of the ~~lines excited with~~

~~the known sequence of input symbols, determined to have been most affected by~~

~~crosstalk coupling within the communications channel~~ crosstalk coupling between the primary line and each of the crosstalking lines based on the ordering of the ~~plurality~~ crosstalking lines; and

means for sending instructions to one or more modems communicatively interfaced with the ~~plurality of lines in the channel DSL system~~ based on the data quantity generated.

65. (Previously presented) The controller of claim 64, wherein the instructions sent to the one or more modems comprise instructions to implement: operational condition values, a maximum data rate limit, upstream transmission frequency band limits, transmit power levels, and coding/latency requirements.

66. (Currently amended) The controller of claim 64, further comprising means for zeroing all inputs into the crosstalking ~~plurality of lines of the DSL system~~ to eliminate other crosstalk among the plurality of lines in the channel prior to exciting the crosstalking lines.

67. (Currently amended) The controller of claim 64, wherein the output data from the ~~one or more~~ primary line[[s]] ~~of the DSL system~~ is collected over time on a periodic basis.

68. (Previously presented) The controller of claim 64, wherein the DSL system comprises a multi-line, vectored DSL system.

69. (Currently amended) The controller of claim 64, wherein the output data further comprises FEXT and/or NEXT transfer functions between the ~~one or more~~ primary line[[s]] and each of the ~~plurality of~~ crosstalking lines; and

further wherein the data quantity representative of crosstalk coupling between the primary line and each of the crosstalking lines ~~the lines determined to have been most affected by crosstalk coupling within the communications channel~~ is the insertion loss equivalent of

the acquired FEXT and/or NEXT transfer functions.

70. (Currently amended) The controller of claim 64, wherein the data quantity representative of crosstalk coupling between the primary line and each of the crosstalking lines comprises ~~the lines determined to have been most affected by crosstalk coupling within the communications channel~~ is at least one of the following:

Xlog(u,n), wherein Xlog(u,n) is a decibel-magnitude value representative of crosstalk coupling between the primary line n and each ~~potential crosstalking~~ crosstalking line; and
Xlin(u,n), wherein Xlin(u,n) is the linear version of Xlog(u,n).

71. (Currently amended) The controller of claim 70, wherein Xlin(u,n) is represented in a linear format by a scale(u) factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, \text{NSC}$, wherein NSC is the number of used carriers, ~~and~~ further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and further wherein the value of Xlin(u,n) is defined as $\text{Xlin}(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) + j*b(u,n))/2^{15}$; and ~~further~~

wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

72. (Previously presented) The controller of claim 70, wherein the quantity Xlog(u,n) is a function of a 10-bit unsigned integer $m(u,n)$ such that $\text{Xlog}(u,n) = 6 - (m(u,n)/10)$.

73. (Currently amended) The controller of claim 70, further comprising:

means for acquiring a value representative of insertion loss for ~~each of the one or more~~ the primary line[[s]], including any transmitter and receiver filter effects; and

means for assigning the value to index $u=0$ so that the value is identified as $\text{Xlin}(0,n)$.

74. (Currently amended) The controller of claim 70, further comprising:

means for acquiring a value representative of insertion loss for the ~~each of the one or more~~

primary line[[s]], including any transmitter and receiver filter effects; and
means for assigning the value to index $u=0$ so that the value is identified as $X_{\log}(0,n)$.

75. (Currently amended) The controller of claim 64, wherein the means for acquiring output data
from the ~~one or more~~ primary line[[s]] and the means for generating the data quantities
comprises the means of one or more computer systems.

76. (Currently amended) A computer-readable medium having executable program code stored
thereon that, when executed by a processor in a Digital Subscriber Line (DSL) system
having a plurality of lines in a common communication channel (channel), the executable
program code causes the DSL system to perform a method comprising:
exciting a plurality of crosstalking lines in the channel ~~of the DSL system~~ with a known
sequence of input symbols applied to the crosstalking lines;
acquiring output data from ~~one or more~~ a primary line[[s]] among the plurality of lines in the
channel, of the DSL system, the output data comprising the known sequence of input
symbols after having propagated through the crosstalking lines ~~each respective line~~ and
having been affected by crosstalk coupling within the plurality of crosstalking lines in the
channel; within a communications channel common to the plurality of lines;
ordering the ~~plurality of~~ crosstalking lines based on a comparison between the known sequence
of input symbols ~~as applied to the respective line~~ used to excite the crosstalking lines and
based further on the output data acquired from the ~~one or more~~ primary line[[s]];
generating, ~~for each of the lines~~, a data quantity representative of the ~~lines excited with the~~
~~known sequence of input symbols, determined to have been most affected by crosstalk~~
~~coupling within the communications channel~~ crosstalk coupling between the primary line
and each of the crosstalking lines based on the ordering of the ~~plurality~~ crosstalking lines;

and

sending instructions to one or more modems communicatively interfaced with the plurality of lines in the channel ~~DSL system~~ based on the data quantity generated.

77. (Previously presented) The computer-readable medium of claim 76, wherein the instructions sent to the one or more modems comprise instructions to implement: operational condition values, a maximum data rate limit, upstream transmission frequency band limits, transmit power levels, and coding/latency requirements.

78. (Currently amended) The computer-readable medium of claim 76, wherein the method further comprises zeroing all inputs into the ~~plurality of~~ crosstalking lines of the DSL system to eliminate other crosstalk among the plurality of lines in the channel prior to exciting the crosstalking lines.

79. (Currently amended) The computer-readable medium of claim 76, wherein the output data from the ~~one or more~~ primary line[[s]] ~~of the DSL system~~ is collected over time on a periodic basis.

80. (Currently amended) The computer-readable medium of claim 76, wherein the data quantity representative of crosstalk coupling between the primary line and each of the crosstalking lines ~~representing the extent of crosstalk coupling associated with each respective line~~ within the ~~communications~~ channel comprises a Dynamic Spectrum Management data (DSM-data) quantity $Xlog(u,n)$ that is a decibel-magnitude value representative of the extent of crosstalk coupling between the primary line and ~~associated with each of the~~ crosstalking lines ~~respective line~~ within the ~~communications~~ channel.

81. (Previously presented) The computer-readable medium of claim 80, wherein the DSM-data quantity $Xlog(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) =$

$$6 - (m(u,n)/10).$$

82. (Previously presented) The computer-readable medium of claim 80, wherein the DSM-data quantity $Xlog(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.
83. (Previously presented) The computer-readable medium of claim 80, wherein the DSM-data quantity $Xlog(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$ and further wherein $Xlog(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.
84. (Currently amended) The computer-readable medium of claim 76, wherein the output data further comprises FEXT and/or NEXT transfer functions between the ~~one or more~~ primary line[[s]] and each of the ~~plurality of~~ crosstalking lines; and further wherein the DSM-data quantity $Xlog(u,n)$ is a decibel-magnitude value of the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.
85. (Currently amended) The computer-readable medium of claim 76, wherein the data quantity representative of crosstalk coupling between the primary line and each of the crosstalking lines ~~the lines determined to have been most affected by crosstalk coupling within the communications channel~~ comprises a Dynamic Spectrum Management data (DSM-data) quantity $Xlin(u,n)$ that is a decibel-magnitude value representative of the extent of crosstalk coupling between the primary line and each of the crosstalking lines ~~associated with each respective line within the communications channel~~.
86. (Currently amended) The computer-readable medium of claim 85, wherein $Xlin(u,n)$ is represented in a linear format by a $scale(u)$ factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, NSC$, wherein NSC is the

number of carriers used and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and ~~further~~ wherein the value of $X_{lin}(u,n)$ is defined as $X_{lin}(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) + j * b(u,n)) / 2^{15}$; and ~~further~~ wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

87. (Previously presented) The computer-readable medium of claim 85, wherein the DSM-data quantity $X_{lin}(u,n)$ is a linear version of $X_{log}(u,n)$.

88. (Currently amended) The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line one-sided vectored communication system, wherein transmit signals on ~~multiple~~ the plurality of lines are co-generated with a common clock and processor at a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system.

89. (Currently amended) The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line double-sided vectored communication system, wherein transmit signals on ~~multiple~~ the plurality of lines are co-generated with a common clock and processor at each of a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system and at a Customer Premises Equipment (CPE) end of the DSL system.

90. (Currently amended) The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line bonded vectored communication system, wherein ~~multiple~~ the plurality of lines are allocated to a single customer.

91. (Currently amended) The computer-readable medium of claim 90, wherein generating the data quantity representative of the crosstalk coupling between the primary line and each of the crosstalking lines ~~determined to have been most affected by crosstalk coupling within the communications channel~~ comprises generating a Dynamic Spectrum

Management data (DSM-data) quantity $X_{\log}(u, n)$ for $u=1, \dots, U$, ~~$2n-1$~~ , representing line transfer[[s]] functions between U among n lines in the multi-line bonded vectored communication system and the primary line at subcarrier index n .

92. (Currently amended) The computer-readable medium of claim 85, wherein the method further comprises:

acquiring a value representative of insertion loss for ~~each of the one or more~~ the primary line[[s]], including any transmitter and receiver filter effects; and
assigning the value to index $u=0$ so that the value is identified as $X_{\text{lin}}(0, n)$.

SECTION II—REMARKS

Applicant thanks the Examiner for a thorough review, and respectfully requests reconsideration of the above referenced patent application for the following reasons:

Claims 47-92 rejected under 35 U.S.C. § 112, second paragraph

The Office Action rejected claims 47-92 rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

In particular, the Office Action stated that one skilled in the art is unable to determine with respect to claim 47, “between which of the ‘plurality of lines of the DSL system’ crosstalk coupling is measured” and “between which lines the ‘data quantity representative of the lines’ is to be determined.” The Examiner further stated that independent claim 47, “[c]ollectively ... is lacking a cohesive and consistent antecedent basis for the limitations provided,” thus making the claim indefinite.

Applicant respectfully submits that the amendments to independent claim 47 overcome the rejection. In particular, independent claim 47, as amended herein, recites in pertinent part:

A method of evaluating operational characteristics of a multi-line, vectored Digital Subscriber Line (DSL) system having a plurality of lines in a common communication channel (channel), the method comprising:

exciting a plurality of crosstalking lines in the channel with a known sequence of input symbols applied to the crosstalking lines;

acquiring output data from **a primary line among the plurality of lines** in the channel, the output data comprising the known sequence of input symbols after having propagated through the crosstalking lines and having been affected by crosstalk coupling within the plurality of crosstalking lines in the channel;

ordering the **crosstalking lines** based on a comparison between the known sequence of input symbols used to excite the crosstalking lines and based further on the **output data acquired from the primary line**;

generating a data quantity representative of the crosstalk coupling between the **primary line and each of the crosstalking lines** based on the ordering of the crosstalking lines; and

sending instructions to one or more modems communicatively interfaced with the plurality of lines in the channel based on the data quantity generated.

Applicant has made further clarifying amendments to independent claims 64 and 76 and to the dependent claims of independent claims 47, 64, and 76 which recite limitations that are consistent with the terms used within independent claim 47.

Accordingly, Applicant respectfully requests the Examiner to withdraw the rejection to claims 47-92.

CONCLUSION

Given the above amendments and accompanying remarks, all claims pending in the application are in condition for allowance. If the undersigned attorney has overlooked subject matter in any of the cited references that is relevant to allowance of the claims, the Examiner is requested to specifically point out where such subject matter may be found. Further, if there are any informalities or questions that can be addressed via telephone, the Examiner is encouraged to contact the undersigned attorney at (503) 439-8778.

Charge Deposit Account

Please charge our Deposit Account No. 02-2666 for any additional fee(s) that may be due in this matter, and please credit the same deposit account for any overpayment.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

/Gregory D. Caldwell/

Gregory D. Caldwell
Registration No. 39,926
Attorney for Applicant

Date: April 14, 2009

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Facsimile: (503) 439-6073

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application No. 11/122,365

Filing Date May 5, 2005

First Inventor John M. Cioffi

Art Unit 2611

Examiner Name Perilla, Jason M.

Attorney Docket No. 8241P013

Conf. No. 5593

DUTY OF DISCLOSURE STATEMENT

In accordance with the duty of disclosure, enclosed is a copy of an Information Disclosure Statement (IDS) Citation Form PTO/SB/08 or PTO-1449, together with copies of the documents cited on that form, except for copies not required to be submitted (e.g., copies of U.S. patents and U.S. published patent applications need not be enclosed). This IDS and IDS Citation Form are being submitted before the mailing of a final Office Action. It is respectfully requested that the cited references be considered and that the enclosed copy of PTO/SB/08 be initialed by the Examiner to indicate such consideration and a copy thereof returned to applicant(s).

The submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made in the subject application and is not to be construed as an admission that the information cited in this statement is material to patentability.

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).

OR

- ☐ None
- ☐ The IDS Filing Fee in the amount of \$180.00 as set forth in 37 CFR 1.17(p) has been submitted herewith.
- ☒ It is requested that any requisite fees be debited from Deposit Account 02-2666.

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 signature.

Signature	/Gregory D. Caldwell/	Date (YYYY-MM-DD)	2009- 04-14
Name/Print	Gregory D. Caldwell	Registration Number	39,926

I hereby certify that this correspondence is being submitted electronically via EFS Web on the date shown below.

/Christina M. Rainey/

Date 04-14-09

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.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	Complete if Known	
	Application Number	11/122,365
	Filing Date	May 5, 2005
	First Named Inventor	Cioffi, John
	Group Art Unit	2611
	Examiner Name	Perilla, Jason
Sheet 1 of 1		Attorney Docket No: 8241P013

US PATENT DOCUMENTS					
Examiner Initial *	Cite No ¹	USP Document Number	Publication or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2004/0095921	05/20/2004	Kerpez	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No ¹	Foreign Patent Document Country Code/Number/Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ²

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS						
Examiner Initials*	Cite No ¹	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, page(s), volume-issue number(s), publisher, city and/or country where published.				T ²
		<u>International Search Report and Written Opinion from PCT/IB2005/001544 (Attorney Docket No. 8241.P013PCT) mailed July 27, 2005, 11 pgs.</u>				
		CIOFFI, JOHN , et al., "Example of Improvements of Dynamic Spectrum Management", <u>T1E1</u> , (2/19/01)				
		EUROPEAN PATENT OFFICE, "Examination Report", <u>Application No. 05741016.9</u> , Attorney Docket No. 8241P013EP, (5/2/08).				
		GINIS, GEORGE, et al., "Vectored-DMT: a FEXT canceling modulation scheme for coordinating users", <u>IEEE International Conference on Communications, New York, NY, US, vol. 1 of 10</u> , (6/11/01), pgs. 305-309.				
		YU, W, et al., "An Adaptive Multiuser Power Control Algorithm for VSDL", <u>IEEE Global Communications Conference, New York, NY, vol. 1 of 6</u> , (11/25/01), pgs. 394-98.				

EXAMINER

DATE CONSIDERED

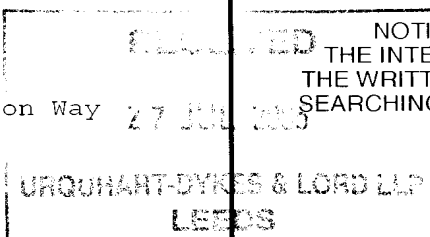
PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

URQUHART-DYKES & LORD LLP
 Attn. Alton, Andrew
 Tower North Central, Merrion Way
 Leeds
 LS2 8PA
 UNITED KINGDOM



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

(PCT Rule 44.1)

Applicant's or agent's file reference AA/P205512WO	Date of mailing (day/month/year) 27/07/2005
International application No. PCT/IB2005/001544	International filing date (day/month/year) 18/05/2005
Applicant ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC.	

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 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

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 the 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 the applicant's 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

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 as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

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. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

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.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority

European Patent Office, P.B. 5818 Patentlaan 2
 NL-2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Rosa Poquet Oliver

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, a publication of WIPO.

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, 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 19 except 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.

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 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 must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. 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 (Administrative Instructions, Section 205(b)).

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.

NOTES TO FORM PCT/ISA/220 (continued)

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 under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

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, where 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 Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference AA/P205512WO	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/IB2005/001544	International filing date (day/month/year) 18/05/2005	(Earliest) Priority Date (day/month/year) 18/05/2004
Applicant ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC.		

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, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ 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 II).

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

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB2005/001544

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04B3/32 H04M11/06 H04L12/28 H04L27/26

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 7 H04B H04M 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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CIOFFI ET AL: "Example improvements of Dynamic Spectrum Management" T1E1.4/2001-089, 19 February 2001 (2001-02-19), XP002224058 the whole document	1-46
A	YU W ET AL: "AN ADAPTIVE MULTIUSER POWER CONTROL ALGORITHM FOR VDSL" GLOBECOM'01. 2001 IEEE GLOBAL TELECOMMUNICATIONS CONFERENCE. SAN ANTONIO, TX, NOV. 25 - 29, 2001, IEEE GLOBAL TELECOMMUNICATIONS CONFERENCE, NEW YORK, NY : IEEE, US, vol. VOL. 1 OF 6, 25 November 2001 (2001-11-25), pages 394-398, XP001090284 ISBN: 0-7803-7206-9 the whole document	1-46



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° 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 document 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

13 July 2005

Date of mailing of the international search report

27/07/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Ricciardi, M

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB2005/001544

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	YU W ET AL: "DISTRIBUTED MULTIUSER POWER CONTROL FOR DIGITAL SUBSCRIBER LINES" IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, IEEE INC. NEW YORK, US, vol. 20, no. 5, June 2002 (2002-06), pages 1105-1115, XP001143168 ISSN: 0733-8716 the whole document -----	1-46
A	GINIS G ET AL: "VECTORED TRANSMISSION FOR DIGITAL SUBSCRIBER LINE SYSTEMS" IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, IEEE INC. NEW YORK, US, vol. 20, no. 5, June 2002 (2002-06), pages 1085-1104, XP001143167 ISSN: 0733-8716 the whole document -----	1-46
A	GINIS G ET AL: "Vectored-DMT: a FEXT canceling modulation scheme for coordinating users" ICC 2001. 2001 IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS. CONFERENCE RECORD. HELSINKY, FINLAND, JUNE 11 - 14, 2001, IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS, NEW YORK, NY : IEEE, US, vol. VOL. 1 OF 10, 11 June 2001 (2001-06-11), pages 305-309, XP010553013 ISBN: 0-7803-7097-1 the whole document -----	1-46

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION

See paragraph 2 below

International application No.
PCT/IB2005/001544

International filing date (day/month/year)
18.05.2005

Priority date (day/month/year)
18.05.2004

International Patent Classification (IPC) or both national classification and IPC
H04B3/32, H04M11/06, H04L12/28, H04L27/26

Applicant
ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC.

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 43bis.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 usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, 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 66.1bis(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 opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three 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:



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D-80298 Munich
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Authorized Officer

Ricciardi, M

Telephone No. +49 89 2399-7294



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2005/001544

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, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto 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.
4. Additional comments:

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

1. Statement

Novelty (N)	Yes: Claims	1-46
	No: Claims	
Inventive step (IS)	Yes: Claims	1-46
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-46
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

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 claims are fully supported by the description, are made:

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following document:

D1: GINIS G ET AL: "VECTORED TRANSMISSION FOR DIGITAL SUBSCRIBER LINE SYSTEMS" IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, IEEE INC. NEW YORK, US, vol. 20, no. 5, June 2002 (2002-06), pages 1085-1104, XP001143167 ISSN: 0733-8716

1. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows a vectored dsl communications system.
2. The subject-matter of claim 1 differs from this known document in that the latter is silent about the way the crosstalk among different lines is computed. The subject-matter of claim 1 is therefore new (Article 33(2) PCT).
3. The problem to be solved by the present invention may be regarded as how to efficiently compute the crosstalk occurring on a bundle of line bound together.
4. The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) because none of the prior art discloses the step of generating a DSM-data quantity Xlog.
5. For the same reasons, independent claims 8, 16, 25, 27, 33, 38 and 42 are novel and inventive.
6. Claims 2-7, 9-15, 17-24, 26, 28-32, 34-37, 39-41, 43-46 are dependent on claims 1, 8, 16, 25, 27, 33, 38 and 42, respectively, and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VII

Certain defects in the international application

The vague statement in the description on page 28 last sentence implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them.

Re Item VIII

Certain observations on the international application

Although claims 1, 8, 16, 25, 27, 33, 38 and 42 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

Electronic Patent Application Fee Transmittal				
Application Number:		11122365		
Filing Date:		05-May-2005		
Title of Invention:		FEXT determination system		
First Named Inventor/Applicant Name:		John M. Cioffi		
Filer:		Gregory D. Caldwell/Christina Rainey		
Attorney Docket Number:		8241P013		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	5153182
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT determination system
First Named Inventor/Applicant Name:	John M. Cioffi
Customer Number:	08791
Filer:	Gregory D. Caldwell/Christina Rainey
Filer Authorized By:	Gregory D. Caldwell
Attorney Docket Number:	8241P013
Receipt Date:	14-APR-2009
Filing Date:	05-MAY-2005
Time Stamp:	19:08:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	4609
Deposit Account	022666
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		8241P013_Response_OA_mailed_01-14-09.pdf	76636 ec4295f2b9a01698f3140982f623cf6e8163ca8d	yes	16

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment After Final		1	1	
	Claims		2	13	
	Applicant Arguments/Remarks Made in an Amendment		14	16	

Warnings:

Information:

2	Information Disclosure Statement (IDS) Filed (SB/08)	8241P013_IDS_4-14-09.pdf	41036 2e6bf72a24564fbb4138af2808bdc0a8c279b1a	no	1
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Warnings:

Information:

This is not an USPTO supplied IDS fillable form

3	Information Disclosure Statement (IDS) Filed (SB/08)	8241P013_IDS_1449.pdf	114703 f666320fc1c841748d5f46cb38485500d9077de5	no	1
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Warnings:

Information:

This is not an USPTO supplied IDS fillable form

4	NPL Documents	1_P013PCT_PCT_ISR.pdf	953759 eca4d38cd29935414a0f081e65e8adeaf9cbf500	no	11
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Warnings:

Information:

5	NPL Documents	2_Cioffi_Examples_Improvements_of_Dynamic_Spectrum_2-19-01.pdf	701430 1daf3be4b79a7679b969fea1466bfb631e449911	no	14
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Warnings:

Information:

6	NPL Documents	3_8241P013EP_Office_Action_5-2-08.pdf	696821	no	8
			56e97223cacef8b89fafa82d2154968f66c3f ade		
Warnings:					
Information:					
7	NPL Documents	4_Ginis_Vectored-DMT_A_FEXT_canceling_modulation_scheme_for_coordinating_users.pdf	214912	no	5
			51265469b806d762048aa23419bcc4b1f6c 5be92		
Warnings:					
Information:					
8	NPL Documents	5_Yu_An_Adaptive_Multiuser_Power_Control_Algorithm_for_VDSL_11-25-01.pdf	420410	no	5
			c7482f0ed6b568d5dd4f811f0b414f847706 229a		
Warnings:					
Information:					
9	Fee Worksheet (PTO-06)	fee-info.pdf	29999	no	2
			511effb53528f4323f8da94c29240d85bb28 7164		
Warnings:					
Information:					
Total Files Size (in bytes):			3249706		

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.

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Filing Date
05/05/2005

APPLICATION AS FILED – PART I

(Column 1)

(Column 2)

SMALL ENTITY ☒

OR

OTHER THAN

SMALL ENTITY

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

APPLICATION AS AMENDED – PART II

(Column 1)

(Column 2)

(Column 3)

SMALL ENTITY

OR

OTHER THAN

SMALL ENTITY

TOTAL
ADD'L
FEE

0

TOTAL
ADD'L
FEEADD'L
FEE

(Column 1)

(Column 2)

(Column 3)

TOTAL
ADD'L
FEETOTAL
ADD'L
FEE

ADD'L

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/TARA J. WITCHER/

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.**

IPR2025-00492
Petitioners' Exhibit 1004
Page 85 of 245



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.
-----------------	-------------	----------------------	---------------------	------------------

11/122,365

05/05/2005

John M. Cioffi

8241P013

5593

8791

7590

01/14/2009

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER

PERILLA, JASON M

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

01/14/2009

PAPER

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.

Office Action Summary	Application No. 11/122,365	Applicant(s) CIOFFI, JOHN M.	
	Examiner JASON M. PERILLA	Art Unit 2611	

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

Period for Reply

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

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

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 47-92 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 47-92 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ 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) | 4) ☐ Interview Summary (PTO-413) |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) ☐ Information Disclosure Statement(s) (PTO/SB/08) | 5) ☐ Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) ☐ Other: _____ |

DETAILED ACTION

1. Claims 47-92 are pending in the instant application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

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.

3. Claims 47-92 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 47, the claim is rejected because one skilled in the art is unable to determine (1) between which of the "plurality of lines of the DSL system" crosstalk coupling is measured and (2) between which lines the "data quantity representative of the lines" is to be determined. The claim provides for exciting **(1)** "a plurality of lines" (ln. 3), acquiring output data from **(2)** "one or more primary lines of the DSL system" (ln. 5), the output data comprising the known sequence of input symbols after having propagated through **(3)** "each respective line" (ln. 5-7), and generating **(4)** "for each of the lines" a data quantity representative of the lines (ln. 12-13). However, one skilled in the art is unable to determine if any of the lines **(2)**, **(3)**, and **(4)** *are or are not* a subset or a portion of the lines **(1)**, and it makes the claim indefinite. Further, one skilled in the art is unable to determine if the claimed "a communications channel common to the plurality of lines" (ln. 7-8) is one of the plurality of lines or otherwise. In line 10, "the respective line" is lacking antecedent basis. Collectively, the claim is lacking a cohesive

Art Unit: 2611

and consistent antecedent basis for the limitations provided for, and it makes the claim indefinite.

Regarding claims 48-63, the claims are rejected as being based upon a rejected parent claim.

Regarding claim 64, the claim is rejected for the same reasons as applied to claim 47 above.

Regarding claims 65-75, the claims are rejected as being based upon a rejected parent claim.

Regarding claim 76, the claim is rejected for the same reasons as applied to claim 47 above.

Regarding claims 77-92, the claims are rejected as being based upon a rejected parent claim.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON M. PERILLA whose telephone number is (571)272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. 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 <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jason M Perilla/
Primary Examiner, Art Unit 2611
January 13, 2009

/jmp/



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

11/122,365

05/05/2005

John M. Cioffi

8241P013

5593

8791

7590

11/17/2008

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER

PERILLA, JASON M

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

11/17/2008

PAPER

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.

Interview Summary	Application No. 11/122,365	Applicant(s) CIOFFI, JOHN M.	
	Examiner JASON M. PERILLA	Art Unit 2611	

All participants (applicant, applicant's representative, PTO personnel):

(1) Jason M. Perilla. (3) Ardavan Maleki-Tehrani.

(2) Gordon Lindeen. (4) ____.

Date of Interview: 21 October 2008.

Type: a) ☐ Telephonic b) ☐ Video Conference
c) ☒ Personal [copy given to: 1) ☒ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☐ No.
If Yes, brief description: ____.

Claim(s) discussed: 1.

Identification of prior art discussed: U.S. Pub. No. 2002/0041565.

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: It was agreed that the attached proposed amendment to claim 1 overcomes the prior art rejection set forth in the office action dated July 29, 2008. The prior art reference Valenti (U.S. Pub. No. 2002/0041565) does not anticipate the proposed claim.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Jason M Perilla/ Primary Examiner, Art Unit 2611	
--	--

1. A method of evaluating operational characteristics of a multi-line, vectored Digital Subscriber Line (DSL) system, the method comprising:

exciting U potential-crosstalking lines from the DSL system with a known sequence of input symbols applied to the U potential-crosstalking lines;

acquiring output data from a primary line n of the DSL system, the output data representative of any crosstalk coupling between the a primary line n and the excited U potential-crosstalking lines within from the DSL system;

ordering the U potential-crosstalking lines by according to an index u based on the known sequence of input symbols applied to the excited U potential-cross talking lines and based further on the output data from the primary line n representative of crosstalk coupling, wherein $u=1$ is the largest crosstalker and $u=U$ is the smallest crosstalker; and

generating, for each of the U potential-crosstalking lines, a Dynamic Spectrum Management data (DSM-data) quantity $X_{\log}(u,n)$ that is a decibel-magnitude value representative of crosstalk coupling between the primary line n and each the U potential-crosstalking line.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Cioffi	Confirmation No.:	5593
Serial No.:	11/122,365	Examiner:	Perilla, Jason M.
Filed:	May 5, 2005	Art Unit:	2611
For:	FEXT DETERMINATION SYSTEM		
Docket No.:	8241.P013		

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

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.111

Dear Examiner:

This amendment is submitted in response to the Office Action mailed July 29, 2008, for the above-noted patent application.

Applicant respectfully requests the Examiner to:

1. Please enter the amendments to the claims in section I, beginning on page 2.
2. Please consider the amendments to the claims in section I in view of the remarks in section II, beginning on page 13.

I hereby certify that this correspondence is being deposited via
EFS Web on the date below:

October 29, 2008

Date of Deposit

/Debbie Casias /

SECTION I—CLAIMS

Amendment to the Claims:

This listing of the claims will replace all prior versions and listings of claims in the application. Claims 1-46 are, or remain, canceled herein without prejudice. New claims 47-92 are presented herein. Claims 47-92 remain pending in the application.

Listing of Claims:

1-46. (Canceled).

47. (New) A method of evaluating operational characteristics of a multi-line, vectored Digital

Subscriber Line (DSL) system, the method comprising:

exciting a plurality of lines of the DSL system with a known sequence of input symbols applied to the lines;

acquiring output data from one or more primary lines of the DSL system, the output data

comprising the known sequence of input symbols after having propagated through each respective line and having been affected by crosstalk coupling within a communications channel common to the plurality of lines;

ordering the plurality of lines based on a comparison between the known sequence of input

symbols as applied to the respective line and the output data acquired from the one or more primary lines;

generating, for each of the lines, a data quantity representative of the lines excited with the

known sequence of input symbols, determined to have been most affected by crosstalk

coupling within the communications channel based on the ordering of the plurality lines;

and

sending instructions to one or more modems communicatively interfaced with the DSL system based on the data quantity generated.

48. (New) The method of claim 47, wherein the instructions sent to the one or more modems comprise instructions to implement: operational condition values, a maximum data rate limit, upstream transmission frequency band limits, transmit power levels, and coding/latency requirements.

49. (New) The method of claim 47, further comprising zeroing all inputs into the plurality of lines of the DSL system to eliminate other crosstalk among the lines prior to exciting the lines.

50. (New) The method of claim 47, wherein the output data from the one or more primary lines of the DSL system is collected over time on a periodic basis.

51. (New) The method of claim 47, wherein the data quantity representative of the lines determined to have been most affected by crosstalk coupling within the communications channel comprises a Dynamic Spectrum Management data (DSM-data) quantity $Xlog(u,n)$ that is a decibel-magnitude value representative of the extent of crosstalk coupling associated with each respective line within the communications channel.

52. (New) The method of claim 51, wherein the DSM-data quantity $Xlog(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$.

53. (New) The method of claim 51, wherein the DSM-data quantity $Xlog(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.

54. (New) The method of claim 51, wherein the DSM-data quantity $Xlog(u,n)$ is a function of a

10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$ and further wherein $Xlog(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.

55. (New) The method of claim 47, wherein the output data further comprises FEXT and/or NEXT transfer functions between the one or more primary lines and each of the plurality of lines; and

further wherein the DSM-data quantity $Xlog(u,n)$ is a decibel-magnitude value of the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.

56. (New) The method of claim 47, wherein the data quantity representative of the lines determined to have been most affected by crosstalk coupling within the communications channel comprises a Dynamic Spectrum Management data (DSM-data) quantity $Xlin(u,n)$ that is a decibel-magnitude value representative of the extent of crosstalk coupling associated with each respective line within the communications channel.

57. (New) The method of claim 56, wherein $Xlin(u,n)$ is represented in a linear format by a $scale(u)$ factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, NSC$, wherein NSC is the number of carriers used and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and further wherein the value of $Xlin(u,n)$ is defined as $Xlin(u,n) = (scale(u)/2^{15})*(a(u,n) + j*b(u,n))/2^{15}$; and

further wherein the scale factor is chosen such that $max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

58. (New) The method of claim 56, wherein the DSM-data quantity $Xlin(u,n)$ is a linear version of $Xlog(u,n)$.

59. (New) The method of claim 47, wherein the DSL system comprises a multi-line one-sided vectored communication system, wherein transmit signals on multiple lines are co-generated with a common clock and processor at a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system.
60. (New) The method of claim 47, wherein the DSL system comprises a multi-line double-sided vectored communication system, wherein transmit signals on multiple lines are co-generated with a common clock and processor at each of a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system and at a Customer Premises Equipment (CPE) end of the DSL system.
61. (New) The method of claim 47, wherein the DSL system comprises a multi-line bonded vectored communication system, wherein multiple lines are allocated to a single customer.
62. (New) The method of claim 61, wherein generating the data quantity representative of the lines determined to have been most affected by crosstalk coupling within the communications channel comprises generating a Dynamic Spectrum Management data (DSM-data) quantity $X_{\log}(u, n)$ for $u=1, \dots, 2n-1$, representing line transfers among n lines in the multi-line bonded vectored communication system.
63. (New) The method of claim 56, further comprising:
acquiring a value representative of insertion loss for each of the one or more primary lines,
including any transmitter and receiver filter effects; and
assigning the value to index $u=0$ so that the value is identified as $X_{\text{lin}}(0, n)$.
64. (New) A controller communicably interfaced with a Digital Subscriber Line (DSL) system, comprising:

means for exciting a plurality of lines of the DSL system with a known sequence of input symbols applied to the lines;

means for acquiring output data from one or more primary lines of the DSL system, the output data comprising the known sequence of input symbols after having propagated through each respective line and having been affected by crosstalk coupling within a communications channel common to the plurality of lines;

means for ordering the plurality of lines based on a comparison between the known sequence of input symbols as applied to the respective line and the output data acquired from the one or more primary lines;

means for generating, for each of the lines, a data quantity representative of the lines excited with the known sequence of input symbols, determined to have been most affected by crosstalk coupling within the communications channel based on the ordering of the plurality lines; and

means for sending instructions to one or more modems communicatively interfaced with the DSL system based on the data quantity generated.

65. (New) The controller of claim 64, wherein the instructions sent to the one or more modems comprise instructions to implement: operational condition values, a maximum data rate limit, upstream transmission frequency band limits, transmit power levels, and coding/latency requirements.

66. (New) The controller of claim 64, further comprising means for zeroing all inputs into the plurality of lines of the DSL system to eliminate other crosstalk among the lines prior to exciting the lines.

67. (New) The controller of claim 64, wherein the output data from the one or more primary

lines of the DSL system is collected over time on a periodic basis.

68. (New) The controller of claim 64, wherein the DSL system comprises a multi-line, vectored DSL system.

69. (New) The controller of claim 64, wherein the output data further comprises FEXT and/or NEXT transfer functions between the one or more primary lines and each of the plurality of lines; and

further wherein the data quantity representative of the lines determined to have been most affected by crosstalk coupling within the communications channel is the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.

70. (New) The controller of claim 64, wherein the data quantity representative of the lines determined to have been most affected by crosstalk coupling within the communications channel is at least one of the following:

$X_{\log}(u,n)$, wherein $X_{\log}(u,n)$ is a decibel-magnitude value representative of crosstalk coupling between the primary line n and each potential-crosstalking line; and

$X_{\text{lin}}(u,n)$, wherein $X_{\text{lin}}(u,n)$ is the linear version of $X_{\log}(u,n)$.

71. (New) The controller of claim 70, wherein $X_{\text{lin}}(u,n)$ is represented in a linear format by a $\text{scale}(u)$ factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, \text{NSC}$, wherein NSC is the number of used carriers and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and

further wherein the value of $X_{\text{lin}}(u,n)$ is defined as $X_{\text{lin}}(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) + j*b(u,n))/2^{15}$; and

further wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

72. (New) The controller of claim 70, wherein the quantity $X_{\log}(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $X_{\log}(u,n) = 6 - (m(u,n)/10)$.
73. (New) The controller of claim 70, further comprising:
means for acquiring a value representative of insertion loss for each of the one or more primary lines, including any transmitter and receiver filter effects; and
means for assigning the value to index $u=0$ so that the value is identified as $X_{\text{lin}}(0,n)$.
74. (New) The controller of claim 70, further comprising:
means for acquiring a value representative of insertion loss for each of the one or more primary lines, including any transmitter and receiver filter effects; and
means for assigning the value to index $u=0$ so that the value is identified as $X_{\log}(0,n)$.
75. (New) The controller of claim 64, wherein the means for acquiring output data from the one or more primary lines and the means for generating the data quantities comprise one or more computer systems.
76. (New) A computer-readable medium having executable program code stored thereon that, when executed by a processor in a Digital Subscriber Line (DSL) system, the executable program code causes the DSL system to perform a method comprising:
exciting a plurality of lines of the DSL system with a known sequence of input symbols applied to the lines;
acquiring output data from one or more primary lines of the DSL system, the output data comprising the known sequence of input symbols after having propagated through each respective line and having been affected by crosstalk coupling within a communications channel common to the plurality of lines;
ordering the plurality of lines based on a comparison between the known sequence of input

symbols as applied to the respective line and the output data acquired from the one or more primary lines;

generating, for each of the lines, a data quantity representative of the lines excited with the known sequence of input symbols, determined to have been most affected by crosstalk coupling within the communications channel based on the ordering of the plurality lines; and

sending instructions to one or more modems communicatively interfaced with the DSL system based on the data quantity generated.

77. (New) The computer-readable medium of claim 76, wherein the instructions sent to the one or more modems comprise instructions to implement: operational condition values, a maximum data rate limit, upstream transmission frequency band limits, transmit power levels, and coding/latency requirements.

78. (New) The computer-readable medium of claim 76, wherein the method further comprises zeroing all inputs into the plurality of lines of the DSL system to eliminate other crosstalk among the lines prior to exciting the lines.

79. (New) The computer-readable medium of claim 76, wherein the output data from the one or more primary lines of the DSL system is collected over time on a periodic basis.

80. (New) The computer-readable medium of claim 76, wherein the data quantity representing the extent of crosstalk coupling associated with each respective line within the communications channel comprises a Dynamic Spectrum Management data (DSM-data) quantity $X_{\log}(u,n)$ that is a decibel-magnitude value representative of the extent of crosstalk coupling associated with each respective line within the communications channel.

81. (New) The computer-readable medium of claim 80, wherein the DSM-data quantity $Xlog(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$.
82. (New) The computer-readable medium of claim 80, wherein the DSM-data quantity $Xlog(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.
83. (New) The computer-readable medium of claim 80, wherein the DSM-data quantity $Xlog(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$ and further wherein $Xlog(u,n)$ is specified during a diagnostics mode, an initialization mode, or during both the diagnostics and the initialization mode.
84. (New) The computer-readable medium of claim 76, wherein the output data further comprises FEXT and/or NEXT transfer functions between the one or more primary lines and each of the plurality of lines; and
further wherein the DSM-data quantity $Xlog(u,n)$ is a decibel-magnitude value of the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.
85. (New) The computer-readable medium of claim 76, wherein the data quantity representative of the lines determined to have been most affected by crosstalk coupling within the communications channel comprises a Dynamic Spectrum Management data (DSM-data) quantity $Xlin(u,n)$ that is a decibel-magnitude value representative of the extent of crosstalk coupling associated with each respective line within the communications channel.
86. (New) The computer-readable medium of claim 85, wherein $Xlin(u,n)$ is represented in a linear format by a scale(u) factor and a normalized complex number $a(u,n) + j*b(u,n)$,

where n is the subcarrier index $n=0, \dots, \text{NSC}$, wherein NSC is the number of carriers used and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and

further wherein the value of $X_{\text{lin}}(u,n)$ is defined as $X_{\text{lin}}(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) + j * b(u,n)) / 2^{15}$; and

further wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

87. (New) The computer-readable medium of claim 85, wherein the DSM-data quantity $X_{\text{lin}}(u,n)$ is a linear version of $X_{\text{log}}(u,n)$.

88. (New) The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line one-sided vectored communication system, wherein transmit signals on multiple lines are co-generated with a common clock and processor at a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system.

89. (New) The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line double-sided vectored communication system, wherein transmit signals on multiple lines are co-generated with a common clock and processor at each of a Digital Subscriber Line Access Multiplexer (DSLAM) end of the DSL system and at a Customer Premises Equipment (CPE) end of the DSL system.

90. (New) The computer-readable medium of claim 76, wherein the DSL system comprises a multi-line bonded vectored communication system, wherein multiple lines are allocated to a single customer.

91. (New) The computer-readable medium of claim 90, wherein generating data quantity representative of the lines determined to have been most affected by crosstalk coupling

within the communications channel comprises generating a Dynamic Spectrum Management data (DSM-data) quantity $X_{log}(u,n)$ for $u=1, \dots, 2n-1$, representing line transfers among n lines in the multi-line bonded vectored communication system.

92. (New) The computer-readable medium of claim 85, wherein the method further comprises: acquiring a value representative of insertion loss for each of the one or more primary lines, including any transmitter and receiver filter effects; and assigning the value to index $u=0$ so that the value is identified as $X_{lin}(0,n)$.

SECTION II—REMARKS

Applicant thanks the Examiner for a thorough review, and respectfully requests reconsideration of the above referenced patent application for the following reasons:

Allowable subject matter

Applicant acknowledges that dependent claims 2, 9, 15 and 20-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicant respectfully submits that new claims 47-92 presented herein, in view of the remarks set forth below, overcome the rejections in the present Office Action and place all claims pending in the application in condition for allowance.

Supplementary Restriction Requirement

The Office Action alleges that claims 1-26 (Group I) and claims 27-32 (Group II) are distinct and would cause a “serious search and examination burden” without a restriction.

Examiner Jason Perilla spoke with Spencer K. Hunter, a law clerk working under the discretion of Gregory D. Caldwell, the undersigned attorney for Applicant, on July 24, 2008, at which time a provisional election of Group I (claims 1-26) was made.

Without addressing the merits of the Restriction, and without conceding the correctness of the Office Action’s interpretation of the claims, Applicant affirms the provisional election, formally electing Group I (claims 1-26) herein without traverse. Further, Applicant cancels the claims of unelected Group II (claims 27-32) herein without prejudice, and reserves the right to pursue the cancelled claims and/or Species in a divisional or continuing application.

Applicant notes that claims 1-26 of Group I are canceled herein without prejudice, however, Applicant submits that new claims 47-92 fall within the scope of formally elected Group 1 (claims 1-26) and thus do not pose a serious search and examination burden.

Claims 3-5, 10-12, 14, and 17 rejected under 35 U.S.C. § 112

The Office Action rejected claims 3-5, 10-12, 14, and 17 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 3-5, 10-12, 14, and 17 are canceled herein without prejudice, and thus, the rejection to claims 3-5, 10-12, 14, and 17 is rendered moot. However, Applicant respectfully submits that new claims 47-92 are in condition for allowance as each provides sufficient descriptive language sufficient for patentability under 35 U.S.C. § 112.

Thus, Applicants respectfully request the Examiner to withdraw the rejection to claims 3-5, 10-12, 14, and 17 and allow new claims 47-92 as presented herein.

Claims 1, 3-8, 10-14, 16-19 and 24-26 rejected under 35 U.S.C. § 102(b)

Applicant's representatives Gordon Lindeen and Ardavan Maleki interviewed Examiner Perilla at the USPTO in Washington D.C. on October 21, 2008. During that interview, Applicant's representatives and Examiner Perilla came to general agreement as to subject matter for an independent claim that would be patentable over the prior art of record.

As agreed to during the personal interview, new independent claims 47, 64, and 76 presented above, specifically set forth the use of "a known sequence of input symbols."

Accordingly, Applicant respectfully submits that independent claims 47, 64, and 76, as well as

those claims which depend upon independent claims 47, 64, and 76, are patentable over the prior art of record and in condition for allowance.

Thus, Applicant respectfully requests the Examiner to withdraw the rejection to now canceled claims 1, 3-8, 10-14, 16-19 and 24-26 rejected under 35 U.S.C. § 102(b) and allow new claims 47-92 as presented herein.

New claims 47-92

Applicant respectfully submits that new claims 47-92 presented herein do not add new subject matter as the claims find support in the specification as originally presented, in the original claims, and in the original Figures accompanying the specification.

Thus, Applicant respectfully requests the Examiner to allow new claims 47-92 as presented herein.

CONCLUSION

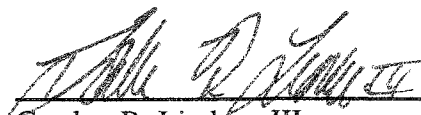
Given the above amendments and accompanying remarks, all claims pending in the application are in condition for allowance. If the undersigned attorney has overlooked subject matter in any of the cited references that is relevant to allowance of the claims, the Examiner is requested to specifically point out where such subject matter may be found. Further, if there are any informalities or questions that can be addressed via telephone, the Examiner is encouraged to contact the undersigned attorney at (503) 439-8778.

Charge Deposit Account

Please charge our Deposit Account No. 02-2666 for any additional fee(s) that may be due in this matter, and please credit the same deposit account for any overpayment.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP



Gordon R. Lindeen III
Registration No. 33,192
Attorney for Applicant

Date: October 29, 2008

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Electronic Acknowledgement Receipt

EFS ID:	4200612
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT determination system
First Named Inventor/Applicant Name:	John M. Cioffi
Customer Number:	08791
Filer:	Gordon R. Lindeen/Debbie Casias
Filer Authorized By:	Gordon R. Lindeen
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Filing Date:	05-MAY-2005
Time Stamp:	18:21:19
Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	8241P013response.pdf	2829503 b572cb5be2ef3d7c804b71033e6843fd6dd e5e46	no	16

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/122,365	05/05/2005	John M. Cioffi	8241P013	5593
8791	7590	07/29/2008		
BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP 1279 OAKMEAD PARKWAY SUNNYVALE, CA 94085-4040			EXAMINER PERILLA, JASON M	
			ART UNIT	PAPER NUMBER
			2611	
			MAIL DATE	DELIVERY MODE
			07/29/2008	PAPER

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.

Office Action Summary	Application No. 11/122,365	Applicant(s) CIOFFI, JOHN M.	
	Examiner JASON M. PERILLA	Art Unit 2611	

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

Period for Reply

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

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

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 27-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-8,10-14,16-19 and 24-26 is/are rejected.
- 7) ☒ Claim(s) 2,9,15 and 20-23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ 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) | 4) ☐ Interview Summary (PTO-413) |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) ☐ Information Disclosure Statement(s) (PTO/SB/08) | 5) ☐ Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) ☐ Other: _____ |

DETAILED ACTION

1. Claims 1-32 are pending in the instant application.

Response to Amendment/Remarks

2. The Applicant's remarks, filed June 9, 2008, have been fully considered.

In view of a further examination of the prior art of record, new grounds of rejection are set forth below.

An updated restriction requirement is set forth below.

Election/Restrictions

3. The following restriction requirement is supplementary to and updates the requirement submitted in the office action dated April 9, 2008. The groupings of claims are updated because claims 27-32 are found to be related to invention II rather than invention I as previously indicated.

4. Restriction to one of the following inventions is required under 35 U.S.C. § 121 :

I. Claims 1-26, drawn to methods of ordering crosstalking lines, classified in class 375, subclass 222.

II. Claims 27-32, drawn to methods of obtaining and combining NEXT and FEXT interference, classified in class 375, subclass 222.

The inventions are distinct, each from the other because of the following reasons:

5. Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions have different designs and modes of operation.

6. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

(a) the inventions have acquired a separate status in the art in view of their different classification;

(b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;

(c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);

(d) the prior art applicable to one invention would not likely be applicable to another invention;

(e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

7. During a telephone conversation with Spencer Hunter on July 24, 2008 a provisional election was made without traverse to prosecute invention I, claims 1-26. Affirmation of this election must be made by applicant in replying to this Office action. Claims 27-32 are withdrawn from further consideration by the examiner, 37 CFR § 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

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.

9. Claims 3-5, 10-12, 14, and 17 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 3, the claim is indefinite because one skilled in the art is unable to determine how limiting the method to a "one-sided" DSL system limits the claim. That is, the specification does not clearly define what a "one-sided" system is comprised of, and one skilled in the art is unable to determine the meaning of the limitation from knowledge commonly known in the art.

Regarding claim 4, the claim is indefinite because one skilled in the art is unable to determine how limiting the method to a "two-sided" DSL system limits the claim. That is, the specification does not clearly define what a "two-sided" system is comprised of, and one skilled in the art is unable to determine the meaning of the limitation from knowledge commonly known in the art. Moreover, the claim is indefinite because one skilled in the art is unable to definitely determine what a "vectored" DSL system comprises.

Regarding claim 5, the claim is indefinite because one skilled in the art is unable to definitely determine what a "bonded vectored" DSL system comprises. Neither the specification nor knowledge commonly known in the art provides one with skill in the art with a definite interpretation of such limitations.

Regarding claims 10-12, the claims are rejected for the same reasons as applied, respectively, to claims 3-5 above.

Regarding claim 14, the claim is indefinite because one skilled in the art is unable to determine the meaning of a "bonded" system (see also, the rejection of claim 5 above).

Regarding claim 17, the claim is indefinite because one skilled in the art is unable to determine the meaning of a "vectored" system (see also, the rejection of claim 5 above).

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1, 3-8, 10-14, 16-19, 24, 25, and 26 are rejected under 35 U.S.C. § 102(b) as being anticipated by Valenti et al (U.S. Pub. No. 2002/0041565; "Valenti" – 4/09/08 892 reference "E").

Regarding claim 1, Valenti discloses a method of evaluating operational characteristics of a multi-line (fig. 3, refs. 18-18n), vectored Digital Subscriber Line (DSL) system (¶ 0002), the method comprising: acquiring data (i.e. fig. 9 or 10) representative of any crosstalk coupling between a primary line n and U (i.e. see Table 4; DSL Couplings #7 and #11) crosstalking lines (¶¶ 0065-66; Table 4) from the DSL system; ordering (see Table 4; ordering via "Max Correlation") the U crosstalking lines (DSL Couplings #7 and #11) by an index u (i.e. see Table 4; "Iteration"), wherein u=1 is the largest crosstalker ("strongest disturber that generated crosstalk c1(m)"; ¶ 0061)

and $u=U$ (i.e. $U=3$) is the smallest crosstalker; and generating a Dynamic Spectrum Management data (DSM-data) quantity $X_{\log}(u,n)$ (Table 4 itself) that is a decibel-magnitude value (Table 4; "Next Power (dBm)") representative of crosstalk coupling between the primary line and each crosstalking line. Valenti discloses a method of determining crosstalk between a primary line n or "a subscriber loop" and U crosstalking "disturbers" (§ 0016). Power spectral densities (PSDs) (i.e., for instance, figs. 9 or 10) representing a possible set of disturbers are correlated against the U crosstalking lines such that a crosstalking line having the "most closely correlated power spectral density is selected as the identified disturber" for each particular PSD (§ 0016). According to the iterative steps illustrated in figure 11, the PSDs are sorted according to maximum correlation (i.e. the largest crosstalker first; see Table 4) until all PSDs which meet a specific threshold are correlated to particular disturber crosstalking line coupling identifications (§ 0065).

Regarding claim 3, Valenti discloses the limitations of claim 1 as applied above. Further, as broadly as claimed, Valenti discloses that the DSL system is a multi-line (fig. 3, refs. 18), one-sided (fig. 3, left hand couplings of refs. 18) vectored (§ 0031) DSL (§ 0002) system.

Regarding claim 4, Valenti discloses the limitations of claim 1 as applied above. Further, as broadly as claimed, Valenti discloses that the DSL system is a multi-line (fig. 3, refs. 18), two-sided (fig. 3, left and right hand couplings of refs. 18) vectored (§ 0031) DSL (§ 0002) system.

Regarding claim 5, Valenti discloses the limitations of claim 1 as applied above. Further, as broadly as claimed, Valenti discloses that the DSL system is a multi-line (fig. 3, refs. 18), bonded (fig. 3, "binder" 100) vectored (§ 0031) DSL (§ 0002) system.

Regarding claim 6, Valenti discloses the limitations of claim 1 as applied above. Further, Valenti discloses that the data representative of crosstalk coupling between lines includes FEXT and/or NEXT transfer functions (§ 0041) between the primary line and each crosstalking line as applied in claim 1 above; and further wherein the DSM-data quantity $X\log(u,n)$ is a decibel-magnitude value of the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions as applied in claim 1 above.

Regarding claim 7, Valenti discloses the limitations of claim 1 as applied above. Further, Valenti discloses generating the DSM-data quantity $X\log(u,n)$ for $u=1, \dots, 2n-1$, representing the line transfers among n lines in a bonded system (i.e. conductors in a binder) because Valenti's $X\log(u,n)$ data (i.e. Power dBm values in Table 4) represents the maximum values of correlation between *every* n crosstalking line in a binder (§ 0063-0066).

Regarding claim 8, Valenti discloses the limitations of the claim as applied to claim 1 above.

Regarding claims 10-14, Valenti discloses the limitations of claim 8 as applied above. Further, Valenti discloses the remaining limitations of the claims as applied, respectively, to claims 3-7 above.

Regarding claim 16, Valenti discloses the limitations of claim 16 as applied to claim 1 above. Further, Valenti discloses a controller (fig. 2, ref. 200) comprising means

(fig. 2, ref. 220) for collecting operational data from a Digital Subscriber Line (DSL) (fig. 2, ref. 18) system; means (fig. 2, ref. 210) coupled to the collecting means for calculating operational characteristics of the DSL system. Valenti's controller 200 is operable to execute the method of claim 1 as applied above.

Regarding claim 17, Valenti discloses the limitations of claim 16 as applied above. Further, Valenti discloses the remaining limitations of the claim as applied to claim 3 above.

Regarding claim 18, Valenti discloses the limitations of claim 16 as applied above. Further, Valenti discloses the remaining limitations of the claim as applied to claim 6 above.

Regarding claim 19, Valenti discloses the limitations of claim 16 as applied above. Further, Valenti discloses the remaining limitations of the claim as applied to claim 1 above. The DSM-data quantity is at least the disclosed $X_{log}(u,n)$ as applied in claim 1 above.

Regarding claim 24, Valenti discloses the limitations of claim 16 as applied above. Further, Valenti discloses that the collecting means (fig. 2, ref. 220) and the calculating means (fig. 2, ref. 210) comprise one or more computer systems (§ 0037).

Regarding claim 25, Valenti discloses the limitations of the claim as applied to claim 1 above. Further, Valenti discloses that the method is embodied as computer instructions stored on computer readable media which, when executed by a processor, perform the steps of the method (§ 0038).

Regarding claim 26, Valenti discloses the limitations of claim 25 as applied above. Further, Valenti discloses the remaining limitations of the claim as applied to claim 1 above. The DSM-data quantity is at least the disclosed $X_{\log(u,n)}$ as applied in claim 1 above.

Allowable Subject Matter

12. Claims 2, 9, 15, and 20-23 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

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON M. PERILLA whose telephone number is (571)272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. 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 <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jason M Perilla/
Primary Examiner, Art Unit 2611
July 24, 2008

/jmp/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Cioffi	Confirmation No.:	5593
Serial No.:	11/122,365	Examiner:	Perilla, Jason M.
Filed:	May 5, 2005	Art Unit:	2611
For:	FEXT DETERMINATION SYSTEM		
Docket No.:	8241.P013		

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

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.111

Dear Examiner:

This amendment is submitted in response to the Office Action mailed April 9, 2008, for the above-noted patent application.

Applicant respectfully requests the Examiner to:

1. Please enter the amendments to the claims in section I, beginning on page 2.
2. Please consider the amendments to the claims in section I in view of the remarks in section II, beginning on page 10.

I hereby certify that this correspondence is being deposited via
EFS Web on the date below:

June 9, 2008
Date of Deposit

/Gregory D. Caldwell/
Gregory D. Caldwell, Reg. No. 39,926

SECTION I—CLAIMS

Amendment to the Claims:

This listing of the claims will replace all prior versions and listings of claims in the application. Claims 1, 2, 7, 8, 14, 16, 21, and 25 are amended herein. Claims 33-46 are canceled herein without prejudice. Claims 1-32 remain pending in the application.

Listing of Claims:

1. (Currently amended) A method of evaluating operational characteristics of a multi-line, vectored Digital Subscriber Line (DSL) system, the method comprising:
acquiring data representative of any crosstalk coupling between a primary line n and U crosstalking lines from the DSL system;
ordering the U crosstalking lines by an index u , wherein $u=1$ is the largest crosstalker and $u=U$ is the smallest crosstalker; and
generating a Dynamic Spectrum Management data (DSM-data) quantity $Xlog(u,n)$ that is a decibel-magnitude value representative of crosstalk coupling between the primary line and each crosstalking line.
2. (Currently amended) The method of claim 1 wherein the quantity $Xlog(u,n)$ is a function of a 10-bit unsigned integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$ and further wherein $Xlog(u,n)$ is specified during both diagnostics and initialization modes.
3. (Original) The method of claim 1 wherein the DSL system is a multi-line, one-sided vectored DSL system.
4. (Original) The method of claim 1 wherein the DSL system is a multi-line, two-sided vectored

DSL system.

5. (Original) The method of claim 1 wherein the DSL system is a multi-line, bonded vectored DSL system.

6. (Original) The method of claim 1 wherein the data representative of crosstalk coupling between lines includes FEXT and/or NEXT transfer functions between the primary line and each crosstalking line; and

further wherein the DSM-data quantity $Xlog(u,n)$ is a decibel-magnitude value of the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.

7. (Currently amended) The method of claim 1 further comprising generating ~~[[a]]~~ the DSM-data quantity $Xlog(u,n)$ for $u=1, \dots, 2n-1$, representing the line transfers among n lines in a bonded system.

8. (Currently amended) A method of evaluating operational characteristics of a multi-line, vectored Digital Subscriber Line (DSL) system, the method comprising:

acquiring data representative of any crosstalk coupling between a primary line n and U crosstalking lines from the DSL system;

ordering the U crosstalking lines by an index u , wherein $u=1$ is the largest crosstalker and $u=U$ is the smallest crosstalker; and

generating a Dynamic Spectrum Management data (DSM-data) quantity $Xlin(u,n)$ that is a value representative of crosstalk coupling between the primary line and each crosstalking line.

9. (Original) The method of claim 8 wherein $Xlin(u,n)$ is represented in a linear format by a $scale(u)$ factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, NSC$, wherein NSC is the number of used carriers and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and

further wherein the value of $X_{lin}(u,n)$ is defined as $X_{lin}(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) + j * b(u,n))/2^{15}$; and

further wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

10. (Original) The method of claim 8 wherein the DSL system is a multi-line, one-sided vectored DSL system.

11. (Original) The method of claim 8 wherein the DSL system is a multi-line, two-sided vectored DSL system.

12. (Original) The method of claim 8 wherein the DSL system is a multi-line, bonded vectored DSL system.

13. (Original) The method of claim 8 wherein the data representative of crosstalk coupling between lines includes FEXT and/or NEXT transfer functions between the primary line and each crosstalking line; and

further wherein the DSM-data quantity $X_{lin}(u,n)$ is the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.

14. (Currently amended) The method of claim 8 further comprising generating [[a]] the DSM-data quantity $X_{lin}(u,n)$ for $u=1, \dots, 2n-1$, representing the line transfers among n lines in a bonded system.

15. (Original) The method of claim 8 further comprising:

acquiring the insertion loss of the primary line, including any transmitter and receiver filter effects;

assigning this value to index $u=0$ so that this value is identified as $X_{lin}(0,n)$.

16. (Currently amended) A controller comprising:

means for collecting operational data from a Digital Subscriber Line (DSL) system;

means coupled to the collecting means for calculating operational characteristics of the DSL system;

wherein the controller is configured to perform the method comprising:

acquiring data representative of any crosstalk coupling between a primary line n and U crosstalking lines from the DSL system;

ordering the U crosstalking lines by an index u , wherein $u=1$ is the largest crosstalker and $u=U$ is the smallest crosstalker; and

generating a Dynamic Spectrum Management data (DSM-data) quantity that is representative of crosstalk coupling between the primary line and each crosstalking line.

17. (Original) The controller of claim 16 wherein the DSL system is a multi-line, vectored DSL system.

18. (Original) The controller of claim 16 wherein the data representative of crosstalk coupling between lines includes FEXT and/or NEXT transfer functions between the primary line and each crosstalking line; and

further wherein the DSM-data quantity that is representative of crosstalk coupling between the primary line and each crosstalking line is the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.

19. (Original) The controller of claim 16 wherein the DSM-data quantity that is representative of crosstalk coupling between the primary line and each crosstalking line is at least one of the following:

$X_{\log}(u,n)$, wherein $X_{\log}(u,n)$ is a decibel-magnitude value representative of crosstalk coupling

between the primary line and each crosstalking line; or

$X_{lin}(u,n)$, wherein $X_{lin}(u,n)$ is the linear version of $X_{log}(u,n)$.

20. (Original) The controller of claim 19 wherein $X_{lin}(u,n)$ is represented in a linear format by a

scale(u) factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the

subcarrier index $n=0, \dots, NSC$, wherein NSC is the number of used carriers and further

wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and

further wherein the value of $X_{lin}(u,n)$ is defined as $X_{lin}(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) +$

$j*b(u,n))/2^{15}$; and

further wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to

$2^{15}-1$.

21. (Currently amended) The controller of claim 19 wherein the quantity $X_{log}(u,n)$ is a function

of a 10-bit unsigned integer $m(u,n)$ such that $X_{log}(u,n) = 6 - (m(u,n)/10)$.

22. (Original) The controller of claim 16 wherein the method further comprises:

acquiring the insertion loss of the primary line, including any transmitter and receiver filter

effects; and

assigning this value to index $u=0$ so that this value is identified as $X_{lin}(0,n)$.

23. (Original) The controller of claim 16 wherein the method further comprises:

acquiring the insertion loss of the primary line, including any transmitter and receiver filter

effects; and

assigning this value to index $u=0$ so that this value is identified as $X_{log}(0,n)$.

24. (Original) The controller of claim 16 wherein the collecting means and the calculating means

comprise one or more computer systems.

25. (Currently amended) A computer program product comprising:

a machine readable medium; and

program instructions contained in the machine readable medium, the program instructions, when executed by a machine, specifying a method of evaluating operational characteristics of a multi-line, vectored Digital Subscriber Line (DSL) system, the method comprising: acquiring data representative of any crosstalk coupling between a primary line and U crosstalking lines from the DSL system; ordering the U crosstalking lines by an index u, wherein $u=1$ is the largest crosstalker and $u=U$ is the smallest crosstalker; and generating a Dynamic Spectrum Management data (DSM-data) quantity that is representative of crosstalk coupling between the primary line and each crosstalking line.

26. (Original) The computer program product of claim 25 wherein the DSM-data quantity that is representative of crosstalk coupling between the primary line and each crosstalking line is at least one of the following:

$Xlog(u,n)$, wherein $Xlog(u,n)$ is a decibel-magnitude value representative of crosstalk coupling between the primary line and each crosstalking line; or
 $Xlin(u,n)$, wherein $Xlin(u,n)$ is the linear version of $Xlog(u,n)$.

27. (Original) A method of determining the downstream FEXT interference generated by a first DSL line into a second DSL line, the method comprising:
obtaining a downstream value for a channel transfer function of the second line;
obtaining an upstream end value of NEXT interference generated by the first line into the second line; and
combining the second line downstream channel transfer value and the upstream end NEXT

interference value to obtain the value of the FEXT interference generated by downstream signals of the first line into the downstream signals of the second line.

28. (Original) The method of claim 27 wherein the second line downstream channel transfer value is in logarithmic format;

further wherein the upstream end NEXT interference value is in logarithmic format; and

further wherein combining the second line downstream channel transfer value and the upstream end NEXT interference value to obtain the value of the FEXT interference generated by downstream signals of the first line into the downstream signals of the second line comprises adding the second line downstream channel transfer value to the upstream end NEXT interference value.

29. (Original) The method of claim 27 wherein the second line downstream channel transfer value is in linear format;

further wherein the upstream end NEXT interference value is in linear format; and

further wherein combining the second line downstream channel transfer value and the upstream end NEXT interference value to obtain the value of the FEXT interference generated by downstream signals of the first line into the downstream signals of the second line comprises multiplying the second line downstream channel transfer value by the upstream end NEXT interference value.

30. (Original) The method of claim 27 wherein obtaining the second line downstream channel transfer value comprises collecting a downstream Hlog value from a DSL system MIB, wherein any undesirable filter effects are removed from the downstream Hlog value.

31. (Original) The method of claim 27 wherein obtaining the second line downstream channel transfer value comprises determining $X_{log}(0,n)$ from operational data collected from a

DSL system in which the first DSL line and the second DSL line operate, wherein any undesirable filter effects are removed from the $X_{log}(0,n)$ value.

32. (Original) The method of claim 27 wherein obtaining the upstream end NEXT interference value comprises instructing the first line and the second line to operate in a manner that generates DSL system operational data representative of the upstream end NEXT interference value.

33-46. (Canceled).

SECTION II—REMARKS

Applicant thanks the Examiner for a thorough review, and respectfully requests reconsideration of the above referenced patent application for the following reasons:

Allowable subject matter

Applicant acknowledges that claims 1-32 are objected to due to informalities, but would be allowable if rewritten to incorporate the suggestions of the Examiner. Accordingly, Applicant has amended claims 1, 2, 7, 8, 14, 16, and 25 herein, and respectfully submits that each objection has been overcome as discussed below under the “claim objections.”

Restriction Requirement

The Office Action asserts that claims 1-32 (Group I) and claims 33-46 (Group II) are distinct and would cause a “serious search and examination burden” without a restriction.

Examiner Perilla spoke with the undersigned Attorney for Applicant, Gregory D. Caldwell, on April 1, 2008, who agreed to a provisional election of Group I (claims 1-32).

Without addressing the merits of the Restriction, and without conceding the correctness of the Office Action’s interpretation of the claims, Applicant affirms the provisional election, formally electing Group I (claims 1-32) herein without traverse. Further, Applicant cancels the claims of unelected Group II (claims 33-46) herein without prejudice, and reserves the right to pursue the cancelled claims and/or Species in a divisional or continuing application.

Claim objections

The Office Action objected to claims 1-32 due to informalities.

Claims 1, 8, 16, and 25 - Definition of DSL and DSM:

In accordance with the Examiner's recommendation, Applicant has amended claims 1, 8, 16, and 25 to recite the full definition of DSL and DSM (Digital Subscriber Line and Dynamic Spectrum Management respectively) upon the first occurrence of each acronym.

Claim 2 - Function of m(u,n):

In accordance with the Examiner's recommendation, Applicant has amended claim 2 to recite "Xlog(u,n) is **a function of** a 10-bit unsigned integer m(u,n) ..." to overcome any potential indefiniteness in the definition of "Xlog(u,n)." Claim 21, which was not objected to, has been amended in a similar manner.

Claims 7 and 14 – Term "DSM-data quantity" already defined:

In accordance with the Examiner's recommendation, Applicant has amended dependent claims 7 and 14 to recite, "**the** DSM-data quantity," as the term is already defined in a parent to each dependent claim.

Claim 25 – Examiner's suggested amendment:

In accordance with the Examiner's suggested amendment, Applicant has amended claim 25 to recite "the program instructions, **when executed by a machine** ..." so as to overcome any potential rejection under 35 U.S.C. § 101.

Accordingly, Applicant respectfully requests the Examiner to withdraw the objections to claims 1-32.

CONCLUSION

Given the above amendments and accompanying remarks, all claims pending in the application are in condition for allowance. If the undersigned attorney has overlooked subject matter in any of the cited references that is relevant to allowance of the claims, the Examiner is requested to specifically point out where such subject matter may be found. Further, if there are any informalities or questions that can be addressed via telephone, the Examiner is encouraged to contact the undersigned attorney at (503) 439-8778.

Charge Deposit Account

Please charge our Deposit Account No. 02-2666 for any additional fee(s) that may be due in this matter, and please credit the same deposit account for any overpayment.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

/Gregory D. Caldwell/

Gregory D. Caldwell
Registration No. 39,926
Attorney for Applicant

Date: June 9, 2008

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Electronic Acknowledgement Receipt

EFS ID:	3424101
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT determination system
First Named Inventor/Applicant Name:	John M. Cioffi
Customer Number:	8791
Filer:	Gregory D. Caldwell/Gigi Hoover
Filer Authorized By:	Gregory D. Caldwell
Attorney Docket Number:	8241P013
Receipt Date:	09-JUN-2008
Filing Date:	05-MAY-2005
Time Stamp:	15:40:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1		8241P013_Amendment_060908.pdf	139520 6c43239e93e4653404b8b3e21248e58e6c975fee	yes	12

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Amendment - After Non-Final Rejection	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	12
Warnings:			
Information:			
Total Files Size (in bytes):		139520	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 11/122,365		Filing Date 05/05/2005		☐ To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)		SMALL ENTITY ☒ OR			OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$	=		X \$	=			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=			
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL				
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)		SMALL ENTITY OR			OTHER THAN SMALL ENTITY		
AMENDMENT	06/09/2008	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 32	Minus	** 46	=	0		X \$	=	
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 9	=	0		X \$	=	
☐ Application Size Fee (37 CFR 1.16(s))										
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE	0		TOTAL ADD'L FEE		
(Column 1)			(Column 2)		SMALL ENTITY OR			OTHER THAN SMALL ENTITY		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=			X \$	=	
	Independent (37 CFR 1.16(h))	*	Minus	***	=			X \$	=	
☐ Application Size Fee (37 CFR 1.16(s))										
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE			TOTAL ADD'L FEE		
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

Legal Instrument Examiner:
/BRENDA L. TURNER/

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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/122,365

05/05/2005

John M. Cioffi

8241P013

5593

8791

7590

04/09/2008

BLAKELY SOKOLOFF TAYLOR & ZAFMAN
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER

PERILLA, JASON M

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

04/09/2008

PAPER

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.

Office Action Summary	Application No. 11/122,365	Applicant(s) CIOFFI, JOHN M.	
	Examiner JASON M. PERILLA	Art Unit 2611	

-- 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 2 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) 33-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 1-32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ 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) | 4) ☐ Interview Summary (PTO-413) |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) ☒ Information Disclosure Statement(s) (PTO/SB/08) | 5) ☐ Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) ☐ Other: _____ |

DETAILED ACTION

1. Claims 1-46 are pending in the instant application.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. § 121:
 - I. Claims 1-32, drawn to methods of ordering crosstalking lines, classified in class 375, subclass 222.
 - II. Claims 33-46, drawn to methods of obtaining and combining NEXT and FEXT interference, classified in class 375, subclass 222.

The inventions are distinct, each from the other because of the following reasons:

3. Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions have different designs and modes of operation.
4. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:
 - (a) the inventions have acquired a separate status in the art in view of their different classification;
 - (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;

- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- (d) the prior art applicable to one invention would not likely be applicable to another invention;
- (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

5. During a telephone conversation with Gregory Caldwell on April 1, 2008 a provisional election was made without traverse to prosecute invention I, claims 1-32. Affirmation of this election must be made by applicant in replying to this Office action. Claims 33-46 are withdrawn from further consideration by the examiner, 37 CFR § 1.142(b), as being drawn to a non-elected invention.

Information Disclosure Statement

6. The information disclosure statements (IDS) submitted on June 8, 2007 and September 23, 2005 are in compliance with the provisions of 37 CFR § 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

7. Claims 1-32 are objected to because of the following informalities:

Regarding claim 1, the acronyms "DSL" and "DSM" should be defined in the claim to make it definite.

Regarding claim 2, the claim is objected to for being nearly indefinite because $X_{\log(u,n)}$ is defined as $m(u,n)$ and thereafter a function of $m(u,n)$.

Regarding claim 7, the claim is objected to because the "DSM-data quantity $X_{\log}(u,n)$ " is already defined in parent claim 1 although claim 3 presents an additional version of it (i.e. "a DSM-data quantity $X_{\log}(u,n)$ ").

Regarding claim 8, the claim is objected to for the same reasons as applied to claim 1 above.

Regarding claim 14, the claim is objected to for the same reasons as applied to claim 7 above.

Regarding claim 16, the claim is objected to for the same reasons as applied to claim 1 above.

Regarding claim 25 the claim is objected to for the same reasons as applied to claim 1 above. Further, the following version of the claim is presented by the Examiner to overcome any possible rejections under 35 U.S.C. § 101:

25. A computer program product comprising:
a machine readable medium; and
program instructions contained in the machine readable medium, the program instructions, when executed by a machine, specifying a method of evaluating operational characteristics of a multi-line, vectored DSL system, the method comprising:
acquiring data representative of any crosstalk coupling between a primary line and U crosstalking lines from the DSL system;
ordering the U crosstalking lines by an index u, wherein $u=1$ is the largest crosstalker and $u=U$ is the smallest crosstalker; and
generating a DSM-data quantity that is representative of crosstalk coupling between the primary line and each crosstalking line.
Appropriate correction is required.

Allowable Subject Matter

8. Notwithstanding the claim objections above, claims 1-32 are indicated to contain allowable subject matter.

Conclusion

9. The prior art of record not relied upon above but cited on the accompanying PTO-892 form is presented by the Examiner to further show the state in the art with respect to carrier frequency recovery.

10. This application is in condition for allowance except for the following formal matters:

The claim objections above.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 25 USPQ 74, 453 O.G. 213, (Comm'r Pat. 1935).

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON M. PERILLA whose telephone number is (571)272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. 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 <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jason M Perilla/
April 2, 2008

/jmp/

/Chieh M Fan/
Supervisory Patent Examiner, Art Unit 2611

Notice of References Cited	Application/Control No. 11/122,365		Applicant(s)/Patent Under Reexamination CIOFFI, JOHN M.	
	Examiner JASON M. PERILLA		Art Unit 2611	Page 1 of 3

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,479,447 A	12-1995	Chow et al.	375/260
*	B	US-5,887,032 A	03-1999	Cioffi, John M.	375/257
*	C	US-6,259,746 B1	07-2001	Levin et al.	375/295
*	D	US-6,377,640 B2	04-2002	Trans, Francois	375/354
*	E	US-2002/0041565 A1	04-2002	Valenti et al.	370/201
*	F	US-2002/0136397 A1	09-2002	Zeng et al.	379/417
*	G	US-2002/0181633 A1	12-2002	Trans, Francois	375/354
*	H	US-2003/0086514 A1	05-2003	Ginis et al.	375/346
*	I	US-2003/0086362 A1	05-2003	Hasegawa et al.	370/201
*	J	US-2003/0112967 A1	06-2003	Hausman et al.	379/417
*	K	US-2003/0202459 A1	10-2003	Warke et al.	370/201
*	L	US-2004/0095921 A1	05-2004	Kerpez, Kenneth	370/351
*	M	US-6,748,016 B1	06-2004	Tzannes, Marcos C.	375/227

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 11/122,365		Applicant(s)/Patent Under Reexamination CIOFFI, JOHN M.	
	Examiner JASON M. PERILLA		Art Unit 2611	Page 2 of 3

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2004/0136463 A1	07-2004	Tzannes, Marcos C.	375/257
*	B	US-2004/0157566 A1	08-2004	Fishman, Ilya M.	455/091
*	C	US-6,870,901 B1	03-2005	Gudmundsson et al.	379/22
*	D	US-6,885,746 B2	04-2005	Hausman et al.	379/417
*	E	US-2005/0123027 A1	06-2005	Cioffi et al.	375/222
*	F	US-2005/0123028 A1	06-2005	Cioffi et al.	375/222
*	G	US-2005/0129218 A1	06-2005	Kimble et al.	379/325
*	H	US-2005/0259725 A1	11-2005	Cioffi, John M.	375/222
*	I	US-6,990,196 B2	01-2006	Zeng et al.	379/417
*	J	US-6,999,583 B2	02-2006	Valenti et al.	379/417
*	K	US-7,016,822 B2	03-2006	Bosley et al.	703/2
*	L	US-2006/0072722 A1	04-2006	Savoor et al.	379/093.05
*	M	US-7,035,400 B1	04-2006	Gaikwad et al.	379/417

FOREIGN PATENT DOCUMENTS

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

Notice of References Cited	Application/Control No. 11/122,365		Applicant(s)/Patent Under Reexamination CIOFFI, JOHN M.	
	Examiner JASON M. PERILLA		Art Unit 2611	Page 3 of 3

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0098725 A1	05-2006	Rhee et al.	375/222
*	B	US-7,050,489 B1	05-2006	Sjoberg et al.	375/222
*	C	US-2006/0198430 A1	09-2006	Rhee et al.	375/222
*	D	US-7,133,441 B1	11-2006	Barlev et al.	375/222
*	E	US-7,158,563 B2	01-2007	Ginis et al.	375/224
*	F	US-7,190,665 B2	03-2007	Warke et al.	370/201
*	G	US-7,274,734 B2	09-2007	Tsatsanis, Michail	375/222
*	H	US-7,302,379 B2	11-2007	Cioffi et al.	703/20
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes 	Application/Control No. 11122365	Applicant(s)/Patent Under Reexamination CIOFFI, JOHN M.
	Examiner Jason M. Perilla	Art Unit 2611

SEARCHED			
Class	Subclass	Date	Examiner
375	222	4/2/08	JP
	316	4/2/08	JP
	295	4/2/08	JP

SEARCH NOTES		
Search Notes	Date	Examiner
East; USPAT, USPGPUB	4/2/08	JP
Inventor Name Search; EAST, EDAN	4/2/08	JP

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner



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BIB DATA SHEET

CONFIRMATION NO. 5593

SERIAL NUMBER 11/122,365	FILING or 371(c) DATE 05/05/2005 RULE	CLASS 375	GROUP ART UNIT 2611	ATTORNEY DOCKET NO. 8241P013	
APPLICANTS John M. Cioffi, Atherton, CA; ** CONTINUING DATA ***** This appln claims benefit of 60/572,051 05/18/2004 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 06/09/2005					
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and Acknowledged <u>/JASON M PERILLA/</u> Examiner's Signature		☐ Met after Allowance Initials	STATE OR COUNTRY CA	SHEETS DRAWINGS 9	TOTAL CLAIMS 46 INDEPENDENT CLAIMS 9
ADDRESS BLAKELY SOKOLOFF TAYLOR & ZAFMAN 1279 OAKMEAD PARKWAY SUNNYVALE, CA 94085-4040 UNITED STATES					
TITLE FEXT determination system					
FILING FEE RECEIVED 1750	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	69	GIOFFI.IN. AND JOHN.IN.	US-PGPUB; USPAT	OR	ON	2008/04/02 07:58
S1	3	\$DSL AND Xlog\$	US-PGPUB; USPAT	OR	ON	2008/03/26 09:02
S2	7	\$DSL AND Hlog\$	US-PGPUB; USPAT	OR	ON	2008/03/26 09:02
S3	1157	\$DSL AND crosstalk	US-PGPUB; USPAT	OR	ON	2008/03/28 06:34
S4	848	S3 AND @ad<"20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 06:36
S5	134	S4 AND sort\$	US-PGPUB; USPAT	OR	ON	2008/03/28 06:39
S6	743	S4 AND order\$	US-PGPUB; USPAT	OR	ON	2008/03/28 06:39
S7	714	S4 NOT S5	US-PGPUB; USPAT	OR	ON	2008/03/28 08:37
S8	444	S7 AND "twisted pair"	US-PGPUB; USPAT	OR	ON	2008/03/28 08:45
S9	26	S8 AND ordering	US-PGPUB; USPAT	OR	ON	2008/03/28 08:45
S10	33	crosstalker	US-PGPUB; USPAT	OR	ON	2008/03/28 08:48
S11	23	S10 AND @ad<"20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 08:49
S12	3	S8 AND ((order OR sort) NEAR crosstalk\$)	US-PGPUB; USPAT	OR	ON	2008/03/28 09:37
S13	2417	375/222.OCLS.	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S14	36016	crosstalk	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S15	2451	S14 AND "twisted pair"	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S16	127	S14 AND ((order OR sort) NEAR crosstalk\$)	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S17	124	S16 NOT S12	US-PGPUB; USPAT	OR	ON	2008/03/28 09:39
S18	2	S17 AND \$DSL	US-PGPUB; USPAT	OR	ON	2008/03/28 09:40
S19	90	S16 AND @ad<"20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 09:41

S20	165	crosstalking	US-PGPUB; USPAT	OR	ON	2008/03/28 10:31
S21	118	S20 AND @ad< "20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 10:31
S22	15	S21 AND \$DSL	US-PGPUB; USPAT	OR	ON	2008/03/28 10:31
S23	5831	vector\$ AND \$DSL	US-PGPUB; USPAT	OR	ON	2008/03/28 11:18
S24	72	vectored AND \$DSL	US-PGPUB; USPAT	OR	ON	2008/03/28 11:34
S25	33	S24 AND @ad< "20040518"	US-PGPUB; USPAT	OR	ON	2008/03/28 11:35
S26	17	("20010026602" "20010028692" "20020027985" "20020054610" "20020149484" "20020172166" "20030117995" "5471647" "5843139" "5887034" "6014412" "6404830" "6449324" "6456673" "6470047" "6498820" "6873653"). PN.	US-PGPUB; USPAT; USOCR	OR	ON	2008/03/28 11:45
S27	3	("7158563").URPN.	USPAT	OR	ON	2008/03/28 11:51

4/ 2/ 08 8:00:03 AM

C:\Documents and Settings\JPerilla\My Documents\EAST\Workspaces\11_122365.wsp

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	Complete if Known	
	Application Number	11/122,365
	Filing Date	May 5, 2005
	First Named Inventor	Cioffi, John
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 1		Attorney Docket No: 8241P013

US PATENT DOCUMENTS					
Examiner Initial *	Cite No ¹	USP Document Number	Publication or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6,870,901	05/22/2005	Gudmundsson, Thorkell , et al.	
		US-6,990,196	01/24/2006	Zeng, Chaohuang , et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No ¹	Foreign Patent Document Country Code/Number/Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ²

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No ¹	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		ALDANA, CARLOS , "Interference Estimation for Multicarrier Systems".	
		ZENG, CHAOHUANG , "Crosstalk Identification and Cancellation In DSL Systems", (7/2001).	

/Jason Perilla/

03/28/2008

EXAMINER

DATE CONSIDERED

Based on PTO/SB/06A(09-06) - Substitute Disclosure Statement Form (PTO-1449) as modified by BSTZ 03/26/07
 * EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. Applicant to unique citation designation number (optional). Applicant to place a check mark next to English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH

IPR2025-00492
 Petitioners' Exhibit 1004
 Page 153 of 245

JP

SYLKE LAW OFFICES, LLC

756 NORTH MILWAUKEE STREET, SUITE 210
MILWAUKEE, WISCONSIN 53202
PHONE 414-431-2317
FAX 414-431-1317

September 21, 2005



By Certificate of Mailing dated September 21, 2005

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

Re: Information Disclosure Statement
United States Serial No. 11/122,365
Filed 05 May 2005
FEXT DETERMINATION SYSTEM
Inventor: CIOFFI

Attorney Docket No. 0101-p13

Dear Sir or Madam:

Enclosed for filing via Express Mail are the following:

- Information Disclosure Statement (2 pgs), with:
 - 7 References (63 printed pages);
- Information Disclosure Statement Transmittal (w/Cert. of Mailing dated September 21, 2005) (2 pgs);
- Transmittal letter dated September 21, 2005 (w/Cert. of Mailing dated September 21, 2005) (2 pgs);
- Cert. of Mailing dated September 21, 2005; and
- Return Receipt Postcard.

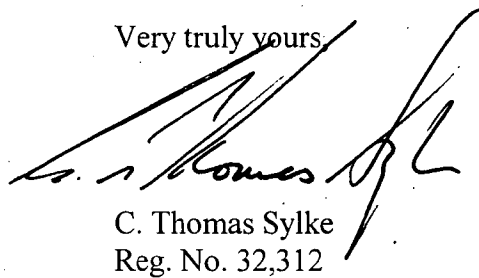
The attached Information Disclosure Statement is being filed pursuant to 37 CFR § 1.97(b)(3), before the mailing of a first Office action on the merits in the above-referenced case.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH /JP/

MAIL STOP AMENDMENT
Commissioner for Patents
September 21, 2005
Page 2

Please file the foregoing papers and acknowledge receipt of same by date-stamping and returning the enclosed postcard. Please direct all correspondence and any questions to the undersigned, **Customer Number 36171**. Thank you for your assistance.

Very truly yours,



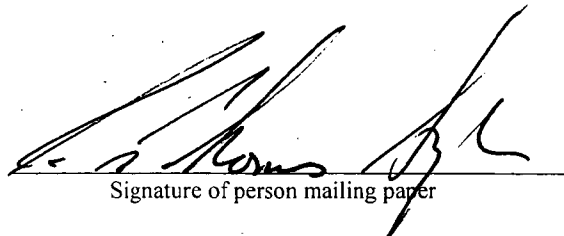
C. Thomas Sylke
Reg. No. 32,312

Enclosures

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on September 21, 2005.

C. Thomas Sylke
Printed name of person mailing paper and fee



Signature of person mailing paper

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Re application of: CIOFFI

Attorney Docket No.: 0101-p13

Application No.: 11/122,365

Examiner: Unknown

Filed: 05 May 2005

Group: 2631

Title: **FEXT DETERMINATION SYSTEM**

**INFORMATION DISCLOSURE STATEMENT
37 CFR §§1.56 AND 1.97(b)**

MAIL STOP AMENDMENT

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

via Certificate of Mailing dated September 21, 2005

Dear Sir:

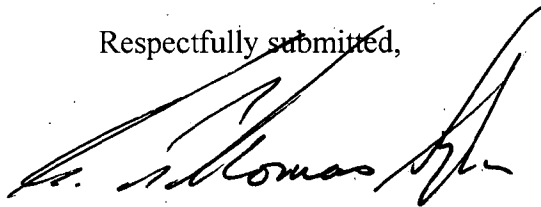
The non-U.S. patent document references listed under the heading "Other Documents" in the attached Information Disclosure Statement, copies of which are attached, may be material to examination of the above-identified patent application. Applicant submits these references in compliance with its duty of disclosure pursuant to 37 CFR §§1.56 and 1.97. The Examiner is requested to make these references of official record in this application.

This Information Disclosure Statement is not to be construed as a representation that a search has been made, that additional information material to the examination of this application does not exist, or that these references indeed constitute prior art.

This Information Disclosure Statement is: (i) filed within three (3) months of the filing date of the above-referenced application, (ii) believed to be filed before the mailing date of a first Office Action on the merits, or (iii) believed to be filed before the mailing of a first Office Action after the filing of a Request for Continued Examination under §1.114. Accordingly, it is believed that no fees are due in connection with the filing of this Information Disclosure Statement. However, if it is determined that any fees are due, please contact the undersigned immediately at 414-431-2317.

Dated: September 21, 2005

Respectfully submitted,



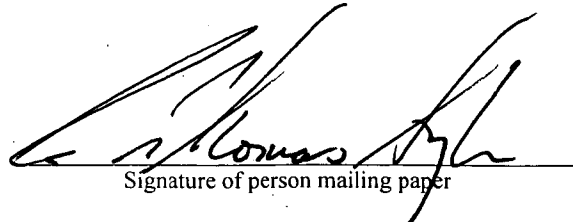
C. Thomas Sylke
Registration No. 32,312

Sylke Law Offices, LLC
756 N. Milwaukee St.
Suite 210
Milwaukee, Wisconsin 53202
Phone: 414-431-2317

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on September 21, 2005.

C. Thomas Sylke
Printed name of person mailing paper and fee



Signature of person mailing paper



Information Disclosure Statement By Applicant Pursuant to 37 CFR § 1.97(b)(3) Dated: September 21 2005 Sheet 1 of 2	Application No.: 11/122,365	
	Filing Date: 05 May 2005	
	First Named Inventor: CIOFFI	
	Applicant: Adaptive Spectrum and Signal Alignment, Inc.	
	Art Unit: 2631	Examiner Name: UNKNOWN
Attorney Docket No. 0101-p13		

U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date

Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No

Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	C1	International Search Report, International Application No. PCT/IB2005/001544 (3 pgs).
	C2	Written Opinion of the International Searching Authority, International Application No. PCT/IB2005/001544 (5 pgs).
	C3	J. Cioffi et al., "Example Improvements of Dynamic Spectrum Management," ANSI Contribution T1E1.4/2001-089 (as provided by International Searching Authority), February 19, 2001 (pgs 1-14).
	C4	W. Yu et al., "An Adaptive Multiuser Power Control Algorithm for VDSL," Globecom '01 2001 IEEE Global Telecommunications Conference; San Antonio, TX; November 25, 2001 (pgs 394-98, as provided by International Searching Authority). Reference No. XP-001090284
	C5	W. Yu et al., "Distributed Multiuser Power Control for Digital Subscriber Lines," IEEE Journal on Selected Areas in Communications; June 2002 (pgs 1105-15, as provided by International Searching Authority). Reference No. XP-001143168

/Jason Perilla/

03/28/2008

	C6	Ginis et al., "Vectored Transmission for Digital Subscriber Line Systems," IEEE Journal on Selected Areas in Communications; June 2002 (pgs 1085-1104, as provided by International Searching Authority). Reference No. XP-001143167
	C7	Ginis et al., "Vectored-DMT: A FEXT Canceling Modulation Scheme for Coordinating Users," ICC 2001; 2001 IEEE International Conference on Communications; June 11-14, 2001 (pgs 305-309, as provided by International Searching Authority). Reference No. XP-010553013

Examiner: Please initial citation considered; draw line through citation if not in conformance and not considered; and include copy of this form with next communication to applicant.

/Jason Perilla/

03/28/2008



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
11/122,365	05/05/2005	John M. Cioffi	8241P013

CONFIRMATION NO. 5593

8791
BLAKELY SOKOLOFF TAYLOR & ZAFMAN
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040



Date Mailed: 06/14/2007

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/05/2007.

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.

Office of Initial Patent Examination (571) 272-4000, or 1-800-PTO-9199
OFFICE COPY



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/122,365	05/05/2005	John M. Cioffi	0101-p13

36171
 SYLKE LAW OFFICES, LLC
 756 N. MILWAUKEE STREET
 SUITE 210
 MILWAUKEE, WI 53202

CONFIRMATION NO. 5593



OC000000024364436

Date Mailed: 06/14/2007

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/05/2007.

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

Mu
 Office of Initial Patent Examination (571) 272-4000, or 1-800-PTO-9199
 OFFICE COPY

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

JOHN M. CIOFFI

Application No.: 11/122,365

Filed: May 5, 2005

For: **FEXT-determination System**

Art Group: 2611

Examiner: PATEL, JAYANTI K

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. §1.97

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

Sir:

In accordance with the duty of disclosure, enclosed is a copy of Information Disclosure Statement by Applicant (form PTO/SB/08), which is being submitted before the mailing of a first Office Action. It is respectfully requested that the cited references be considered and that the enclosed copy of PTO/SB/08 be initialed by the Examiner to indicate such consideration and a copy thereof returned to applicant(s).

It is hereby stated that no item of information contained in the Information Disclosure Statement was cited in a patent office in a counterpart application, and, to the knowledge of the undersigned, after making reasonable inquiry, no item of information contained in the Information Disclosure Statement was known to any individual associated with the filing or prosecution of the subject application more than three months prior to the filing of the Information Disclosure Statement.

The submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made in the subject application and is not to be construed as an admission that the information cited in this statement is material to patentability.

Applicant has concurrently submitted an electronic Information Disclosure Statement (IDS) for the above-referenced patent application. In the concurrently filed electronic IDS submission, it was requested that any requisite fees be debited from Deposit Account 02-2666. Applicant respectfully requests that only one fee be debited for these concurrently filed IDS submissions if such fees are required.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

/Gregory D. Caldwell/

Gregory D. Caldwell, Reg. No. 39,926

Date: June 08, 2007

12400 Wilshire Boulevard, 7th Floor
Los Angeles, CA 90025
Telephone: (503) 439-8778

I hereby certify that this correspondence is being submitted electronically via EFS Web on the date shown below.

/Christina M. Rainey/

06-08-07

Christina Rainey

Date

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	Complete if Known	
	Application Number	11/122,365
	Filing Date	May 5, 2005
	First Named Inventor	Cioffi, John
	Group Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 1		Attorney Docket No: 8241P013

US PATENT DOCUMENTS					
Examiner Initial *	Cite No ¹	USP Document Number	Publication or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6,870,901	05/22/2005	Gudmundsson, Thorkell , et al.	
		US-6,990,196	01/24/2006	Zeng, Chaohuang , et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No ¹	Foreign Patent Document Country Code/Number/Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ²

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No ¹	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		ALDANA, CARLOS , "Interference Estimation for Multicarrier Systems".	
		ZENG, CHAOHUANG , "Crosstalk Identification and Cancellation In DSL Systems", (7/2001).	

EXAMINER

DATE CONSIDERED

Electronic Acknowledgement Receipt

EFS ID:	1853649
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT determination system
First Named Inventor/Applicant Name:	John M. Cioffi
Customer Number:	36171
Filer:	Gregory D. Caldwell/Christina Rainey
Filer Authorized By:	Gregory D. Caldwell
Attorney Docket Number:	0101-p13
Receipt Date:	08-JUN-2007
Filing Date:	05-MAY-2005
Time Stamp:	18:51:38
Application Type:	Utility

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	8241P013_IDS_6-8-07.pdf	39330	no	2

Warnings:

Information:					
This is not an USPTO supplied IDS fillable form					
2	Information Disclosure Statement (IDS) Filed	8241P013_IDS_PTO1449_6-8-07.pdf	110704	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	NPL Documents	Aldana_Interference_Estimation_for_Multicarrier_Systems.pdf	1043897	no	80
Warnings:					
Information:					
4	NPL Documents	Zeng_Crosstalk_Identification_and_Cancellation_in_DSL_Systems_7-2001.pdf	8032391	no	124
Warnings:					
Information:					
Total Files Size (in bytes):			9226322		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

REVOCATION OF POWER OF ATTORNEY WITH NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS	Application No.	11/122,365
	Filing Date	May 5, 2005
	First Named Inventor	John M. Cioffi
	Group Art Unit	2611
	Examiner Name	PATEL, JAYANTI K
	Attorney Docket Number	8241P013

I hereby revoke all previous powers of attorney given in the above-identified application:

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint the practitioners associated with Customer Number: **08791**

☒ Please change the correspondence address for the above-identified application to:

☒ The address associated with Customer Number: **08791**

OR

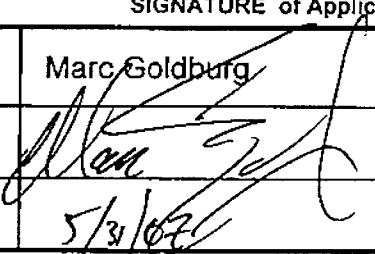
☐ Firm or Individual Name	BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP				
Address	12400 Wilshire Boulevard, 7th Floor				
Address					
City	Los Angeles	State	California	Zip Code	90025
Country	U.S.A.	Telephone	(503) 439-8778	Fax	(503) 439-6073

I am the:

☐ Applicant.

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

SIGNATURE of Applicant or Assignee of Record

Name	Marc Goldberg
Signature	
Date	5/3/07

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

☐ *Total of _____ forms are submitted.

Based on PTO/SB/82 (04-05) as modified by BSTZ (11/30/2005 - WLR)
SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

STATEMENT UNDER 37 CFR 3.73(b)Applicant/Patent Owner: Adaptive Spectrum and Signal Alignment, Inc.Application No./Patent No.: 11/122,365 Filing/Issue Date: 5/5/2005Entitled: FEEXT-determination SystemAdaptive Spectrum and Signal Alignment, Inc., a Corporation

(Name of Assignee)

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

states that it is:

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

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

- A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the Patent and Trademark Office at Reel 016879, Frame 0668, or for which a copy thereof is attached.

OR

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

1. From: _____ To: _____

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

2. From: _____ To: _____

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

3. From: _____ To: _____

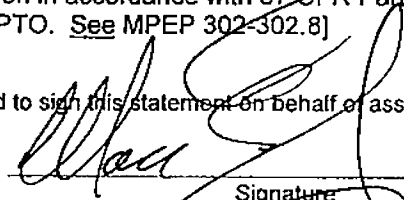
The document was recorded in the Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the 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.

- ☐ Copies of assignments or other documents in the chain of title are attached.
[NOTE: A separate copy (i.e., the original assignment document or a true copy of the original document) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the PTO. See MPEP 302-302.8]

The undersigned (whose title is supplied below) is empowered to sign this statement on behalf of assignee.

5/31/07
Date
SignatureMarc Goldberg
Typed or printed nameExecutive Vice President

Title

Electronic Acknowledgement Receipt

EFS ID:	1832320
Application Number:	11122365
International Application Number:	
Confirmation Number:	5593
Title of Invention:	FEXT determination system
First Named Inventor/Applicant Name:	John M. Cioffi
Customer Number:	36171
Filer:	Gregory D. Caldwell/Christina Rainey
Filer Authorized By:	Gregory D. Caldwell
Attorney Docket Number:	0101-p13
Receipt Date:	05-JUN-2007
Filing Date:	05-MAY-2005
Time Stamp:	12:42:00
Application Type:	Utility

Payment information:

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	P013_revPOA.pdf	4046380	no	2

Warnings:

Information:	
Total Files Size (in bytes):	4046380
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	



10351 U.S. PTO

PTO/SB/05 (04-05)

Approved for use through 07/31/2006. 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.

UTILITY
PATENT APPLICATION
TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	0101-p13
First Inventor	Cioffi
Title	FEXT DETERMINATION SYSTEM
Express Mail Label No.	ED857699391US

113262 U.S. PTO
11/22/05APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.ADDRESS TO: Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Applicant claims small entity status.
See 37 CFR 1.27.
3. ☒ Specification [Total Pages 45]
Both the claims and abstract must start on a new page
(For information on the preferred arrangement, see MPEP 608.01(a))
4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 9]
5. Oath or Declaration [Total Sheets 3]
 - a. ☒ Newly executed (original or copy)
 - b. ☐ A copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 18 completed)
 - i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s)
name in the prior application, see 37 CFR
1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76
7. ☐ CD-ROM or CD-R in duplicate, large table or
Computer Program (Appendix)
☐ Landscape Table on CD
8. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, items a. - c. are required)
 - a. ☐ Computer Readable Form (CRF)
 - b. Specification Sequence Listing on:
 - i. ☐ CD-ROM or CD-R (2 copies); or
 - ii. ☐ Paper
 - c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
Name of Assignee _____
10. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☒ Power of Attorney
11. ☐ English Translation Document (if applicable)
12. ☐ Information Disclosure Statement (PTO/SB/08 or PTO-1449)
☐ Copies of citations attached
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☐ Nonpublication Request under 35 U.S.C. 122(b)(2)(B)(i).
Applicant must attach form PTO/SB/35 or equivalent.
17. ☒ Other: Transmittal letter dated 05 May 2005
Certificate of Express Mail dated 05 May 2005

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Prior application information: Examiner _____ Art Unit: _____

19. CORRESPONDENCE ADDRESS

☒ The address associated with Customer Number: 35171 OR ☐ Correspondence address below

Name

Address

City

State

Zip Code

Country

Telephone

Email

Signature

Date 05 May 2005

Name
(Print/Type)

C. Thomas Sylke

Registration No.
(Attorney/Agent) 32,312

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

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

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

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).**FEE TRANSMITTAL**
For FY 2005☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 1,750.00

Complete if Known

Application Number	
Filing Date	
First Named Inventor	Cioffi
Examiner Name	
Art Unit	
Attorney Docket No.	0101-p13

METHOD OF PAYMENT (check all that apply)☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____☒ Deposit Account Deposit Account Number: 50-3349 Deposit Account Name: Sylke Law Offices, LLC

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee
☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

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

FEE CALCULATION**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	500.00
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)
46	- 20 or HP = 26	x 25 =	650.00

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee (\$)	Fee Paid (\$)
9	- 3 or HP = 6	x 100 =	600.00

HP = highest number of independent claims paid for, if greater than 3.

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
54	- 100 = 0	/ 50 =	(round up to a whole number) x	0

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other (e.g., late filing surcharge):

Fees Paid (\$)
0
0

SUBMITTED BY

Signature	Registration No. 32,312	Telephone 414-431-2317
Name (Print/Type) C. Thomas Sylke	(Attorney/Agent)	Date 05 May 2005

This collection of information is required by 37 CFR 1.138. 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, 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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SYLKE LAW OFFICES, LLC

756 NORTH MILWAUKEE STREET, SUITE 210

MILWAUKEE, WISCONSIN 53202

PHONE 414-431-2317

FAX 414-431-1317

May 5, 2005

By United States Postal Service Express Mail Post Office to Addressee
Express Mail Label No. ED857699391US

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

Re: New Non-Provisional Patent Application
Serial No.: Unknown
Title: **FEXT DETERMINATION SYSTEM**
Filing Date: Unknown
Inventor: CIOFFI

Atty. Docket No. 0101-p13

Dear Sir or Madam:

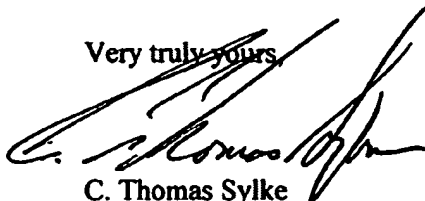
Enclosed for filing via Express Mail are the following:

- Utility Patent Application Transmittal Form PTO/SB/05 (1 pg);
- Transmittal letter dated May 5, 2005 (w/Cert. of Express Mail dated May 5, 2005) (2 pgs);
- Fee Transmittal Form PTO/SB/17 (1 pg + one duplicate for processing);
- USPTO Credit Card Payment Form PTO-2038 dated May 5, 2005 for \$1,750.00 (1 pg);
- Patent Application (Specification - 45 pgs; Drawings - 9 pgs);
- Declaration executed May 5, 2005 by John M. Cioffi (3 pgs);
- Power of Attorney executed by John M. Cioffi PTO/SB/81 (2 pgs);
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May 5, 2005
Page 2

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C. Thomas Sylke
Reg. No. 32,312

Enclosures

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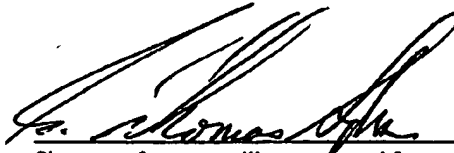
"Express Mail" mailing label number: ED857699391US

Date of Deposit: May 5, 2005

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C. Thomas Sylke

Printed name of person mailing paper and fee



Signature of person mailing papers and fee

JFW

SYLKE LAW OFFICES, LLC

756 NORTH MILWAUKEE STREET, SUITE 210
MILWAUKEE, WISCONSIN 53202
PHONE 414-431-2317
FAX 414-431-1317

September 21, 2005



By Certificate of Mailing dated September 21, 2005

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

Re: Information Disclosure Statement
United States Serial No. 11/122,365
Filed 05 May 2005
FEXT DETERMINATION SYSTEM
Inventor: CIOFFI

Attorney Docket No. 0101-p13

Dear Sir or Madam:

Enclosed for filing via Express Mail are the following:

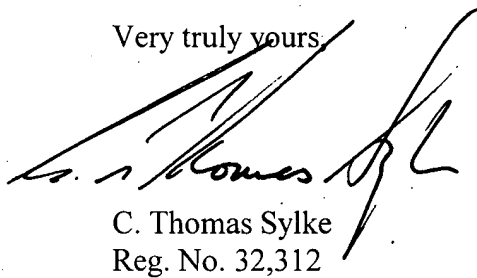
- Information Disclosure Statement (2 pgs), with:
 - 7 References (63 printed pages);
- Information Disclosure Statement Transmittal (w/Cert. of Mailing dated September 21, 2005) (2 pgs);
- Transmittal letter dated September 21, 2005 (w/Cert. of Mailing dated September 21, 2005) (2 pgs);
- Cert. of Mailing dated September 21, 2005; and
- Return Receipt Postcard.

The attached Information Disclosure Statement is being filed pursuant to 37 CFR § 1.97(b)(3), before the mailing of a first Office action on the merits in the above-referenced case.

MAIL STOP AMENDMENT
Commissioner for Patents
September 21, 2005
Page 2

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Very truly yours,



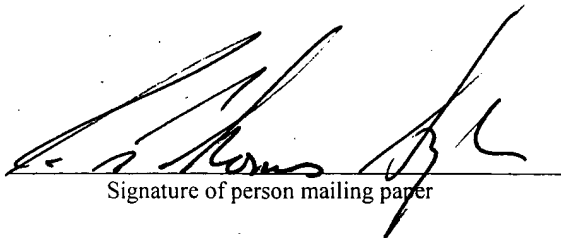
C. Thomas Sylke
Reg. No. 32,312

Enclosures

CERTIFICATE OF MAILING

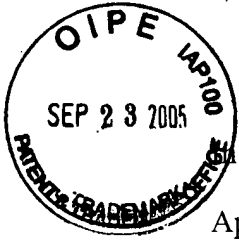
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on September 21, 2005.

C. Thomas Sylke
Printed name of person mailing paper and fee



Signature of person mailing paper

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Re application of: CIOFFI

Attorney Docket No.: 0101-p13

Application No.: 11/122,365

Examiner: Unknown

Filed: 05 May 2005

Group: 2631

Title: **FEXT DETERMINATION SYSTEM**

**INFORMATION DISCLOSURE STATEMENT
37 CFR §§1.56 AND 1.97(b)**

MAIL STOP AMENDMENT

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

via Certificate of Mailing dated September 21, 2005

Dear Sir:

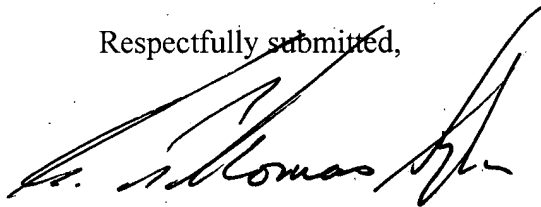
The non-U.S. patent document references listed under the heading "Other Documents" in the attached Information Disclosure Statement, copies of which are attached, may be material to examination of the above-identified patent application. Applicant submits these references in compliance with its duty of disclosure pursuant to 37 CFR §§1.56 and 1.97. The Examiner is requested to make these references of official record in this application.

This Information Disclosure Statement is not to be construed as a representation that a search has been made, that additional information material to the examination of this application does not exist, or that these references indeed constitute prior art.

This Information Disclosure Statement is: (i) filed within three (3) months of the filing date of the above-referenced application, (ii) believed to be filed before the mailing date of a first Office Action on the merits, or (iii) believed to be filed before the mailing of a first Office Action after the filing of a Request for Continued Examination under §1.114. Accordingly, it is believed that no fees are due in connection with the filing of this Information Disclosure Statement. However, if it is determined that any fees are due, please contact the undersigned immediately at 414-431-2317.

Dated: September 21, 2005

Respectfully submitted,



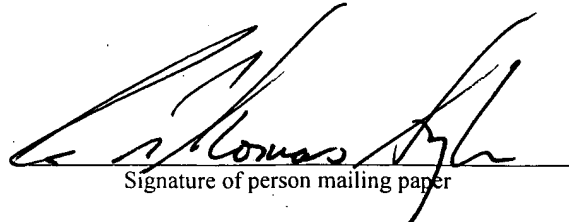
C. Thomas Sylke
Registration No. 32,312

Sylke Law Offices, LLC
756 N. Milwaukee St.
Suite 210
Milwaukee, Wisconsin 53202
Phone: 414-431-2317

CERTIFICATE OF MAILING

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C. Thomas Sylke
Printed name of person mailing paper and fee



Signature of person mailing paper



Information Disclosure Statement By Applicant Pursuant to 37 CFR § 1.97(b)(3) Dated: September 21 2005 Sheet 1 of 2	Application No.: 11/122,365	
	Filing Date: 05 May 2005	
	First Named Inventor: CIOFFI	
	Applicant: Adaptive Spectrum and Signal Alignment, Inc.	
	Art Unit: 2631	Examiner Name: UNKNOWN
Attorney Docket No. 0101-p13		

U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date

Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No

Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	C1	International Search Report, International Application No. PCT/IB2005/001544 (3 pgs).
	C2	Written Opinion of the International Searching Authority, International Application No. PCT/IB2005/001544 (5 pgs).
	C3	J. Cioffi et al., "Example Improvements of Dynamic Spectrum Management," ANSI Contribution T1E1.4/2001-089 (as provided by International Searching Authority), February 19, 2001 (pgs 1-14).
	C4	W. Yu et al., "An Adaptive Multiuser Power Control Algorithm for VDSL," Globecom '01 2001 IEEE Global Telecommunications Conference; San Antonio, TX; November 25, 2001 (pgs 394-98, as provided by International Searching Authority). Reference No. XP-001090284
	C5	W. Yu et al., "Distributed Multiuser Power Control for Digital Subscriber Lines," IEEE Journal on Selected Areas in Communications; June 2002 (pgs 1105-15, as provided by International Searching Authority). Reference No. XP-001143168

	C6	Ginis et al., "Vectored Transmission for Digital Subscriber Line Systems," IEEE Journal on Selected Areas in Communications; June 2002 (pgs 1085-1104, as provided by International Searching Authority). Reference No. XP-001143167
	C7	Ginis et al., "Vectored-DMT: A FEXT Canceling Modulation Scheme for Coordinating Users," ICC 2001; 2001 IEEE International Conference on Communications; June 11-14, 2001 (pgs 305-309, as provided by International Searching Authority). Reference No. XP-010553013

Examiner: Please initial citation considered; draw line through citation if not in conformance and not considered; and include copy of this form with next communication to applicant.

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UTILITY
PATENT APPLICATION
TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	0101-p13
First Inventor	Cioffi
Title	FEXT DETERMINATION SYSTEM
Express Mail Label No.	ED857699391US

113262 U.S. PTO
11/18/2005

050505

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ **Fee Transmittal Form** (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ **Applicant claims small entity status.**
See 37 CFR 1.27.
3. ☒ **Specification** [Total Pages 45]
Both the claims and abstract must start on a new page
(For information on the preferred arrangement, see MPEP 608.01(a))
4. ☒ **Drawing(s)** (35 U.S.C. 113) [Total Sheets 9]
5. **Oath or Declaration** [Total Sheets 3]
 - a. ☒ Newly executed (original or copy)
 - b. ☐ A copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 18 completed)
 - i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s)
name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ **Application Data Sheet.** See 37 CFR 1.76
7. ☐ **CD-ROM or CD-R** in duplicate, large table or
Computer Program (Appendix)
☐ Landscape Table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission**
(if applicable, items a. - c. are required)
 - a. ☐ Computer Readable Form (CRF)
 - b. ☐ Specification Sequence Listing on:
 - i. ☐ CD-ROM or CD-R (2 copies); or
 - ii. ☐ Paper
 - c. ☐ Statements verifying identity of above copies

ADDRESS TO: Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

ACCOMPANYING APPLICATION PARTS

9. ☐ **Assignment Papers** (cover sheet & document(s))
Name of Assignee _____
10. ☐ **37 CFR 3.73(b) Statement** (when there is an assignee) ☒ **Power of Attorney**
11. ☐ **English Translation Document** (if applicable)
12. ☐ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
☐ Copies of citations attached
13. ☐ **Preliminary Amendment**
14. ☒ **Return Receipt Postcard** (MPEP 503)
(Should be specifically itemized)
15. ☐ **Certified Copy of Priority Document(s)**
(if foreign priority is claimed)
16. ☐ **Nonpublication Request** under 35 U.S.C. 122(b)(2)(B)(i).
Applicant must attach form PTO/SB/35 or equivalent.
17. ☒ **Other:** Transmittal letter dated 05 May 2005;
Certificate of Express Mail dated 05 May 2005

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

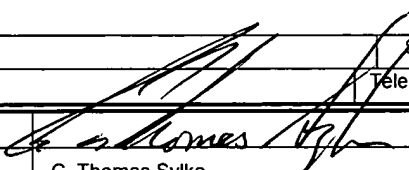
☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Prior application information: Examiner: _____ Art Unit: _____

19. CORRESPONDENCE ADDRESS

☒ The address associated with Customer Number: 36171 OR ☐ Correspondence address below

Name			
Address			
City	State	Zip Code	
Country	Telephone	Email	

Signature		Date	05 May 2005
Name (Print/Type)	C. Thomas Sylke	Registration No. (Attorney/Agent)	32,312

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

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Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL

For FY 2005

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 1,750.00

Complete if Known

Application Number
Filing Date
First Named Inventor Cioffi
Examiner Name
Art Unit
Attorney Docket No. 0101-p13

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify):
☒ Deposit Account Deposit Account Number: 50-3349 Deposit Account Name: Sylke Law Offices, LLC
For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)
☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee
☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	500.00
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
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Each independent claim over 3 (including Reissues)	200	100
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HP = highest number of independent claims paid for, if greater than 3.		
		Fee Paid (\$)
		0

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Total Sheets Extra Sheets Number of each additional 50 or fraction thereof Fee (\$)

54 - 100 = 0 / 50 = (round up to a whole number) x = 0

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other (e.g., late filing surcharge):

Fees Paid (\$)
0
0

SUBMITTED BY

Signature [Signature] Registration No. 32,312 Telephone 414-431-2317
Name (Print/Type) C. Thomas Sylke Date 05 May 2005

This collection of information is required by 37 CFR 1.136. 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, 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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SYLKE LAW OFFICES, LLC
756 NORTH MILWAUKEE STREET, SUITE 210
MILWAUKEE, WISCONSIN 53202
PHONE 414-431-2317
FAX 414-431-1317

May 5, 2005

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

Re: New Non-Provisional Patent Application
Serial No.: Unknown
Title: **FEXT DETERMINATION SYSTEM**
Filing Date: Unknown
Inventor: CIOFFI

Atty. Docket No. 0101-p13

Dear Sir or Madam:

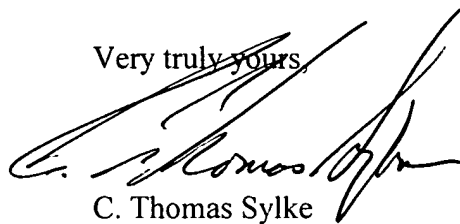
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Commissioner for Patents
May 5, 2005
Page 2

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Very truly yours,



C. Thomas Sylke
Reg. No. 32,312

Enclosures

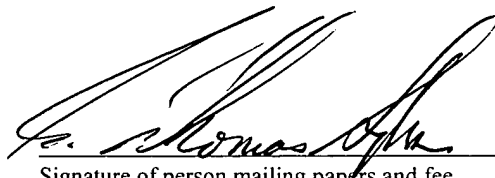
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Date of Deposit: May 5, 2005

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C. Thomas Sylke

Printed name of person mailing paper and fee



Signature of person mailing papers and fee

PATENT APPLICATION

5

TITLE OF THE INVENTION

FEXT DETERMINATION SYSTEM

10

Inventors: John M. Cioffi
323 Stockbridge Avenue
Atherton, California 94027
A Citizen of the United States of America

15

Assignee: Adaptive Spectrum And Signal Alignment, Inc.
Redwood City, California

20

Entity: Small

25

Sylke Law Offices, LLC
756 N. Milwaukee Street
Suite 210
Milwaukee, Wisconsin 53202

30

Telephone (414) 431-2317

FEXT DETERMINATION SYSTEM

John M. Cioffi

5

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of priority under 35 U.S.C. § 119(e) of U.S. Provisional No. 60/572,051 (Attorney Docket No. 0101-p07p) filed on May 18, 2004, entitled DYNAMIC MANAGEMENT OF COMMUNICATION SYSTEM, the disclosure of which is incorporated herein by reference.

10

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

15

Not applicable.

20

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISK APPENDIX

Not applicable.

25

BACKGROUND

Technical Field

This invention relates generally to methods, systems and apparatus for managing digital communication systems. More specifically, this invention relates to collecting
5 operational data from modems and/or other components in a communication system, such as a DSL system or the like, and determining FEXT interference (far-end crosstalk) between two DSL lines without requiring direct measurement of the interference. Even more specifically, at least one embodiment of this invention includes methods and apparatus for measuring NEXT interference (near-end crosstalk) between the two lines
10 and measuring the line channel of one of the lines and thereafter using a combination of the two measurements to approximate the FEXT interference between the two lines.

Description of Related Art

Digital subscriber line (DSL) technologies provide potentially large bandwidth for
15 digital communication over existing telephone subscriber lines (referred to as loops and/or the copper plant). In particular, asymmetric DSL (ADSL) can adjust to the characteristics of the subscriber line by using a discrete multitone (DMT) line code that assigns a number of bits to each tone (or sub-carrier), which can be adjusted to channel conditions as determined during training and initialization of the modems (typically
20 transceivers that function as both transmitters and receivers) at each end of the subscriber line.

Currently, nationwide fixed swaths of frequency have been assigned for DSL systems, establishing static management rules governing spectra use based on worst-case, generally inapplicable transmission situations. Unreasonable static limits on and
25 practices in DSL operation have frustrated efforts to improve service to users and to increase profitability and ubiquity for operators. Current static spectrum management attempts to ensure compatibility based on postulated, assumed and sometimes contrived

binder situations. Associated with any such system is an implied probability of a given situation's occurrence. For example, crosstalk, which increases with wider spectrum use and thus higher data rates, dominates the achievable performance of DSL systems.

Crosstalk models used in American National Standard T1.417-2003, "Spectrum
5 Management for Loop Transmission Systems," September 3, 2003, American National Standards Institute are based on 1% worst-case coupling functions, also necessarily implying a probability of occurrence. Margins, which typically are targeted for 6 dB for DSL systems, are meant to protect against certain probable or improbable changes in line conditions. There also are probabilities of certain line lengths, presence of bridged taps,
10 impulse noise, radio noise and other impairments. All these factors have been combined to generate a set of mandated spectrum masks or an equivalent set of calculated tests (called "Method B" and appearing in Annex A of T1.417-2003) for new communication technologies in an attempt to keep the probability of incompatibility below some threshold.

15 Measurement of crosstalk, especially FEXT interference, allows that interference to be removed from signals sent on various DSL lines. A variety of systems, techniques and methods have been developed for measuring and removing FEXT interference.

Systems, methods and techniques that provide a simple and accurate way to determine and measure FEXT between two DSL lines, without disrupting normal
20 operation of the DSL system, would represent a significant advancement in the art. Also, systems, methods and techniques that permit measurement of FEXT interference in a DSL system from one side of the DSL loops likewise would represent a significant advancement in the art.

BRIEF SUMMARY

Methods, apparatus, computer program products and other embodiments of the present invention utilize data that is readily available at the upstream end of a pair of DSL loops to determine the FEXT interference induced by one line into the other DSL line. In one embodiment, the FEXT interference is calculated using the NEXT interference that can be measured between the two lines at the upstream ends of the loops and the downstream channel transfer function of one of the loops. Because the NEXT and transfer function constitute a linear time-invariant system, as does the FEXT interference between the lines, the NEXT interference and line transfer function can be multiplied (if in linear format) or added (if in logarithmic format) to approximate the FEXT interference between the lines. Data to determine both the NEXT interference and a line's downstream transfer function are readily available at the upstream end of the lines. The collection of data, calculations and other functions performed in these techniques may be performed by a system controller, such as a DSL optimizer.

Other embodiments of the present invention include methods, apparatus and computer program products for providing crosstalk information to various components of a DSL or other communication system, including systems compliant with one or more DSM (Dynamic Spectrum Management) systems and/or standards. The $Xlog(u,n)$ quantity is a decibel-magnitude representation of the insertion-loss equivalent of the FEXT transfer functions specified in one or more DSL standards and is defined as the ratio of (1) a line u 's source power into a matched load of 100 Ohms when no binder is present to (2) the power at the output of the subject line when line u is excited with the same source and the binder is present. $Xlin(u,n)$ is the linear equivalent of $Xlog(u,n)$. $Xlog(u,n)$ and $Xlin(u,n)$ quantities, and quantities related thereto, may be represented in specific formats that assist in their use in DSL and other systems. In some cases, the $Xlog(u,n)$ quantity can be used in jointly determining spectra, even when no crosstalk cancellation is used in a given system. When defined as a line's insertion loss, $Xlin$ (or equivalently $Xlog$) does not include the effect of any transmit filter.

Further details and advantages of the invention are provided in the following
Detailed Description and the associated Figures.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

5 Figure 1 is a schematic block reference model system per the G.997.1 standard applicable to ADSL, VDSL and other communication systems in which embodiments of the present invention may be used.

Figure 2 is a schematic diagram illustrating generic, exemplary DSL deployment.

10 Figure 3 is a flow diagram of a method according to one embodiment of the present invention.

Figure 4 is a flow diagram of another method according to one embodiment of the present invention.

Figure 5A is a controller including a crosstalk interference calculation unit according to one embodiment of the present invention.

15 Figure 5B is a DSL optimizer according to one embodiment of the present invention.

Figures 5C, 5D and 5E show possible crosstalk and filter effects in the system of Figure 5B.

20 Figure 6 is a block diagram of a typical computer system or integrated circuit system suitable for implementing embodiments of the present invention, including a computer program product that can implement one or more methods of the present invention.

DETAILED DESCRIPTION

The following detailed description of the invention will refer to one or more embodiments of the invention, but is not limited to such embodiments. Rather, the detailed description is intended only to be illustrative. Those skilled in the art will readily appreciate that the detailed description given herein with respect to the Figures is provided for explanatory purposes as the invention extends beyond these limited embodiments.

Embodiments of the present invention utilize data that is readily available at the upstream end of a pair of DSL loops to determine the FEXT interference induced by one line into the other DSL line. The FEXT interference is calculated using the NEXT interference that can be measured between the two lines at the upstream ends of the loops and the downstream channel transfer function of one of the lines. Because the NEXT and transfer function constitute a linear time-invariant system, as does the FEXT interference between the lines, the NEXT interference and line transfer function can be multiplied (if in linear format) or added (if in logarithmic format) to approximate the FEXT interference between the lines. As will be appreciated by those skilled in the art, data to determine both the NEXT interference and a line's downstream transfer function are readily available at the upstream end of the lines involved. The collection of data, calculations and other functions performed in these techniques may be performed by a system controller, such as a DSL optimizer. The controller can use the operational data and line control to enhance system operation, for example to reduce crosstalk between lines in a common binder.

In addition, embodiments of the present invention include a unique method for providing crosstalk information to various components of a DSL or other communication system, including systems compliant with one or more DSM (Dynamic Spectrum Management) systems and/or standards. Crosstalk interference relating to FEXT interference can be provided to components using either an $X_{\log}(u,n)$ or $X_{\text{lin}}(u,n)$

quantity (also referred to as “Xlog” and “Xlin” herein), as defined herein. Such methods and information is of use in communication systems, especially one-sided vectored DSL systems. The $Xlog(u,n)$ quantity is a decibel-magnitude representation of the insertion-loss equivalent of the FEXT transfer functions specified in one or more DSL standards and is defined as the ratio of a line u ’s source power into matched load of 100 Ohms when no binder is present to the power at the output of the subject line when line u is excited with the same source and the binder is present. $Xlin(u,n)$ is the linear equivalent of $Xlog(u,n)$. According to some embodiments of the present invention, the $Xlog(u,n)$ and $Xlin(u,n)$ quantities, as well as quantities related thereto, can be represented in specific formats that assist in their use in DSL and other systems. In some cases, the $Xlog(u,n)$ quantity can be used in jointly determining spectra, even when no crosstalk cancellation is used in a given system. As defined as an insertion loss, $Xlin$ (or equivalently $Xlog$) does not include the effect of any transmit filter.

In specific embodiments of the present invention, a controller (such as a DSL optimizer and/or dynamic spectrum manager) can be used to collect operational data relating to two or more communication lines, such as a pair of DSL lines. The operational data may include such data as is normally available from a DSL or other communication systems during normal operation. Moreover, the operational data collected may include data specifically requested, prompted and/or ordered by the controller for use in connection with the present invention. The controller can use the collected operational data to analyze a given line pairing and lines’ relationships to one another to determine an approximation of the FEXT interference induced between the lines. Also, the controller can perform methods according to the present invention to generate $Xlog(u,n)$, $Xlin(u,n)$, and other related information.

More specifically, in some embodiments of the present invention, the controller can use operational data to determine the NEXT interference induced by a first line into a second line at the lines’ upstream ends. The controller also can obtain the second line’s downstream transfer function, which provides downstream attenuation values for the

second line. The first-to-second line NEXT and second line downstream transfer function then are combined to generate an approximation of the downstream FEXT interference induced by the first line into the second line's data signals. Other variations of the present invention will be apparent to those skilled in the art after reviewing the present disclosure.

Various network-management elements are used for management of ADSL and VDSL physical-layer resources, where elements refer to parameters or functions within an ADSL or VDSL modem pair, either collectively or at an individual end. A network-management framework consists of one or more managed nodes, each containing an agent. The managed node could be a router, bridge, switch, modem or other. At least one NMS (Network Management System), which is often called the manager, monitors and controls managed nodes and is usually based on a common PC or other computer. A network management protocol is used by the manager and agents to exchange management information and data. The unit of management information is an object. A collection of related objects is defined as a Management Information Base (MIB).

Figure 1 shows the reference model system according to the G.997.1 standard (G.ploam), which applies to various ADSL and VDSL systems, which is well known to those skilled in the art, and in which embodiments of the present invention can be implemented. This model applies to ADSL and VDSL systems meeting the various standards that may or may not include splitters, such as ADSL1 (G.992.1), ADSL-Lite (G.992.2), ADSL2 (G.992.3), ADSL2-Lite G.992.4, ADSL2+ (G.992.5), VDSL1 (G.993.1) and other G.993.x emerging VDSL standards, as well as the G.991.1 and G.991.2 SHDSL standards, all with and without bonding. These standards, variations thereto, and their use in connection with the G.997.1 standard are all well known to those skilled in the art.

The G.997.1 standard specifies the physical layer management for ADSL and VDSL transmission systems based on the clear embedded operation channel (EOC)

defined in G.997.1 and use of indicator bits and EOC messages defined in G.992.x standards. Moreover, G.997.1 specifies network management elements content for configuration, fault and performance management. In performing these functions, the system utilizes a variety of operational data that are available at and can be collected from an access node (AN). The DSL Forum's TR69 report also lists the MIB and how it might be accessed. In Figure 1, customers' terminal equipment 110 is coupled to a home network 112, which in turn is coupled to a network termination unit (NT) 120. In the case of an ADSL system, NT 120 includes an ATU-R 122 (for example, a modem, also referred to as a transceiver in some cases, defined by one of the ADSL and/or VDSL standards) or any other suitable network termination modem, transceiver or other communication unit. The remote device in a VDSL system would be a VTU-R. As will be appreciated by those skilled in the art and as described herein, each modem interacts with the communication system to which it is connected and may generate operational data as a result of the modem's performance in the communication system.

NT 120 also includes a management entity (ME) 124. ME 124 can be any suitable hardware device, such as a microprocessor, microcontroller, or circuit state machine in firmware or hardware, capable of performing as required by any applicable standards and/or other criteria. ME 124 collects and stores performance data in its MIB, which is a database of information maintained by each ME, and which can be accessed via network management protocols such as SNMP (Simple Network Management Protocol), an administration protocol used to gather information from a network device to provide to an administrator console/program or via TL1 commands, TL1 being a long-established command language used to program responses and commands between telecommunication network elements.

Each ATU-R in a system is coupled to an ATU-C in a CO or other upstream and/or central location. In a VDSL system, each VTU-R in a system is coupled to a VTU-O in a CO or other upstream and/or central location (for example, any line termination device such as an ONU/LT, DSLAM, RT, etc.). In Figure 1, ATU-C 142 is

located at an access node (AN) 140 in a CO 146. AN 140 may be a DSL system component, such as a DSLAM, ONU/LT, RT or the like, as will be appreciated by those skilled in the art. An ME 144 likewise maintains an MIB of performance data pertaining to ATU-C 142. The AN 140 may be coupled to a broadband network 170 or other
5 network, as will be appreciated by those skilled in the art. ATU-R 122 and ATU-C 142 are coupled together by a loop 130, which in the case of ADSL (and VDSL) typically is a telephone twisted pair that also carries other communication services.

Several of the interfaces shown in Figure 1 can be used for determining and collecting operational and/or performance data. To the extent the interfaces in Figure 1
10 differ from another ADSL and/or VDSL system interface scheme, the systems are well known and the differences are known and apparent to those skilled in the art. The Q-interface 155 provides the interface between the NMS 150 of the operator and ME 144 in AN 140. All the parameters specified in the G.997.1 standard apply at the Q-interface 155. The near-end parameters supported in ME 144 are derived from ATU-C 142, while
15 the far-end parameters from ATU-R 122 can be derived by either of two interfaces over the U-interface. Indicator bits and EOC messages, which are sent using embedded channel 132 and are provided at the PMD layer, can be used to generate the required ATU-R 122 parameters in ME 144. Alternately, the OAM (Operations, Administrations and Management) channel and a suitable protocol can be used to retrieve the parameters
20 from ATU-R 122 when requested by ME 144. Similarly, the far-end parameters from ATU-C 142 can be derived by either of two interfaces over the U-interface. Indicator bits and EOC messages, which are provided at the PMD layer, can be used to generate the required ATU-C 142 parameters in ME 122 of NT 120. Alternately, the OAM channel and a suitable protocol can be used to retrieve the parameters from ATU-C 142 when
25 requested by ME 124.

At the U-interface (which is essentially loop 130), there are two management interfaces, one at ATU-C 142 (the U-C interface 157) and one at ATU-R 122 (the U-R interface 158). Interface 157 provides ATU-C near-end parameters for ATU-R 122 to

retrieve over the U-interface 130. Similarly, interface 158 provides ATU-R near-end parameters for ATU-C 142 to retrieve over the U-interface 130. The parameters that apply may be dependent upon the transceiver standard being used (for example, G.992.1 or G.992.2).

5 The G.997.1 standard specifies an optional OAM communication channel across the U-interface. If this channel is implemented, ATU-C and ATU-R pairs may use it for transporting physical layer OAM messages. Thus, the transceivers 122, 142 of such a system share various operational and performance data maintained in their respective MIBs.

10 More information can be found regarding ADSL NMSs in DSL Forum Technical Report TR-005, entitled "ADSL Network Element Management" from the ADSL Forum, dated March 1998. Also, DSL Forum Working Text WT-87 (Rev. 6), entitled "CPE WAN Management Protocol" from the DSL Forum, dated January 2004. Finally, DSL Forum Working Text WT-082v7, entitled "LAN-Side DSL CPE Configuration
15 Specification" from the DSL Forum, dated January 5, 2004. These documents address different situations for CPE side management and the information therein is well known to those skilled in the art. More information about VDSL can be found in the ITU standard G.993.1 (sometimes called "VDSL1") and the emerging ITU standard G.993.2 (sometimes called "VDSL2"), as well as several DSL Forum working texts in progress,
20 all of which are known to those skilled in the art. For example, additional information is available in the DSL Forum's Technical Report TR-057 (Formerly WT-068v5), entitled "VDSL Network Element Management" (February 2003) and Technical Report TR-065, entitled "FS-VDSL EMS to NMS Interface Functional Requirements" (March 2004) as well as in the emerging revision of ITU standard G.997.1 for VDSL1 and VDSL2 MIB
25 elements, or in the ATIS North American Draft Dynamic Spectrum Management Report, NIPP-NAI-2005-031.

It is unlikely that lines sharing the same binder terminate on the same line card or

one that could coordinate the transmissions in ADSL, but it is more feasible in VDSL. However, the discussion of xDSL systems may be extended to ADSL because common termination of same-binder lines might also be done (especially in a newer DSLAM that handles both ADSL and VDSL). In a typical topology of a DSL plant, in which a number of transceiver pairs are operating and/or available, part of each subscriber loop is
5 collocated with the loops of other users within a multi-pair binder (or bundle). After the pedestal, very close to the Customer Premises Equipment (CPE), the loop takes the form of a drop wire and exits the bundle. Therefore, the subscriber loop traverses two different environments. Part of the loop may be located inside a binder, where the loop is
10 sometimes shielded from external electromagnetic interference, but is subject to crosstalk. After the pedestal, the drop wire is often unaffected by crosstalk when this pair is far from other pairs for most of the drop, but transmission can also be more significantly impaired by electromagnetic interference because the drop wires are unshielded. Many drops have 2 to 8 twisted-pairs within them and in situations of multiple services to a
15 home or bonding (multiplexing and demultiplexing of a single service) of those lines, additional substantial crosstalk can occur between these lines in the drop segment.

A generic, exemplary DSL deployment scenario is shown in Figure 2. All the subscriber loops of a total of $(L + M)$ users 291, 292 pass through at least one common binder. Each user is connected to a Central Office (CO) 210, 220 through a dedicated
20 line. However, each subscriber loop may be passing through different environments and mediums. In Figure 2, L customers or users 291 are connected to CO 210 using a combination of optical fiber 213 and twisted copper pairs 217, which is commonly referred to as Fiber to the Cabinet (FTTCab) or Fiber to the Curb. Signals from transceivers 211 in CO 210 have their signals converted by optical line terminal 212 and
25 optical network terminal 215 in CO 210 and optical network unit (ONU) 218. Modems 216 in ONU 218 act as transceivers for signals between the ONU 218 and users 291.

Users' lines that co-terminate in locations such as COs 210, 218 and ONU 220 (as well as others) may be operated in a coordinated fashion, such as vectoring. In vectored

communication systems (such as vectored ADSL and/or VDSL systems), coordination of signals and processing can be achieved. Downstream vectoring occurs when multiple lines' transmit signals from a DSLAM or LT are co-generated with a common clock and processor. In VDSL systems with such a common clock, the crosstalk between users
5 occurs separately for each tone. Thus each of the downstream tones for many users can be independently generated by a common vector transmitter. Similarly, upstream vectoring occurs when a common clock and processor are used to co-receive multiple lines' signals. In VDSL systems with such a common clock, the crosstalk between users occurs separately for each tone. Thus each of the upstream tones for many users can be
10 independently processed by a common vector receiver.

The loops 227 of the remaining M users 292 are copper twisted pairs only, a scenario referred to as Fiber to the Exchange (FTTEx). Whenever possible and economically feasible, FTTCab is preferable to FTTEx, since this reduces the length of the copper part of the subscriber loop, and consequently increases the achievable rates.
15 The existence of FTTCab loops can create problems to FTTEx loops. Moreover, FTTCab is expected to become an increasingly popular topology in the future. This type of topology can lead to substantial crosstalk interference and may mean that the lines of the various users have different data carrying and performance capabilities due to the specific environment in which they operate. The topology can be such that fiber-fed
20 "cabinet" lines and exchange lines can be mixed in the same binder.

As can be seen in Figure 2, the lines from CO 220 to users 292 share binder 222, which is not used by the lines between CO 210 and users 291. Moreover, another binder 240 is common to all the lines to/from CO 210 and CO 220 and their respective users 291, 292. In Figure 2, far end crosstalk (FEXT) 282 and near end crosstalk (NEXT) 281
25 are illustrated as affecting at least two of the lines 227 collocated at CO 220.

As will be appreciated by those skilled in the art, at least some of the operational data and/or parameters described in these documents can be used in connection with

embodiments of the present invention. Moreover, at least some of the system descriptions are likewise applicable to embodiments of the present invention. Various types of operational data and/or information available from an ADSL NMS can be found therein; others may be known to those skilled in the art.

5 The following examples of embodiments of the present invention typically use ADSL systems (for example, ADSL1 and ADSL2 systems) and/or VDSL systems (for example, VDSL1 and VDSL2 systems) as exemplary communication systems. Within these DSL systems, certain conventions, rules, protocols, etc. may be used to describe operation of the exemplary DSL system and the information and/or data available from
10 users and/or equipment on the system. However, as will be appreciated by those skilled in the art, embodiments of the present invention may be applied to various communication systems, and the invention is not limited to any particular system. The present invention can be used in any data transmission system in which determination and use of crosstalk-type interference is useful, especially where such information can be used
15 to improve system performance.

Quantities Xlog, and Xlin typically are level-3 data DSM-compliant insertion-loss measures for multi-line one-sided vectored situations, though their compliance and use may vary. These DSM data MIB elements are both useful for several purposes in advanced (for example, level 3) vectored DSLs. Xlog is also useful in DSL systems with
20 level 2 spectrum balancing, band preference, or OSM (Optimum Spectrum Management, also referred to as Optimum Spectrum Balancing - OSB).

Section 6.4 of the DSM Report (Draft DSM Report, ANSI Contribution T1E1.4/2003-018RA, May 24, 2004, Charlotte, NC) specifies level 3 DSM-data reporting compliance. The Xlin and Xlog quantities for crosstalk identification can be reported for
25 both downstream and upstream level-3-compliant DSM systems. Xlog may also be reported and of use in Level 2 DSM. Reporting of these new quantities may have previously been thought to require coordinated training prior to the present invention.

These quantities typically are most useful in single-sided vectored systems (that is, high bit rate systems that need not be bonded, so that individual lines can be different customers). Level 3 DSM compliance is intended for such single-sided vectored systems. Bonded systems need not exhibit level 3 compliance (or may have no need for doing so) and thus may not wish to claim or state level 3 DSM compliance, or in particular may not wish to supply the crosstalk information described herein.

Quantity $Xlog(u,n)$ is analogous to the $Hlog[n]$ of Section 6.3.1.1 in the above-referenced DSM Report. $Hlog[n]$ also is specified in Section 8.12.3.1 of ITU ADSL2 Standard G.992.3, International Telecommunications Union, 2004, and ITU ADSL2+ Standard G.992.5, International Telecommunications Union, 2004. It also is likely to be specified for the VDSL2 standard. $Xlog(u,n)$ applies to crosstalking channels in a communication system. $Xlog(u,n)$ is the decibel-magnitude of the insertion-loss equivalent of the FEXT transfer in the above-referenced DSM Report

$Xlog(u,n)$ is defined as the ratio $P_S:P_O$, where:

- (1) P_S is line u 's source power into a matched load of 100 Ohms when no binder is present; and
 - (2) P_O is the power at the output of the subject line (reporting DSM data and the line sensing the crosstalk) when line u is excited with the same source power and the binder is present.
- All other lines' inputs are zeroed during this measurement and differentially terminated at both ends with 100 Ohms. If the other lines' inputs are not zeroed, then any other crosstalk is presumably subtracted. The index u is specified in terms of the degree or size of the crosstalk into the DSM-reporting line from other lines with $u = 1$ assigned as the index of the impinging crosstalker that has largest crosstalk measured by $\max_{i,n}\{Xlog[i,n]\}$, and $u = 2$ being assigned the index of the impinging crosstalker that has largest crosstalk

measured by $\max_{i \neq 1, n} \{Xlog[i, n]\}$, and so forth. In general the index u is chosen so that it corresponds to $\max_{i > u, n} \{Xlog[i, n]\}$, presuming previous indices have been identically assigned in the preceding successive stages of sorting.

Nominally, advanced modems using a capability like Xlog would be expected to know (for example, via a training procedure) the input level of the other line. However, if this level is not known, the power spectra density level (PSD) assumed for the other lines' inputs can be reported as $XPSD(u)$.

$Xlin(u, n)$ is analogous to the $Hlin[n]$ specified in Section 6.3.1.1 of the referenced DSM Report and in ADSL2/2+ (and likely VDSL2), but again is applied to crosstalking channels rather than the subject line itself. $Xlin$ is the linear insertion-loss equivalent of the FEXT transfer functions specified in Table 5.1 and in Section 5.1.3.2 (see equation (35) for instance). It can be specified for use in a DSL data system in a format identical to $Hlin[n]$, using the same ordering convention described above for $Xlog[u, n]$ regarding the index u .

Implemented in a DSL system, the linear crosstalk insertion-loss function $Xlin(u, n)$ and the derived logarithmic magnitude $Xlog(u, n)$ for any line n can represent the insertion loss coupling into line n by up to U other crosstalkers, numbered $u = 0, 1, \dots, U$. These other crosstalkers need not be in the same binder and, as noted above, are ordered in terms of highest crosstalk contribution (for $u=1$) at any frequency from $u = 1, \dots, U$, with index $u = 0$ reserved for the line insertion loss itself, as discussed in more detail below.

As will be appreciated by those skilled in the art, the effects of transmitter and receiver filters would not be accurately removed from the insertion loss when reported by a receiver. Indeed, in practice, it may be impossible for the receiver to remove the transmit-filter effects anyway. Thus, $Xlin(0, n)$ is a special function that is the insertion loss of the line without any removal of transmit or receiver filters, and so differs from

Hlin(n) where a “best effort” attempt is made to remove such filters that may be known well on the current line. The crosstalk insertion-loss functions should be supplied both upstream and downstream. In effect, then, the far-end crosstalk that should include the effects of only the receiver filter will be $Xlin(u, n) = \frac{Xlin(0, n) \cdot Nlin(u, n)}{T(n)}$ where $T(n)$ is

- 5 the known (presumably known to the transmit side) transmit filter. This transmit filter only should be removed (and not the receiver filter) because it is included in the $Xlin(0, n)$, but is not included in the FEXT.

The linearity and cascade of transfer functions in the distributed transmission line does not include the transmit filter, which is included in $Xlin(0, n)$. Fortunately, a
 10 reporting level 2 or level 3 device that internally knows $Nlin(u, n)$ would then also know $T(n)$ as both depend only on the same single-end of transmission. The ratio of NEXT to transmit-filter multiplies the reported $Xlin(0, n)$ to obtain the desired FEXT. Equivalently, the true insertion-loss-plus-receiver-filter-only function is the ratio of $Xlin(0, n)$ to $T(n)$. The calculated FEXT coupling, $Xlin(u, n)$, is useful for various types of crosstalk
 15 cancellation methods. As will be appreciated by those skilled in the art, any such linear coupling computed by a single-end would require that the $Nlin(0, n)$ to $T(n)$ ratio could be computed in several ways (for instance by directly measuring at the output of the transmit filter the NEXT so no ratio would be necessary), but if actually computed as a ratio would require the same sampling and DMT symbol phase for each quantity.

20 $Xlin(u, n)$ can be represented in linear format by a $scale(u)$ factor and a normalized complex number $a(u, n) + j*b(u, n)$, where n is the subcarrier index $n = 0, \dots, NSC$ (the number of carriers used) and u is an index of other users that is chosen so that u satisfies $\max_n \{X \log(u, n)\} \geq \max_{i > u, n} \{X \log(i, n)\}$ for $u = 1, \dots, U$. The number of crosstalkers that were identified, U , also is supplied. This may be the number of crosstalkers whose interference
 25 affecting the subject line exceeded a specified threshold value. Both $a(u, n)$ and $b(u, n)$ can be coded for use in various DSL system data conventions as 16-bit 2's complement signed integers. The value of $Xlin(u, n)$ then can be defined as

$$Xlin(u,n) = (scale(u)/2^{15}) * (a(u,n) + j * b(u,n)) / 2^{15} \quad \text{Equation (1)}$$

In order to maximize precision, the $scale(u)$ factor should be chosen so that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$. Such a maximum can be guaranteed for a passive channel and the channel estimation function used.

- 5 An $Xlin(u,n)$ value indicated as $a(u,n)=b(u,n)=(-2^{15})$ can be used as a special value. Such a value can indicate that this subcarrier is not used for data transmission (for example, that it is the DC subcarrier or the Nyquist subcarrier), or that attenuation is outside the range to be represented.

- 10 As noted above, $Xlog(u,n)$ represents the insertion loss magnitude in decibels. In some DSL system data conventions, it can be specified as a 10-bit unsigned integer $m(u,n)$, defined as

$$Xlog(u,n) = 6 - m(u,n)/10 \quad \text{Eq. (2)}$$

- 15 $Xlog(u,n)$ can be specified during both diagnostics and initialization modes. A value of all ones can be used as a special value that indicates that the subcarrier is not used for transmission or is outside the range to be represented.

$XPSPD[u]$ can be a presumed flat PSD level used for the computation of $Xlog(u,n)$ and $Xlin(u,n)$ and can be specified as a 7-bit unsigned integer $xpsd(u)$ where

$$XPSPD(u) = -95 + .5 \cdot xpsd(u) \quad \text{Eq. (3)}$$

- 20 A method according to one embodiment of the present invention relating to $Xlog(u,n)$ and $Xlin(u,n)$ is shown in Figure 3. At 310 a subject communication line (for example, a DSL line) and tone/frequency are selected. Possible crosstalking lines are identified at 320. These typically are lines in the same binder; however, other lines may be considered as well (for example, in cases where it appears that crosstalk is being generated by lines outside a known binder configuration). In the embodiment of Figure 3,

R such potential crosstalkers are identified for evaluation. The first potential crosstalker is selected at 330. The ratio $P_S:P_O$ is calculated at 340 for each and every frequency or tone n using the methodology described above or any other that is suitable for calculation of the quantities required for this method. At decision 350 the method decides whether it has finished evaluation of all potential crosstalkers. If not, then at 360 the next potential crosstalker is brought up for consideration. Once all R of the potential crosstalkers have been evaluated and their ratios $P_S:P_O$ calculated, U of the crosstalkers can be selected at 370. The selection may be based on U of the crosstalkers having ratios that exceeded a threshold crosstalk value. Alternatively, the U worst crosstalkers can be selected. At 380 the crosstalkers are ordered according to the degree of crosstalk they induce in the subject line, for example a line reporting DSM data. The worst (most severe) crosstalker is assigned index $u=1$. Finally, after ordering the U crosstalkers, $X_{log}(u,n)$ and/or $X_{lin}(u,n)$ can be generated at 390 and used in the DSL system (for example, by a controller such as a DSL optimizer that can assist users and operators in improving system performance).

Another embodiment of the present invention uses the fact that downstream FEXT interference, NEXT interference at the upstream end of loops and channel transfer functions are all linear time-invariant systems. As implemented in DSL systems such as ADSL2+ and VDSL2, the present invention can provide a simple way to calculate the FEXT of a pair of loops.

Figure 4 illustrates one method according to the present invention in which FEXT interference between two DSL lines can be determined. At 410 two lines are identified. The downstream Hlog of one line (identified as "Line 1" in Figure 4) is obtained at 420. This may be done by collecting operational data available to the DSL system in which this line operates. Such operational data likely would be generated by the DSL system and/or MIB attempting to remove both transmit and receive filters. The receive filter would then need to be restored or included in the ultimate FEXT transfer to whatever point at which cancellation is presumed (in the case of transmitter pre-cancellation) or implemented (in terms of direct receiver crosstalk cancellation). The Hlog, *per se*, may

be readily available as a data field or point from an MIB within the system. In other cases, the Hlog may have to be calculated from other operational data available. At 430 the upstream end Nlog from Line 2 into Line 1 is then obtained. Again, this may be accomplished in some embodiments of the present invention by collecting operational data that either provides the data field/point itself or provides other data that can be used to calculate Nlog. The operational data may include data that is generated specifically for the purpose of obtaining and/or calculating Nlog, for example by operating Lines 1 and 2 in a manner that allows Nlog to be obtained more easily.

At 440 the Hlog and Nlog values that have been obtained are added to generate an Xlog value that represents the FEXT crosstalk interference generated in a downstream direction by Line 2 into Line 1. As will be appreciated by those skilled in the art, the upstream and downstream orientations and data of the Hlog and Nlog values can be changed to obtain an upstream Xlog value, assuming that the appropriate operational data is available or can be compelled within the DSL system. As noted parenthetically in Figure 4, linear values may be used instead of logarithmic values. In such a case, the Hlin and Nlin values obtained at 420, 430 are then multiplied at 440 to obtain Xlin. The fact that each DSL line and the crosstalk interference between such lines are all linear time-invariant systems makes the use of Hlog/Nlog and/or Hlin/Nlin combinations valid approximations for the Xlog/Xlin interference values, respectively. In linear time-invariant systems, as is well known in the art, different paths between two points will yield the same attenuation values in such a case. The paths can be seen graphically in Figures 5B-5D, where FEXT, NEXT, and Hlog/Hlin are illustrated as examples.

As will be appreciated by those skilled in the art, where two lines' downstream ends are close enough for NEXT to arise, the present invention can be applied to find an upstream Hlog value and a downstream-end NEXT value between two lines to determine the upstream FEXT of one line into the other. While many communication lines, such as DSL lines, are sufficiently separated to avoid downstream end NEXT, the present invention nevertheless can be applied in situations where special topologies make it

applicable. Moreover, the same techniques can be applied to determine ΔX (either $\Delta X_{\log}$ or ΔX_{lin}), which arises in cases where phantom-mode signals are employed. In the case of $\Delta X_{\log}$, an analogous methodology is employed. Hlog is calculated, obtained and/or determined in the same fashion. Instead of the NEXT function Nlog, $\Delta N_{\log}$ is calculated, obtained and/or determined and added to Hlog to arrive at $\Delta X_{\log}$. The same adaptation to linear quantities is used when finding ΔX_{lin} rather than $\Delta X_{\log}$.

The NEXT and Hlin values can be obtained in a variety of ways, as will be appreciated by those skilled in the art. In one embodiment of the present invention, these values are obtained by measuring after exciting the respective channels with a known input sequence of symbols, say $\text{TRAIN}(n, k)$, where k is a time-symbol index, and then observing several corresponding channel outputs $\text{OUT}(n, k)$. In an application where the downstream NEXT from a crosstalking line u is being determined in a subject line, to get the NEXT value, the output would be measured at the upstream end of the subject line with the TRAIN excitation being applied/input at the upstream end of the u^{th} line. For Hlin, the output would be measured at the downstream output end of the subject line with the TRAIN excitation at the input of that main line.

The calculations for this embodiment are

$$\text{Hlin}(n) = \frac{1}{L} \cdot \sum_{k=1}^L \frac{\text{OUT}(n, k)}{\text{TRAIN}(n, k)} \quad \text{Eq. (4)}$$

$$\text{Nlin}(n) = \frac{1}{L} \cdot \sum_{k=1}^L \frac{\text{OUT}(n, k)}{\text{TRAIN}(n, k)} \quad \text{Eq. (5)}$$

where the OUT signal changes as described above. Logarithmic quantities are found by taking 20log of the linear quantities.

As discussed in more detail below, the methods according to the present invention, including the methods illustrated in Figure 4, may be implemented in a computer program product and/or by a controller in a communication system, such as a

DSL optimizer in a DSL system. The operational data may relate to measurements and/or values obtained from a DSLAM, ONU/LT device, RT device or any other suitable component in the DSL system, as shown in Figures 5A and 5B. Of course various types of apparatus may be used in connection with embodiments of the present invention, not
5 merely those provided as examples in this disclosure, as will be appreciated by those skilled in the art. For example, calculations to find $Xlog(u,n)$ and/or $Xlog$ using the NEXT plus Hlog technique could be performed on a chip, processor, computer or other device in a local setting (that is, in or at a modem or other communication device) and then supplied to a controller such as a DSL optimizer for use in its operation. Where
10 embodiments of the present invention are implemented in multiple devices, that apparatus operates in a manner analogous to the embodiments described in detail below where a single unit and/or apparatus at a single location performs the calculations and determinations, as will be apparent to those skilled in the art.

According to one embodiment of the present invention shown in Figure 5A, a
15 crosstalk interference calculation unit 500 may be part of an independent entity coupled to a DSL system, such as a controller 510 (for example, a DSL optimizer) assisting users and/or one or more system operators or providers in the system. (A controller or DSL optimizer may also be referred to as a DSM server, dynamic spectrum manager, Dynamic Spectrum Management Center, DSM Center, System Maintenance Center or SMC.) In
20 some embodiments, the controller 510 may be an independent entity or may be an ILEC or CLEC operating a number of DSL lines from a CO or other location. As seen from the dashed line 546 in Figure 5A, the controller 510 may be in the CO 146 or may be external and independent of CO 146 and any company operating within the system. Moreover, controller 510 may be coupled to and/or controlling DSL and/or other communication
25 lines in multiple COs.

The crosstalk interference calculation unit 500 includes collecting means 520 and analyzing means 540. As seen in Figure 5A, the collecting means 520 may be coupled to NMS 150, ME 144 at AN 140 and/or the MIB 148 maintained by ME 144. Data also

may be collected through the broadband network 170 (for example, via the TCP/IP protocol or other protocol or means outside the normal internal data communication within a given DSL system). One or more of these connections allows the crosstalk interference calculation unit 500 to collect operational data from a communication system
5 such as a DSL system. Data may be collected once or over time. In some cases, the collecting means 520 will collect on a periodic basis, though it also can collect data on-demand or any other non-periodic basis (for example, whenever a DSLAM or other component sends data to the compliance control unit), thus allowing the crosstalk interference calculation unit 500 to update its information, etc., if desired. Data collected
10 by means 520 is provided to the analyzing means 540 for analysis and any calculations to determine Xlog, Xlin or any other analysis required by embodiments of the present invention.

In the exemplary system of Figure 5A, the analyzing means 540 is coupled to an operating signal generating means 550 in the controller 510. This signal generator 550 is
15 configured to generate and send instruction signals to modems and/or other components of the communication system (for example, DSL transceivers and/or other equipment, components, etc. in the system). These instructions may include operational condition values, maximum data rate limits, upstream transmission frequency band limits, compliance instructions or other instructions regarding transmit power levels, coding and
20 latency requirements, etc. The instructions may be generated before or after the controller 510 determines a given line's compliance with any set operational conditions in the communication system. Generator 550 also may be used to configure and order modems, etc. to operate in a manner to generate operational data needed for calculations and/or other determinations used in connection with embodiments of the present invention. For
25 example, in calculating $Xlog(u,n)$ for a given line, crosstalk interference calculation unit 500 and generator 550 may order certain lines to cease operation or order one or more lines to send specific data using a specified PSD or other power restriction in order to generate data that can be used to create and order the information needed for $Xlog(u,n)$. Likewise, crosstalk interference calculation unit 500 and generator 550 may order

operation that will generate and/or collect data relating to Hlog, Nlog and/or Xlog for use in connection with various embodiments of the present invention.

Embodiments of the present invention can utilize a database, library or other collection of data pertaining to the data collected, decisions made regarding relevant parameters, past calculations and determinations relating to Xlog, Xlin, etc. This collection of reference data may be stored, for example, as a library 548 in the controller 510 of Figure 5A and used by the analyzing means 540 and/or collecting means 520.

In some embodiments of the present invention, the crosstalk interference calculation unit 500 may be implemented in a computer such as a PC, workstation or the like. The collecting means 520 and analyzing means 540 may be software modules, hardware modules or a combination of both, as will be appreciated by those skilled in the art. When working with a large numbers of modems (for example, collecting a large amount of data regarding crosstalk values), databases may be introduced and used to manage the volume of data collected.

Another embodiment of the present invention is shown in Figure 5B. A DSL optimizer 565 operates on and/or in connection with a DSLAM 585 or other DSL system component (for example, an ONU/LT device or RT device), either or both of which may be on the telco premises 595. The DSL optimizer 565 includes a data collection module 580, which can collect, assemble, condition, manipulate and supply operational data for and to the DSL optimizer 565. Module 580 can be a computer such as a PC or the like or part of such a computer, either implemented in software, hardware or both. Data from module 580 is supplied to a DSM server 570 (for example, a data analysis module) for analysis (for example, regarding calculation of $Xlog(u,n)$, $Xlin(u,n)$, or $Xlog/Xlin$ using $Nlog/Nlin$ and $Hlog/Hlin$, etc.). Module 570 may be part of and/or implemented in the same computer as used for module 580 or may be a separate unit. Information may also be available from a telco database 575.

An operation selector 590 may be used as an instruction generator to control

and/or instruct modems and the like in a given communication system (for example, to generate operational data needed for determining Xlog, Xlin, Hlog, Hlin, Nlog and/or Nlin). Selector 590 also may generate other operating mode instructions for communication system components and users pursuant to embodiments of the present invention. Instructions regarding needed operational data may be selected and sent under the control of the analysis module 570 or in any other suitable manner, as will be appreciated by those skilled in the art. Profiles and/or other operational controls from selector 590 are implemented in the DSLAM 585 and/or any other appropriate DSL system component equipment. Such equipment is coupled to DSL equipment such as customer premises equipment 581 via line 591 and customer premises equipment 582 via line 592. Crosstalk may arise such as FEXT (in upstream and/or downstream directions) and NEXT (at the upstream end and/or the downstream end). The insertion loss of line 591 arises in both upstream and downstream directions and is shown in Figure 5B as Hlog (or Hlin) 596. The system of Figure 5B can operate in ways analogous to the system of Figure 5A, as will be appreciated by those skilled in the art, though differences are achievable while still using embodiments of the present invention.

Where the downstream FEXT of an offending line into a victim line is sought, some embodiments of the present invention require finding the upstream-end NEXT and the victim line's downstream insertion loss. In Figure 5C the FEXT 593D of line 592 into line 591 is sought using an embodiment of the present invention. Again, because the relevant portions of the diagram are linear time-invariant systems, FEXT 593D can be determined using the upstream end NEXT 594U of line 592 into line 591 and the downstream insertion loss Hlog or Hlin 596D of line 591. As Figure 5C implies, neither the transmit filter 5851 for line 591 nor the upstream-end receive filter 5852 is included in FEXT 593D. As seen in Figure 5C, however, the transmit filter 5853 of upstream-end device 585 (for example, a DSLAM or ONU) is common to both the FEXT 593D and NEXT 594U paths and therefore is best included in the overall FEXT 593D.

As would be clear to one skilled in the art, a crosstalk cancellation system would

probably use the inputs to this filter 5853 to construct an estimate of downstream FEXT for pre-subtraction on line 591, and thus it would be best to include the effects of filter 5853 in NEXT 594U if FEXT 593D were to be reported directly to a device employing FEXT cancellation that used the inputs to filter 5853. If the output of this transmit filter
 5 were instead used for crosstalk pre-estimation and pre-subtraction, then it would be best that the FEXT 593D not include the effects of transmit filter 5853.

Similarly, the receive filter 5811 of CPE 581 is common to both paths and need not be addressed in detail. It also would be best to include the effects of filter 5811 in crosstalk pre-estimation and pre-subtraction and, thus, best also to include the effects of
 10 receive filter 5811 in the FEXT 593D (which is achieved, as described above, by using $\frac{N_{lir}(u, n) \cdot X_{lin}(0, n)}{T(n)}$, that would include the effects of receive filter 5811 (and also transmit filter 5853, in a preferable implementation), but not the effects of transmit filter 5851, modeled by $T(n)$ in the mathematical expression). As will be appreciated by those skilled in the art, these filter effects should be determined and removed where they affect
 15 the estimation.

Likewise, in Figures 5D and 5E, where the upstream FEXT 593U is being determined, the filter effects of CPE transmit filter 5821 and upstream device filter 5852 are common to all paths. However, in Figure 5D, the effects of the receive filter 5812 and transmit filter 5811 of CPE 581 should not be included. Likewise, in Figure 5E, the
 20 effects of the receive filter 5854 and transmit filter 5853 of upstream-end device 585 should not be included. The system of Figure 5E has the advantage of not requiring identification and/or calculation of the NEXT interference 594D between 2 downstream devices, such as CPEs 581, 582. The upstream end NEXT interference 594U of Figure 5E is more easily calculated and/or determined in many situations, due to the common
 25 clock and/or other synchronization available in an upstream-end device 585.

These calculations may be affected by whether Hlog or Hlin as reported (for

example, using a DSL system MIB parameter) is used or, instead, whether Xlog(0,n) or Xlin(0,n) according to the present invention is used. In the former case, Hlog and Hlin normally will not include the receive filter effects, and these effects may need to be addressed in some cases (most likely by including them). In the latter case, Xlog(0,n) and
5 Xlin(0,n) normally include transmit filter effects and therefore those filter effects may have to be addressed (most likely by removing them). Again, those skilled in the art will recognize the filters in use, their respective effects on embodiments of the present invention, and the steps necessary to remove, reduce or accommodate those effects.

Generally, embodiments of the present invention employ various processes
10 involving data stored in or transferred through one or more computer systems. Embodiments of the present invention also relate to a hardware device or other apparatus for performing these operations. This apparatus may be specially constructed for the required purposes, or it may be a general-purpose computer selectively activated or reconfigured by a computer program and/or data structure stored in the computer. The
15 processes presented herein are not inherently related to any particular computer or other apparatus. In particular, various general-purpose machines may be used with programs written in accordance with the teachings herein, or it may be more convenient to construct a more specialized apparatus to perform the required method steps. A particular structure for a variety of these machines will be apparent to those of ordinary skill in the art based
20 on the description given herein.

Embodiments of the present invention as described above employ various process steps involving data stored in computer systems. These steps are those requiring physical manipulation of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined,
25 compared and otherwise manipulated. It is sometimes convenient, principally for reasons of common usage, to refer to these signals as bits, bitstreams, data signals, control signals, values, elements, variables, characters, data structures or the like. It should be remembered, however, that all of these and similar terms are to be associated with the

appropriate physical quantities and are merely convenient labels applied to these quantities.

Further, the manipulations performed are often referred to in terms such as identifying, fitting or comparing. In any of the operations described herein that form part
5 of the present invention these operations are machine operations. Useful machines for performing the operations of embodiments of the present invention include general purpose digital computers or other similar devices. In all cases, there should be borne in mind the distinction between the method of operations in operating a computer and the method of computation itself. Embodiments of the present invention relate to method
10 steps for operating a computer in processing electrical or other physical signals to generate other desired physical signals.

Embodiments of the present invention also relate to an apparatus for performing these operations. This apparatus may be specially constructed for the required purposes, or it may be a general purpose computer selectively activated or reconfigured by a
15 computer program stored in the computer. The processes presented herein are not inherently related to any particular computer or other apparatus. In particular, various general purpose machines may be used with programs written in accordance with the teachings herein, or it may be more convenient to construct a more specialized apparatus to perform the required method steps. The required structure for a variety of these
20 machines will appear from the description given above.

In addition, embodiments of the present invention further relate to computer readable media that include program instructions for performing various computer-implemented operations. The media and program instructions may be those specially designed and constructed for the purposes of the present invention, or they may be of the
25 kind well known and available to those having skill in the computer software arts. Examples of computer-readable media include, but are not limited to, magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD-ROM

disks; magneto-optical media such as floptical disks; and hardware devices that are specially configured to store and perform program instructions, such as read-only memory devices (ROM) and random access memory (RAM). Examples of program instructions include both machine code, such as produced by a compiler, and files containing higher
5 level code that may be executed by the computer using an interpreter.

Figure 6 illustrates a typical computer system that can be used by a user and/or controller in accordance with one or more embodiments of the present invention. The computer system 600 includes any number of processors 602 (also referred to as central processing units, or CPUs) that are coupled to storage devices including primary storage
10 606 (typically a random access memory, or RAM), primary storage 604 (typically a read only memory, or ROM). As is well known in the art, primary storage 604 acts to transfer data and instructions uni-directionally to the CPU and primary storage 606 is used typically to transfer data and instructions in a bi-directional manner. Both of these primary storage devices may include any suitable of the computer-readable media
15 described above. A mass storage device 608 also is coupled bi-directionally to CPU 602 and provides additional data storage capacity and may include any of the computer-readable media described above. The mass storage device 608 may be used to store programs, data and the like and is typically a secondary storage medium such as a hard disk that is slower than primary storage. It will be appreciated that the information
20 retained within the mass storage device 608, may, in appropriate cases, be incorporated in standard fashion as part of primary storage 606 as virtual memory. A specific mass storage device such as a CD-ROM 614 may also pass data uni-directionally to the CPU.

CPU 602 also is coupled to an interface 610 that includes one or more input/output devices such as such as video monitors, track balls, mice, keyboards,
25 microphones, touch-sensitive displays, transducer card readers, magnetic or paper tape readers, tablets, styluses, voice or handwriting recognizers, or other well-known input devices such as, of course, other computers. Finally, CPU 602 optionally may be coupled to a computer or telecommunications network using a network connection as shown

generally at 612. With such a network connection, it is contemplated that the CPU might receive information from the network, or might output information to the network in the course of performing the above-described method steps. The above-described devices and materials will be familiar to those of skill in the computer hardware and software arts.

5 The hardware elements described above may define multiple software modules for performing the operations of this invention. For example, instructions for running a codeword composition controller may be stored on mass storage device 608 or 614 and executed on CPU 602 in conjunction with primary memory 606. In a preferred embodiment, the controller is divided into software submodules.

10 The many features and advantages of the present invention are apparent from the written description, and thus, the appended claims are intended to cover all such features and advantages of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, the present invention is not limited to the exact construction and operation as illustrated and described. Therefore, the described
15 embodiments should be taken as illustrative and not restrictive, and the invention should not be limited to the details given herein but should be defined by the following claims and their full scope of equivalents, whether foreseeable or unforeseeable now or in the future.

CLAIMS

What is claimed is:

- 5 1. A method of evaluating operational characteristics of a multi-line, vectored DSL system, the method comprising:
- acquiring data representative of any crosstalk coupling between a primary line n and U crosstalking lines from the DSL system;
- ordering the U crosstalking lines by an index u , wherein $u=1$ is the largest
- 10 crosstalker and $u=U$ is the smallest crosstalker; and
- generating a DSM-data quantity $Xlog(u,n)$ that is a decibel-magnitude value representative of crosstalk coupling between the primary line and each crosstalking line.
2. The method of Claim 1 wherein the quantity $Xlog(u,n)$ is a 10-bit unsigned
- 15 integer $m(u,n)$ such that $Xlog(u,n) = 6 - (m(u,n)/10)$ and further wherein $Xlog(u,n)$ is specified during both diagnostics and initialization modes.
3. The method of Claim 1 wherein the DSL system is a multi-line, one-sided vectored DSL system.
- 20 4. The method of Claim 1 wherein the DSL system is a multi-line, two-sided vectored DSL system.
5. The method of Claim 1 wherein the DSL system is a multi-line, bonded vectored
- 25 DSL system.

6. The method of Claim 1 wherein the data representative of crosstalk coupling between lines includes FEXT and/or NEXT transfer functions between the primary line and each crosstalking line; and

5 further wherein the DSM-data quantity $X_{\log}(u,n)$ is a decibel-magnitude value of the insertion loss equivalent of the acquired FEXT and/or NEXT transfer functions.

7. The method of Claim 1 further comprising generating a DSM-data quantity $X_{\log}(u,n)$ for $u=1, \dots, 2n-1$, representing the line transfers among n lines in a bonded
10 system.

8. A method of evaluating operational characteristics of a multi-line, vectored DSL system, the method comprising:

acquiring data representative of any crosstalk coupling between a primary line n
15 and U crosstalking lines from the DSL system;

ordering the U crosstalking lines by an index u , wherein $u=1$ is the largest crosstalker and $u=U$ is the smallest crosstalker; and

generating a DSM-data quantity $X_{\text{lin}}(u,n)$ that is a value representative of crosstalk coupling between the primary line and each crosstalking line.

20

9. The method of Claim 8 wherein $X_{\text{lin}}(u,n)$ is represented in a linear format by a $\text{scale}(u)$ factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, \text{NSC}$, wherein NSC is the number of used carriers and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and

25 further wherein the value of $X_{\text{lin}}(u,n)$ is defined as $X_{\text{lin}}(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) + j*b(u,n))/2^{15}$; and

further wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

10. The method of Claim 8 wherein the DSL system is a multi-line, one-sided
5 vectored DSL system.

11. The method of Claim 8 wherein the DSL system is a multi-line, two-sided
vectored DSL system.

10 12. The method of Claim 8 wherein the DSL system is a multi-line, bonded vectored
DSL system.

13. The method of Claim 8 wherein the data representative of crosstalk coupling
between lines includes FEXT and/or NEXT transfer functions between the primary line
15 and each crosstalking line; and

further wherein the DSM-data quantity $X_{lin}(u,n)$ is the insertion loss equivalent of
the acquired FEXT and/or NEXT transfer functions.

14. The method of Claim 8 further comprising generating a DSM-data quantity
20 $X_{lin}(u,n)$ for $u=1, \dots, 2n-1$, representing the line transfers among n lines in a bonded
system.

15. The method of Claim 8 further comprising:
acquiring the insertion loss of the primary line, including any transmitter and
25 receiver filter effects;

assigning this value to index $u=0$ so that this value is identified as $X_{lin}(0,n)$.

16. A controller comprising:

means for collecting operational data from a DSL system;

means coupled to the collecting means for calculating operational characteristics
5 of the DSL system;

wherein the controller is configured to perform the method comprising:

acquiring data representative of any crosstalk coupling between a primary
line n and U crosstalking lines from the DSL system;

ordering the U crosstalking lines by an index u, wherein u=1 is the largest
10 crosstalker and u=U is the smallest crosstalker; and

generating a DSM-data quantity that is representative of crosstalk coupling
between the primary line and each crosstalking line.

17. The controller of Claim 16 wherein the DSL system is a multi-line, vectored DSL
15 system.

18. The controller of Claim 16 wherein the data representative of crosstalk coupling
between lines includes FEXT and/or NEXT transfer functions between the primary line
and each crosstalking line; and

20 further wherein the DSM-data quantity that is representative of crosstalk coupling
between the primary line and each crosstalking line is the insertion loss equivalent of the
acquired FEXT and/or NEXT transfer functions.

19. The controller of Claim 16 wherein the DSM-data quantity that is representative
25 of crosstalk coupling between the primary line and each crosstalking line is at least one of

the following:

Xlog(u,n), wherein Xlog(u,n) is a decibel-magnitude value representative of crosstalk coupling between the primary line and each crosstalking line; or

Xlin(u,n), wherein Xlin(u,n) is the linear version of Xlog(u,n).

5

20. The controller of Claim 19 wherein Xlin(u,n) is represented in a linear format by a scale(u) factor and a normalized complex number $a(u,n) + j*b(u,n)$, where n is the subcarrier index $n=0, \dots, \text{NSC}$, wherein NSC is the number of used carriers and further wherein $a(u,n)$ and $b(u,n)$ are coded as 16-bit 2's complement signed integers, and

10 further wherein the value of Xlin(u,n) is defined as $Xlin(u,n) = (\text{scale}(u)/2^{15}) * (a(u,n) + j*b(u,n))/2^{15}$; and

further wherein the scale factor is chosen such that $\max(|a(u,n)|, |b(u,n)|)$ over all n is equal to $2^{15}-1$.

15 21. The controller of Claim 19 wherein the quantity Xlog(u,n) is a 10-bit unsigned integer m(u,n) such that $Xlog(u,n) = 6 - (m(u,n)/10)$.

22. The controller of Claim 16 wherein the method further comprises:

20 acquiring the insertion loss of the primary line, including any transmitter and receiver filter effects; and

assigning this value to index $u=0$ so that this value is identified as Xlin(0,n).

23. The controller of Claim 16 wherein the method further comprises:

25 acquiring the insertion loss of the primary line, including any transmitter and receiver filter effects; and

assigning this value to index $u=0$ so that this value is identified as $Xlog(0,n)$.

24. The controller of Claim 16 wherein the collecting means and the calculating means comprise one or more computer systems.

5

25. A computer program product comprising:

a machine readable medium; and

program instructions contained in the machine readable medium, the program instructions specifying a method of evaluating operational characteristics of a multi-line, vectored

10 DSL system, the method comprising:

acquiring data representative of any crosstalk coupling between a primary line and U crosstalking lines from the DSL system;

ordering the U crosstalking lines by an index u , wherein $u=1$ is the largest crosstalker and $u=U$ is the smallest crosstalker; and

15 generating a DSM-data quantity that is representative of crosstalk coupling between the primary line and each crosstalking line.

26. The computer program product of Claim 25 wherein the DSM-data quantity that is representative of crosstalk coupling between the primary line and each crosstalking line
20 is at least one of the following:

$Xlog(u,n)$, wherein $Xlog(u,n)$ is a decibel-magnitude value representative of crosstalk coupling between the primary line and each crosstalking line; or

$Xlin(u,n)$, wherein $Xlin(u,n)$ is the linear version of $Xlog(u,n)$.

25 27. A method of determining the downstream FEXT interference generated by a first

DSL line into a second DSL line, the method comprising:

obtaining a downstream value for a channel transfer function of the second line;
obtaining an upstream end value of NEXT interference generated by the first line
into the second line; and

5 combining the second line downstream channel transfer value and the upstream
end NEXT interference value to obtain the value of the FEXT interference
generated by downstream signals of the first line into the downstream signals
of the second line.

10 28. The method of Claim 27 wherein the second line downstream channel transfer
value is in logarithmic format;

further wherein the upstream end NEXT interference value is in logarithmic
format; and

15 further wherein combining the second line downstream channel transfer value and
the upstream end NEXT interference value to obtain the value of the FEXT
interference generated by downstream signals of the first line into the
downstream signals of the second line comprises adding the second line
downstream channel transfer value to the upstream end NEXT interference
value.

20

29. The method of Claim 27 wherein the second line downstream channel transfer
value is in linear format;

further wherein the upstream end NEXT interference value is in linear format; and

25 further wherein combining the second line downstream channel transfer value and
the upstream end NEXT interference value to obtain the value of the FEXT
interference generated by downstream signals of the first line into the

downstream signals of the second line comprises multiplying the second line downstream channel transfer value by the upstream end NEXT interference value.

5 30. The method of Claim 27 wherein obtaining the second line downstream channel transfer value comprises collecting a downstream Hlog value from a DSL system MIB, wherein any undesirable filter effects are removed from the downstream Hlog value.

10 31. The method of Claim 27 wherein obtaining the second line downstream channel transfer value comprises determining $Xlog(0,n)$ from operational data collected from a DSL system in which the first DSL line and the second DSL line operate, wherein any undesirable filter effects are removed from the $Xlog(0,n)$ value.

15 32. The method of Claim 27 wherein obtaining the upstream end NEXT interference value comprises instructing the first line and the second line to operate in a manner that generates DSL system operational data representative of the upstream end NEXT interference value.

20 33. A controller comprising:
 means for collecting operational data from a DSL system;
 means coupled to the collecting means for calculating operational characteristics of the DSL system;
 wherein the controller is configured to perform the method comprising:
 obtaining a downstream value for a channel transfer function of the second
25 line;

obtaining an upstream end value of NEXT interference generated by the
first line into the second line; and

combining the second line downstream channel transfer value and the
upstream end NEXT interference value to obtain the value of the
FEXT interference generated by downstream signals of the first line
into the downstream signals of the second line.

34. The controller of Claim 33 wherein obtaining the second line downstream channel
transfer value comprises collecting a downstream Hlog value from a DSL system MIB,
wherein any undesirable filter effects are removed from the downstream Hlog value.

35. The controller of Claim 33 wherein obtaining the second line downstream channel
transfer value comprises determining $X_{log}(0,n)$ from operational data collected from a
DSL system in which the first DSL line and the second DSL line operate, wherein any
undesirable filter effects are removed from the $X_{log}(0,n)$ value.

36. The controller of Claim 33 wherein the collecting means and the calculating
means comprise one or more computer systems.

37. A computer program product comprising:

a machine readable medium; and

program instructions contained in the machine readable medium, the program instructions
specifying a method of determining the downstream FEXT interference generated by a
first DSL line into a second DSL line, the method comprising:

obtaining a downstream value for a channel transfer function of the second line;

obtaining an upstream end value of NEXT interference generated by the first line into the second line; and

combining the second line downstream channel transfer value and the upstream end NEXT interference value to obtain the value of the FEXT interference generated by downstream signals of the first line into the downstream signals of the second line.

38. A method of determining the downstream FEXT interference generated by a first DSL line into a second DSL line, the method comprising:

obtaining a downstream H for the second DSL line;
obtaining an upstream end N representing the NEXT of the first DSL line into the second DSL line; and
combining the H and the N to obtain an X representing the downstream FEXT of the first DSL line into the second DSL line.

39. The method of Claim 38 wherein the H is an Hlog available from an MIB of a DSL system in which the first DSL line and the second DSL line operate.

40. The method of Claim 38 wherein the H is an Xlog(0,n).

41. The method of Claim 38 wherein combining the H and the N to obtain an X representing the downstream FEXT of the first DSL line into the second DSL line comprises:

removing any undesirable filter effects from H;

adding any desirable filter effects to H;

removing any undesirable filter effects from N; and

adding any desirable filter effects to N.

42. A method of determining FEXT crosstalk from a first end to a second end,
5 wherein the FEXT crosstalk is generated by a first device on a first DSL line into a
second DSL device on a second DSL line, the method comprising:

determining the line insertion loss of one of the lines;

determining the NEXT crosstalk between the lines;

10 combining the insertion loss and the NEXT crosstalk to generate the FEXT
crosstalk.

43. The method of Claim 42 wherein combining the insertion loss and the NEXT
crosstalk to generate the FEXT crosstalk comprises removing any undesired filter effects
and adding any desired filter effects.

15 44. The method of Claim 42 wherein the first device is an upstream-end device;
further wherein the second device is a downstream-end device;
further wherein the FEXT crosstalk is generated in a downstream direction from
an upstream end to a downstream end;

20 further wherein the line insertion loss is a downstream line insertion loss of the
second line; and

further wherein the NEXT crosstalk is the upstream-end NEXT crosstalk from the
first DSL line into the second DSL line.

25 45. The method of Claim 42 wherein the first device is an downstream-end device;

further wherein the second device is an upstream-end device;

further wherein the FEXT crosstalk is generated in an upstream direction from a downstream end to an upstream end;

5 further wherein the line insertion loss is an upstream line insertion loss of the second line; and

further wherein the NEXT crosstalk is the downstream-end NEXT crosstalk from the first DSL line into the second DSL line.

46. The method of Claim 42 wherein the first device is an downstream-end device;

10 further wherein the second device is an upstream-end device;

further wherein the FEXT crosstalk is generated in an upstream direction from a downstream end to an upstream end;

further wherein the line insertion loss is an upstream line insertion loss of the first line; and

15 further wherein the NEXT crosstalk is the upstream-end NEXT crosstalk from the first DSL line into the second DSL line.

ABSTRACT

Operational data is utilized to determine the FEXT interference induced by one
5 line into the other DSL line. FEXT interference can be calculated using the NEXT
interference measured between the two lines at the upstream ends of the loops and the
downstream channel transfer function of one of the loops. Because the NEXT and
transfer function constitute a linear time-invariant system, as does the FEXT interference
between the lines, the NEXT interference and line transfer function can be multiplied (if
10 in linear format) or added (if in logarithmic format) to approximate the FEXT
interference between the lines. The collection of data, calculations and other functions
performed in these techniques may be performed by a system controller, such as a DSL
optimizer. An $Xlog(u, n)$ quantity is a decibel-magnitude representation of the insertion-
loss equivalent of FEXT transfer functions and is defined as the ratio of (1) a line u 's
15 source power into a matched load of 100 Ohms when no binder is present to (2) the
power at the output of the subject line when line u is excited with the same source and the
binder is present. $Xlin(u, n)$ is the linear equivalent of $Xlog(u, n)$. The $Xlog(u, n)$ and
 $Xlin(u, n)$ quantities may be represented in specific formats that assist in their use in DSL
and other systems. When defined as a line's insertion loss, $Xlin$ (or equivalently $Xlog$)
20 does not include the effect of any transmit filter.

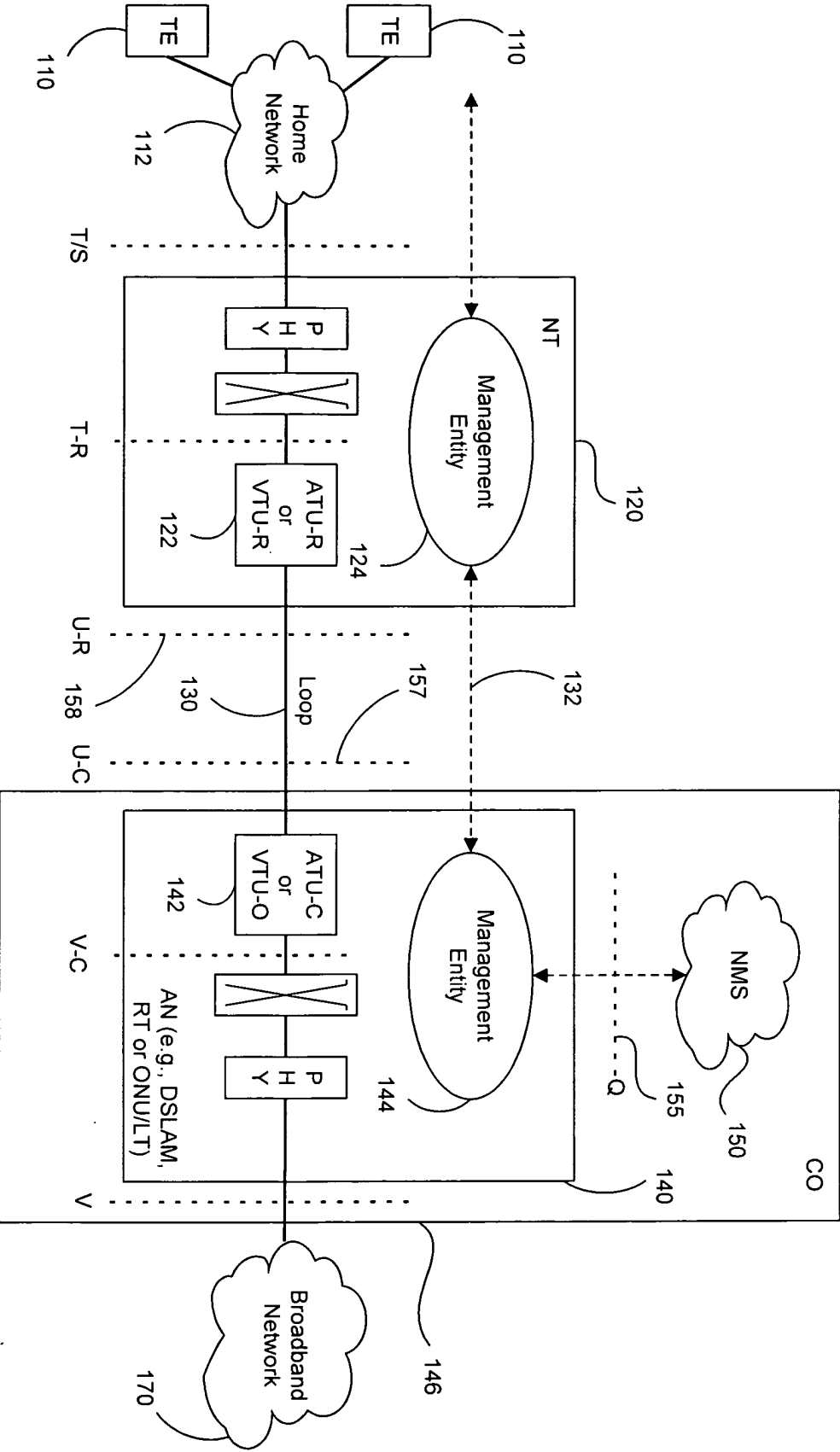


Figure 1



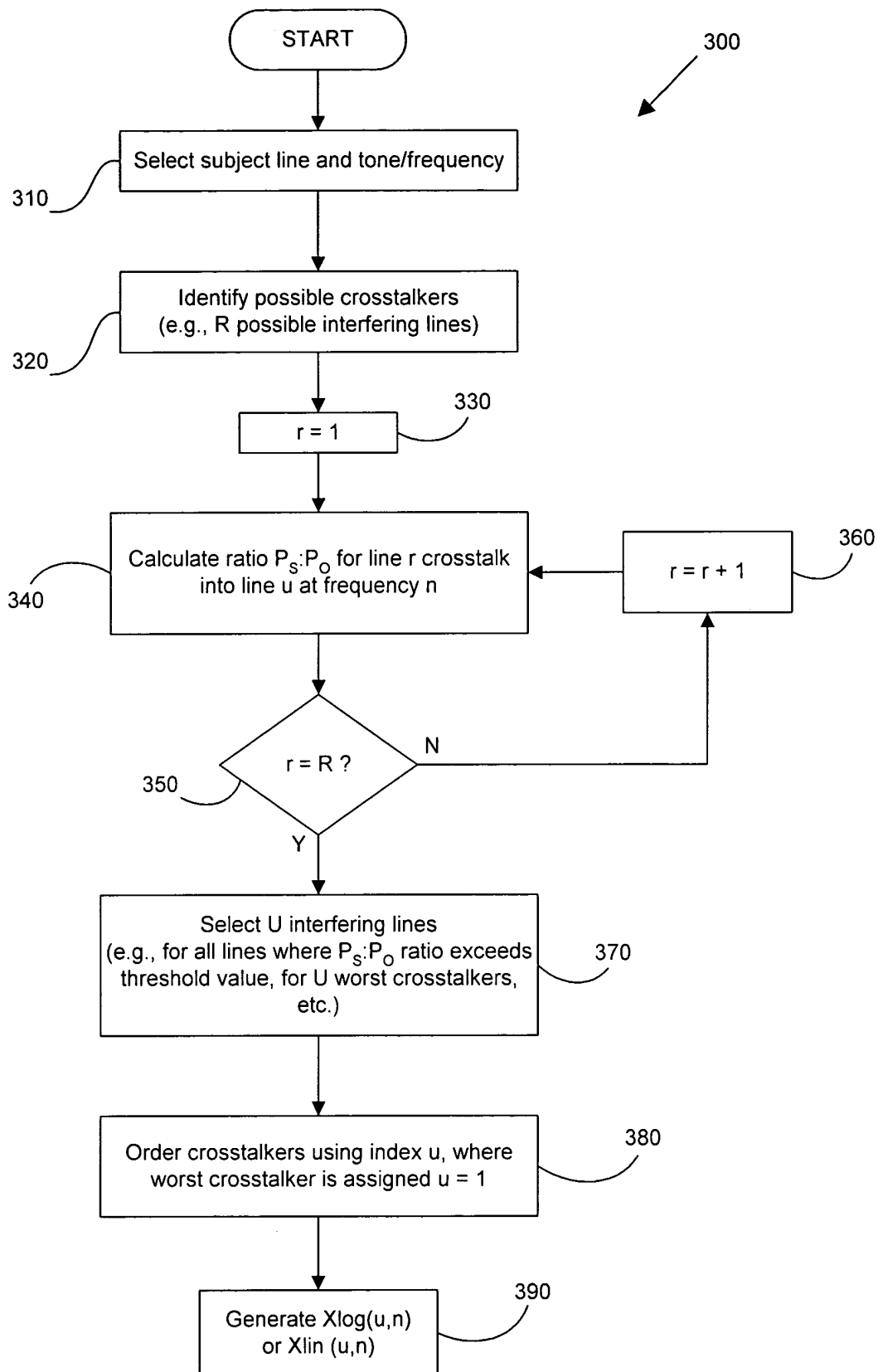


Figure 3

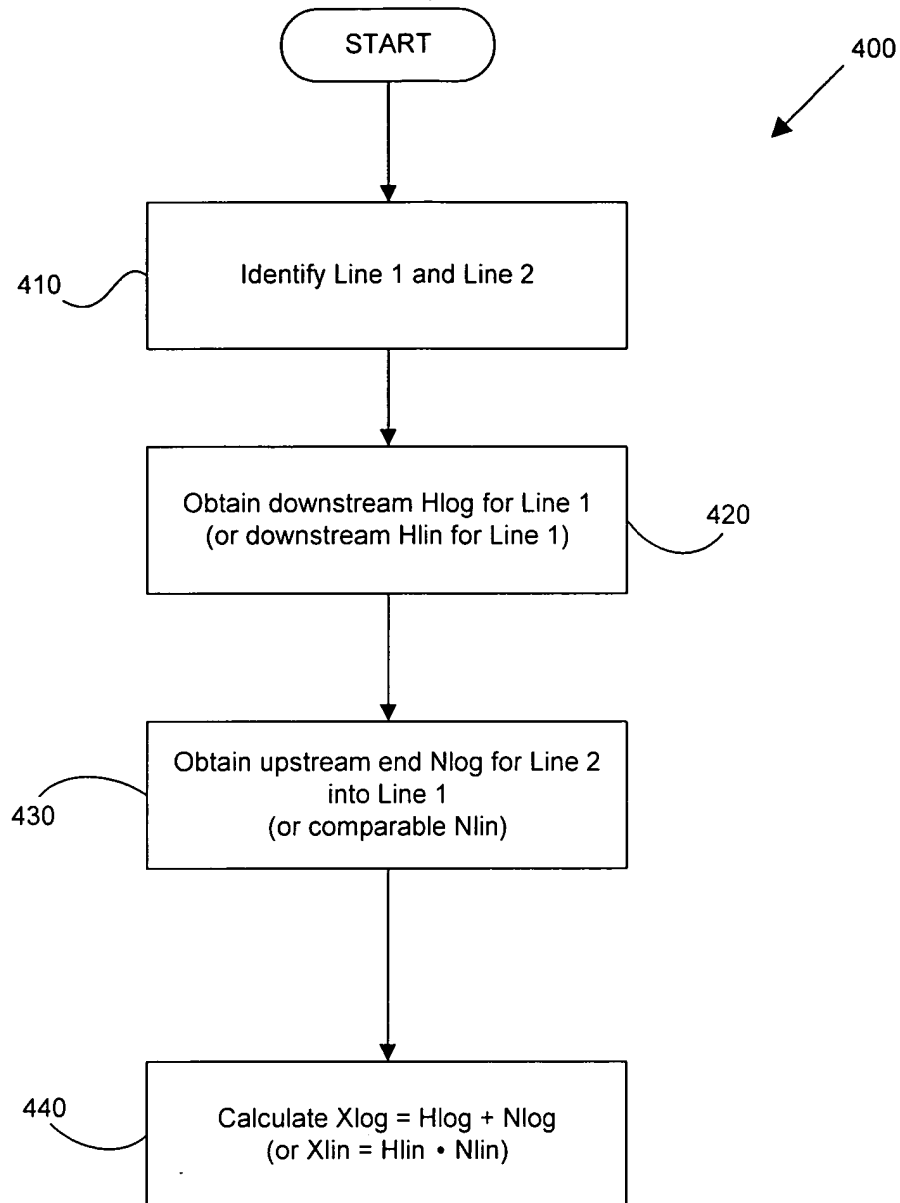


Figure 4

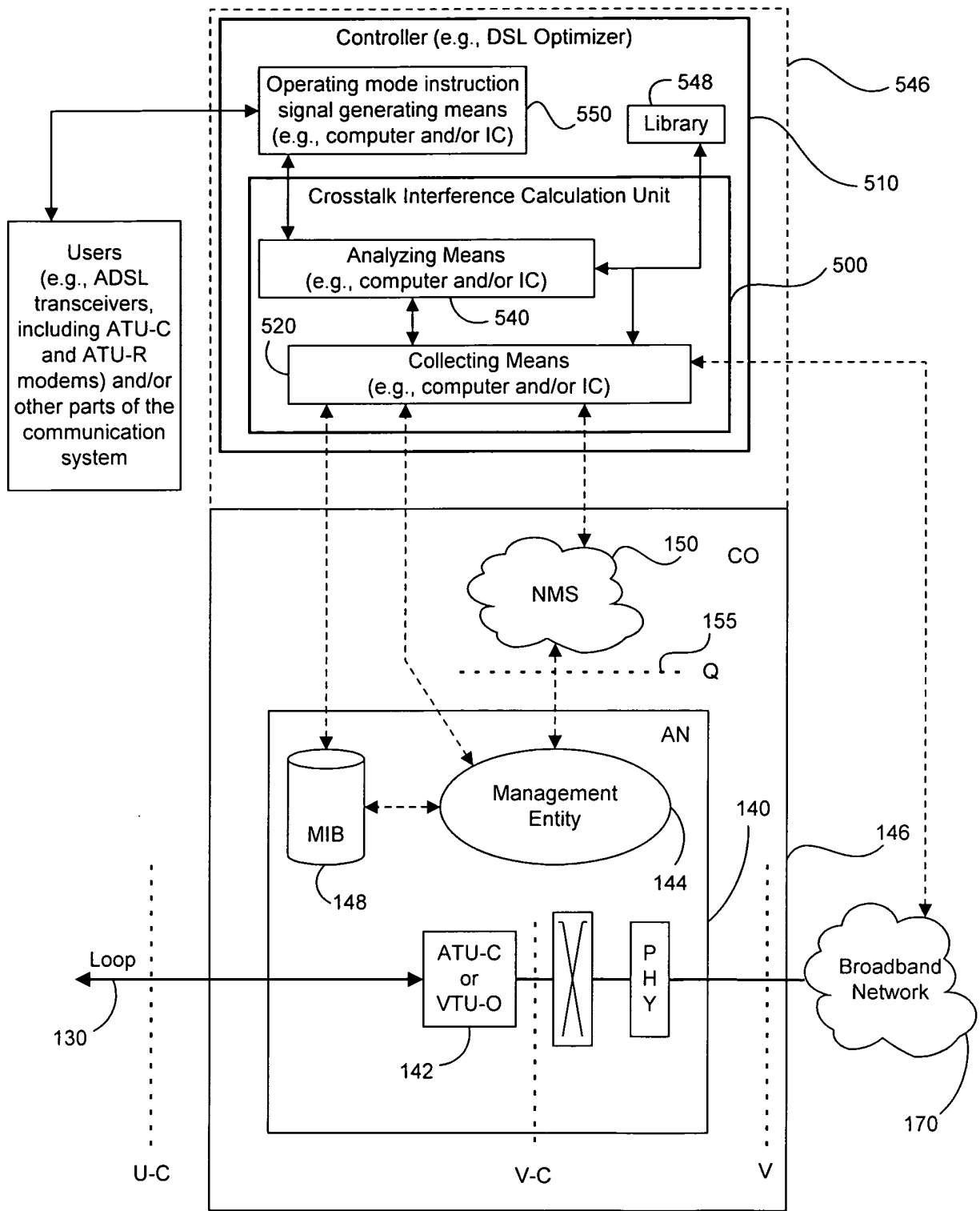
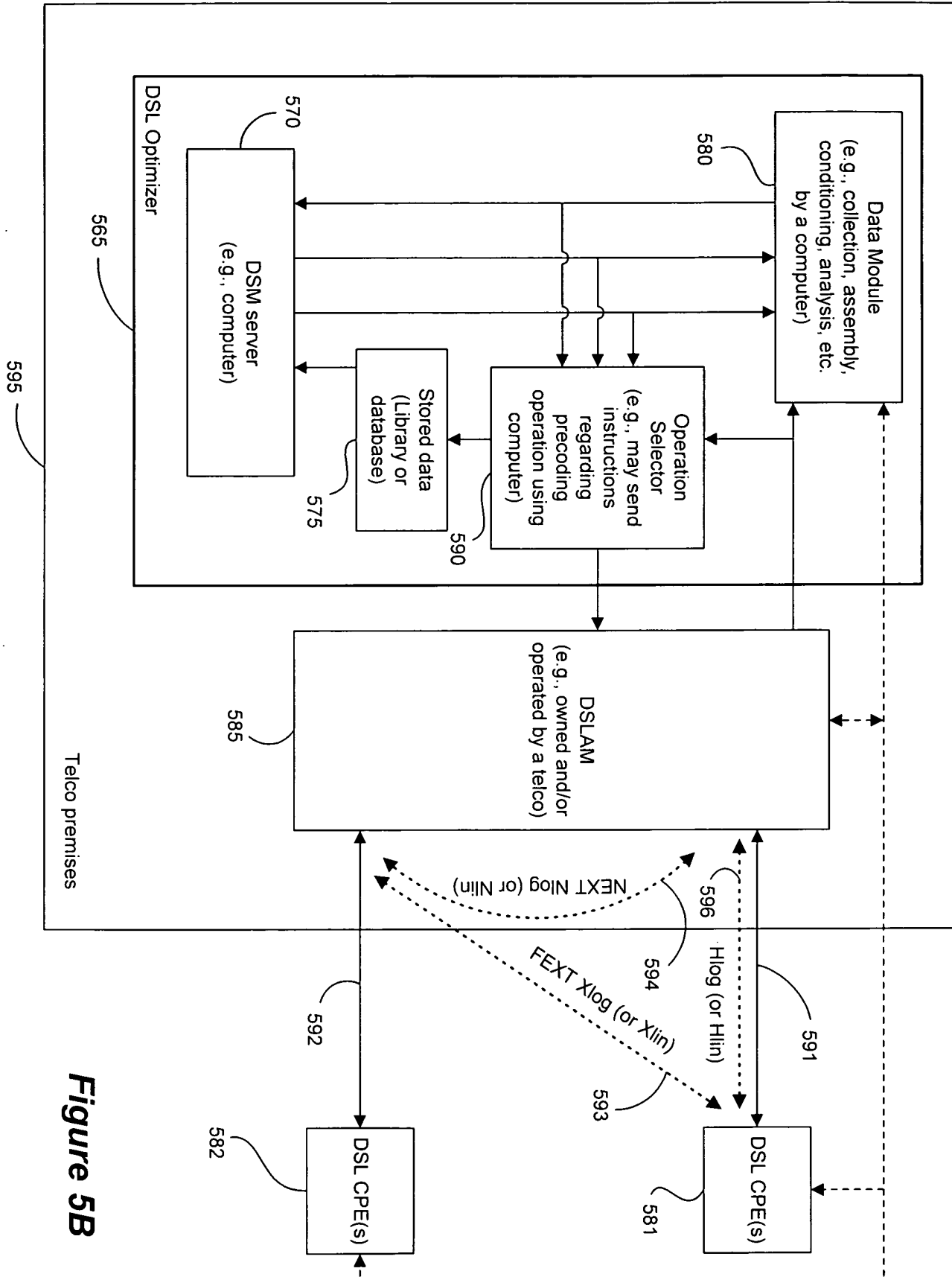


Figure 5A

**Figure 5B**

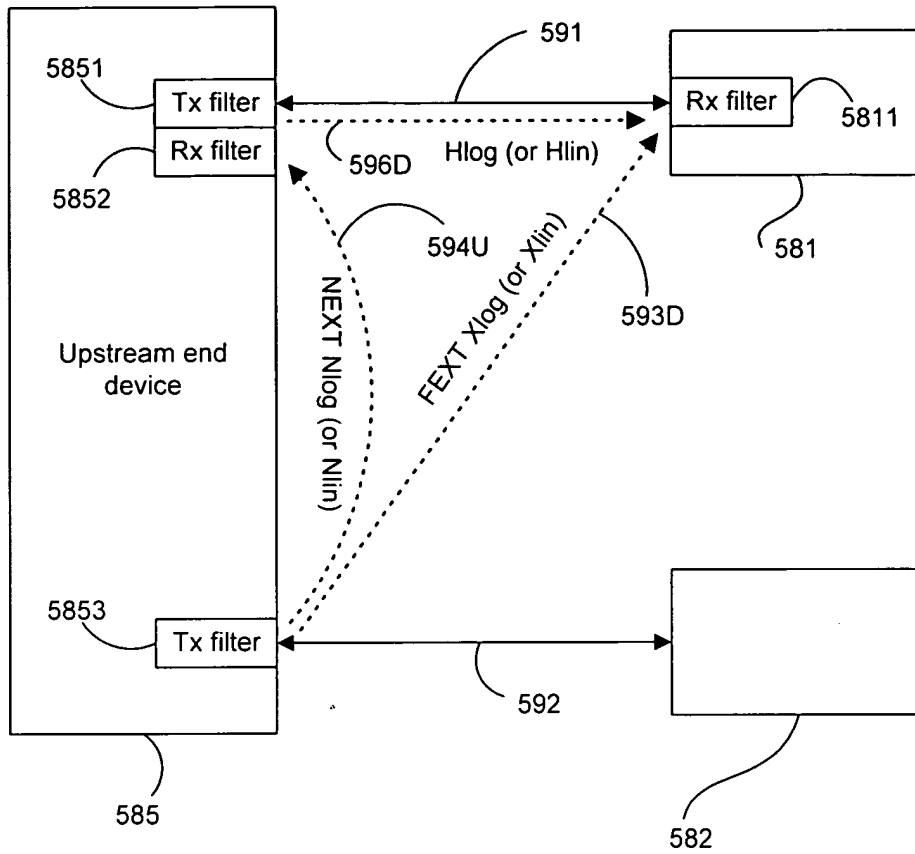


Figure 5C

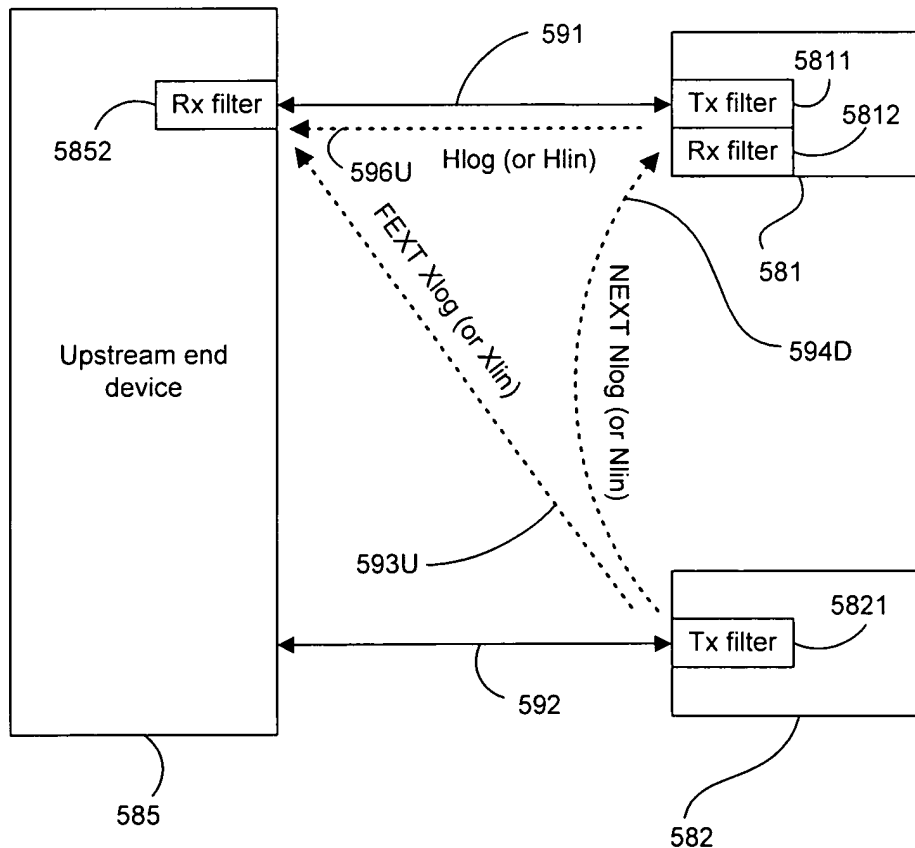


Figure 5D

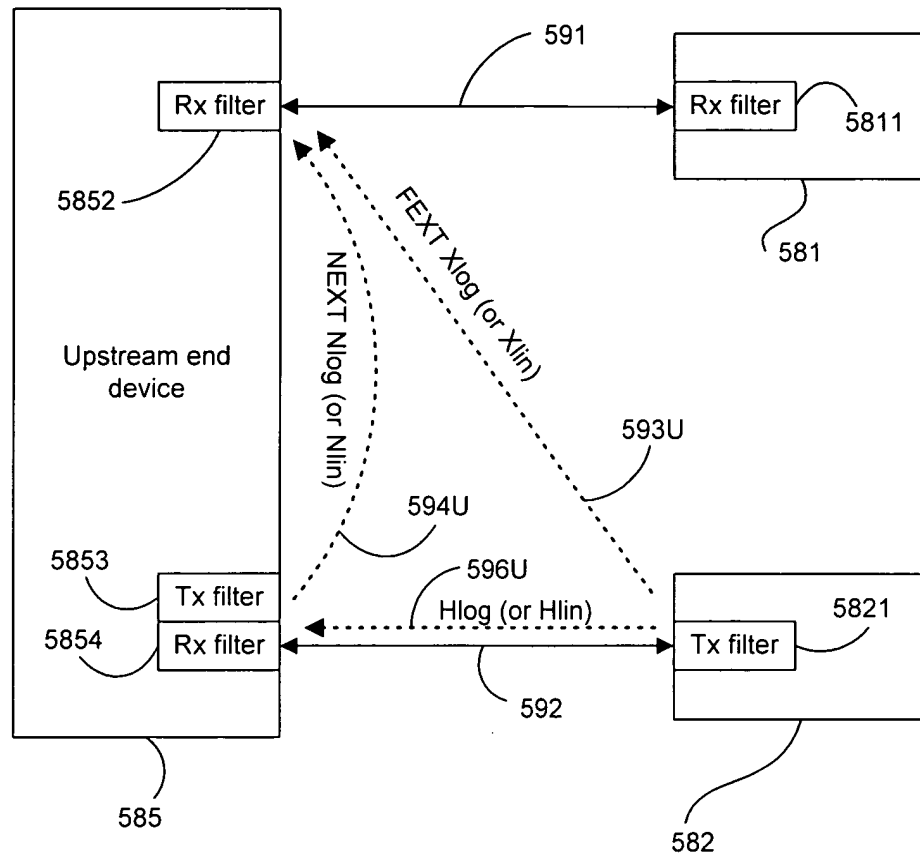


Figure 5E

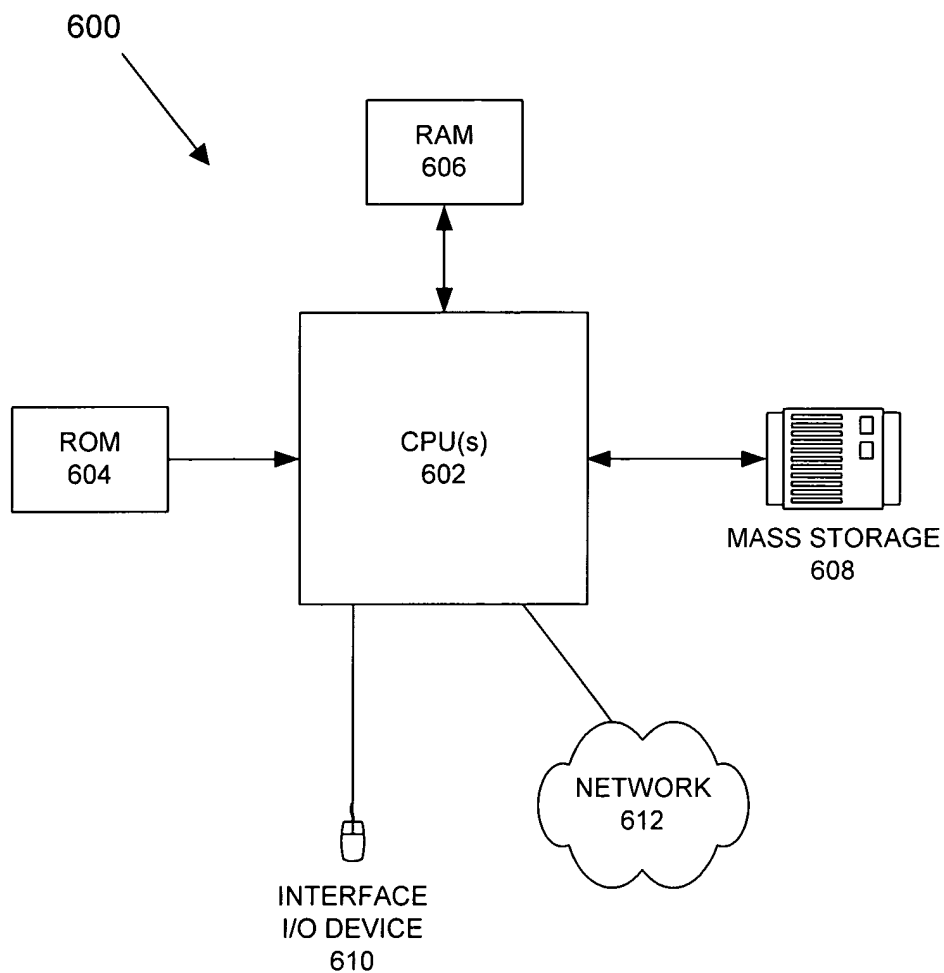


Figure 6

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**DECLARATION FOR UTILITY OR
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PATENT APPLICATION
(37 CFR 1.63)**



Declaration
Submitted
With Initial
Filing

OR



Declaration
Submitted after Initial
Filing (surcharge
(37 CFR 1.16 (e))
required)

Attorney Docket
Number

0101-p13

First Named Inventor

Cioffi

COMPLETE IF KNOWN

Application Number

Filing Date

Art Unit

Examiner Name

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TEXT DETERMINATION SYSTEM

(Title of the Invention)

the specification of which



is attached hereto

OR



was filed on (MM/DD/YYYY)

as United States Application Number or PCT International

Application Number

and was amended on (MM/DD/YYYY)

(if applicable).

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

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

[Page 1 of 2]

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NAME OF SOLE OR FIRST INVENTOR:

A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])

John M.

Family Name or Surname

Cioffi

Inventor's Signature

Date

Residence: City

Atherton

State

California

Country

USA

Citizenship

USA

Mailing Address

323 Stockbridge Avenue

City

Atherton

State

California

Zip

94027

Country

USA

NAME OF SECOND INVENTOR:

A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])

Family Name or Surname

Inventor's Signature

Date

Residence: City

State

Country

Citizenship

Mailing Address

City

State

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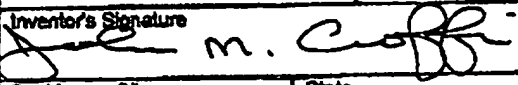
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NAME OF SOLE OR FIRST INVENTOR:		☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle [if any])		Family Name or Surname		
John M.		Coffi		
Inventor's Signature				Date
				May 5, 2005
Residence: City	State	Country	Citizenship	
Atherton	California	USA	USA	
Mailing Address				
323 Stockbridge Avenue				
City	State	Zip	Country	
Atherton	California	94027	USA	
NAME OF SECOND INVENTOR:		☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle [if any])		Family Name or Surname		
Inventor's Signature				Date
Residence: City	State	Country	Citizenship	
Mailing Address				
City	State	Zip	Country	
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(Page 2 of 2)

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POWER OF ATTORNEY and CORRESPONDENCE ADDRESS INDICATION FORM

Application Number	Unknown
Filing Date	Unknown
First Named Inventor	Cioffi
Title	FEXT DETERMINATION SYSTEM
Art Unit	Unknown
Examiner Name	Unknown
Attorney Docket Number	0101-p13

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

I hereby appoint:

☒ Practitioners associated with the Customer Number:

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OR

☐ Practitioner(s) named below:

Name	Registration Number

as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

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I am the:

☒ Applicant/Inventor.

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

SIGNATURE of Applicant or Assignee of Record

Signature		Date	
Name	John M. Cioffi	Telephone	414-431-2317
Title and Company			

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

☒ *Total of 1 forms are submitted.

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

POWER OF ATTORNEY and CORRESPONDENCE ADDRESS INDICATION FORM	Application Number	Unknown
	Filing Date	Unknown
	First Named Inventor	Cloffi
	Title	TEXT DETERMINATION SYSTEM
	Art Unit	Unknown
	Examiner Name	Unknown
	Attorney Docket Number	0101-013

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

I hereby appoint:

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I am the:

☒ Applicant/Inventor.

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

SIGNATURE of Applicant or Assignee of Record

Signature	<i>John M. Cloffi</i>	Date	5/5/05
Name	John M. Cloffi	Telephone	414-431-2317
Title and Company			

NOTE: Signatures of all firm members or assignee of record of the entire interest or their representatives are required. Submit multiple forms if more than one signature is required, see below.

☒ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to the (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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8, 16, 25, 27, 33, 37, 38, 42

PATENT APPLICATION FEE DETERMINATION RECORD

Effective December 8, 2004

11122365

CLAIMS AS FILED - PART I

(Column 1)

(Column 2)

SMALL ENTITY
TYPE ☐

OR

OTHER THAN
SMALL ENTITY

TOTAL CLAIMS	46	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	46 minus 20 =	26
INDEPENDENT CLAIMS	9 minus 3 =	6
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

RATE	FEE
BASIC FEE	150.00
X\$ 25=	650
X100=	600
+180=	
TOTAL	1400

RATE	FEE
BASIC FEE	300.00
X\$50=	
X200=	
+360=	
TOTAL	

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

CLAIMS AS AMENDED - PART II

(Column 1)

(Column 2)

(Column 3)

SMALL ENTITY

OR

OTHER THAN
SMALL ENTITY

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

RATE	ADDI- TIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDI- TIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

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

RATE	ADDI- TIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDI- TIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

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

RATE	ADDI- TIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDI- TIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

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

PATENT APPLICATION SERIAL NO. _____

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

05/09/2005 SDENB0B1 00000017 11122365

01 FC:2011	150.00	OP
02 FC:2111	250.00	OP
03 FC:2311	100.00	OP
04 FC:2202	650.00	OP
05 FC:2201	600.00	OP

PTO-1556
(5/87)

*U.S. Government Printing Office: 2002 — 489-267/89033

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