

<b>PATENT ASSIGNMENT COVER SHEET</b>
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Electronic Version v1.1  
 Stylesheet Version v1.2

EPAS ID: PAT3180768

<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	SECURITY INTEREST

**CONVEYING PARTY DATA**

Name	Execution Date
ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INCORPORATED	01/12/2015

**RECEIVING PARTY DATA**

<b>Name:</b>	PARTNERS FOR GROWTH IV, L.P.
<b>Street Address:</b>	150 PACIFIC AVENUE
<b>City:</b>	SAN FRANCISCO
<b>State/Country:</b>	CALIFORNIA
<b>Postal Code:</b>	94111

**PROPERTY NUMBERS Total: 98**

Property Type	Number
Patent Number:	7428669
Patent Number:	7809996
Patent Number:	7302379
Patent Number:	7711530
Patent Number:	7558315
Patent Number:	7639596
Patent Number:	7535966
Patent Number:	7573943
Patent Number:	7349963
Patent Number:	7809116
Patent Number:	7460588
Patent Number:	7606350
Patent Number:	7593458
Patent Number:	7773497
Patent Number:	8310914
Patent Number:	7774398
Patent Number:	7817745
Patent Number:	7813420
Patent Number:	7852952
Patent Number:	7991122

PATENT

<b>Property Type</b>	<b>Number</b>
Patent Number:	8761348
Patent Number:	7657818
Patent Number:	7688884
Patent Number:	7684546
Patent Number:	8073135
Patent Number:	7881438
Application Number:	11342003
Application Number:	11342023
Patent Number:	8009665
Application Number:	13214598
Patent Number:	8483369
Application Number:	13916493
Patent Number:	7924736
Application Number:	13084829
Patent Number:	7830761
Patent Number:	7830955
Patent Number:	8428225
Application Number:	14162133
Patent Number:	8340279
Patent Number:	8842527
Patent Number:	8363788
Patent Number:	8045629
Application Number:	12226910
Patent Number:	8644169
Application Number:	12226911
Application Number:	13512262
Application Number:	13254454
Application Number:	13376742
Patent Number:	8730785
Application Number:	14242164
Patent Number:	8792620
Application Number:	14341659
Application Number:	13511632
Application Number:	13610195
Application Number:	13995900
Application Number:	13995901
Patent Number:	8489344
Patent Number:	8589093

<b>Property Type</b>	<b>Number</b>
Application Number:	14365604
Application Number:	14385679
Application Number:	14356581
Application Number:	14362584
Application Number:	14362585
Application Number:	14384366
Application Number:	14384379
PCT Number:	US2012033379
PCT Number:	US2012033387
Application Number:	14384368
PCT Number:	US2012033545
PCT Number:	US2012046810
PCT Number:	US2012046811
PCT Number:	US1259395
PCT Number:	US2012059391
PCT Number:	US2013033682
PCT Number:	US2012058157
PCT Number:	US2012057152
PCT Number:	US2012060115
PCT Number:	US2013034697
PCT Number:	US2013061195
PCT Number:	US1265890
PCT Number:	US2013053057
PCT Number:	US2013028750
PCT Number:	US2013026236
PCT Number:	US2013062691
PCT Number:	US2013037805
PCT Number:	US2013064994
PCT Number:	US2013041016
PCT Number:	US2013057672
PCT Number:	US2013075874
PCT Number:	US2013068943
PCT Number:	US2013013793
PCT Number:	US2014012998
PCT Number:	US2014016118
PCT Number:	US2014040402
PCT Number:	US2014044912
PCT Number:	US2014040404

Property Type	Number
PCT Number:	US2014053008
PCT Number:	US2014053002

**CORRESPONDENCE DATA**

**Fax Number:** (415)738-5371

*Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.*

**Phone:** 415-381-3283

**Email:** ben@greenspan-law.com

**Correspondent Name:** BENJAMIN GREENSPAN

**Address Line 1:** 620 LAGUNA ROAD

**Address Line 4:** MILL VALLEY, CALIFORNIA 94941

<b>ATTORNEY DOCKET NUMBER:</b>	PF4-ASSIA
<b>NAME OF SUBMITTER:</b>	BENJAMIN GREENSPAN
<b>SIGNATURE:</b>	/bg/
<b>DATE SIGNED:</b>	01/13/2015

**Total Attachments: 7**

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source=USPTO Patent notice as filed#page6.tif  
source=USPTO Patent notice as filed#page7.tif

PATENT COLLATERAL AGREEMENT AND NOTICE

This Patent Collateral Agreement and Notice dated as of January 12, 2015 ("Patent Agreement"), is between Adaptive Spectrum and Signal Alignment, Incorporated, a California corporation with its principal place of business at 333 Twin Dolphin Drive, Suite 300, Redwood City, CA 94065 ("Assignor") and Partners for Growth IV, L.P., 150 Pacific Avenue, San Francisco, CA 94111 ("Assignee") pursuant to a Loan and Security Agreement, an Intellectual Property Security Agreement of even date herewith by and among Assignor and Assignee (the "IP Security Agreement") and pursuant to certain other loan documents referenced therein (collectively, the "Loan Documents").

WHEREAS, Assignor is the owner of certain United States patents and/or patent applications as listed on Exhibit 1 hereto (the "Patents"); and

WHEREAS, Assignee has agreed to extend certain credit to Assignor on condition that the Assignor pledge and grant to Assignee as collateral for the Obligations (as defined in the Loan Documents) a security interest and lien in and to the Patents and all proceeds thereof and all other related claims and rights as more fully described in the IP Security Agreement in favor of the Assignee, by and among Assignor and Assignee;

NOW THEREFORE, for good and valuable consideration, as security for the due and timely payment and performance of the Obligations, Assignor hereby pledges and grants to Assignee a security interest and lien in and to the Patents and all proceeds thereof and gives notice of such security interest and the existence of the IP Security Agreement providing therefor.

Executed as of the date first above written.

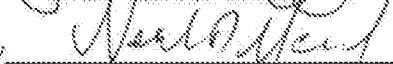
Assignor:

Adaptive Spectrum and Signal Alignment,  
Incorporated

By

  
Chief Executive Officer

By

  
Secretary

Assignee:

PARTNERS FOR GROWTH IV, L.P.

By \_\_\_\_\_

Name: \_\_\_\_\_

Title: Manager, Partners for Growth IV, LLC  
Its General Partner

PATENT COLLATERAL AGREEMENT AND NOTICE

This Patent Collateral Agreement and Notice dated as of January 12, 2014 ("Patent Agreement"), is between Adaptive Spectrum and Signal Alignment, Incorporated, a California corporation with its principal place of business at 333 Twin Dolphin Drive, Suite 300, Redwood City, CA 94065 ("Assignor") and Partners for Growth IV, L.P., 150 Pacific Avenue, San Francisco, CA 94111 ("Assignee") pursuant to a Loan and Security Agreement, an Intellectual Property Security Agreement of even date herewith by and among Assignor and Assignee (the "IP Security Agreement") and pursuant to certain other loan documents referenced therein (collectively, the "Loan Documents").

WHEREAS, Assignor is the owner of certain United States patents and/or patent applications as listed on Exhibit I hereto (the "Patents"); and

WHEREAS, Assignee has agreed to extend certain credit to Assignor on condition that the Assignor pledge and grant to Assignee as collateral for the Obligations (as defined in the Loan Documents) a security interest and lien in and to the Patents and all proceeds thereof and all other related claims and rights as more fully described in the IP Security Agreement in favor of the Assignee, by and among Assignor and Assignee;

NOW THEREFORE, for good and valuable consideration, as security for the due and timely payment and performance of the Obligations, Assignor hereby pledges and grants to Assignee a security interest and lien in and to the Patents and all proceeds thereof and gives notice of such security interest and the existence of the IP Security Agreement providing therefor.

Executed as of the date first above written.

Assignor:

Adaptive Spectrum and Signal Alignment,  
Incorporated

By \_\_\_\_\_  
Chief Executive Officer

By \_\_\_\_\_  
Secretary

Assignee:

PARTNERS FOR GROWTH IV, L.P.

By Jason Georgakis  
Name: JASON GEORGAKIS

Title: Manager, Partners for Growth IV, LLC  
Its General Partner

**EXHIBIT 1**  
**Adaptive Spectrum and Signal Alignment, Incorporated**  
**Patent Schedule**

<b>Country</b>	<b>Status</b>	<b>Application Number</b>	<b>Patent Number</b>	<b>Title</b>
US	Issued	10/795,593	7428669	Adaptive FEC Codeword Management
US	Issued	12/185,729	7,809,996	ADAPTIVE FEC CODEWORD
US	Issued	10/817,128	7,302,379	MANAGEMENT DSL System Estimation and Parameter
US	Issued	11/945,210	7,711,530	Recommendation DSL System Estimation and Parameter
US	Issued	10/893,826	7,558,315	Recommendation Adaptive Margin and Band Control
US	Issued	10/808,771	7,639,596	High Speed Multiple Loop DSL System
US	Issued	10/919,620	7,535,966	DSL Data Collection System
US	Issued	10/922,705	7,573,943	Interference Cancellation System
US	Issued	10/981,068	7349963	Communication Device Identification DSL System Estimation Including Known DSL Line Scanning and Bad Splice
US	Issued	11/069,159	7,809,116	Detection Capability
US	Issued	11/071,762	7,460,588	DSL State and Line Profile Control
US	Issued	11/122,428	7,606,350	Incentive-based DSL System
US	Issued	11/122,365	7,593,458	FEXT-determination System
US	Issued	11/267,623	7,773,497	Phantom Use in DSL Systems
US	Issued	12/853,209	8,310,914	Phantom Use in DSL Systems
US	Issued	11/284,692	7,774,398	Tonal Rotors
US	Issued	11/336,666	7,817,745	Tonal Precoding
US	Issued	11/336,113	7,813,420	Adaptive GDFE
US	Issued	11/344,873	7,852,952	DSL System Loading and Ordering
US	Issued	11/345,215	7,991,122	DSL System Training
US	Issued	13/194,736	8,761,348	DSL System Training DYNAMIC MINIMUM-MEMORY
US	Issued	11/363,769	7,657,818	INTERLEAVING
US	Issued	11/367,930	7,688,884	Vectored DSL Nesting
US	Issued	11/342,024	7,684,546	DSL System Estimation and Control
US	Issued	11/342,028	8,073,135	Binder Identification Self-learning and Self-adjusting DSL
US	Issued	11/341,969	7,881,438	System
US	Allowed	11/342,023		User-Preference-Based DSL System USER-PREFERENCE-BASED DSL
US	Pending	11/342,003		SYSTEM
US	Issued	12/089,044	8,009,665	DSL System
US	Pending	13/214,598		DSL System
US	Issued	12/227,966	8,483,369	DSL SYSTEM

US	Pending	13/916,493		SYSTEMS, METHODS, AND APPARATUSES FOR IMPLEMENTING A DSL SYSTEM
US	Issued	11/995,194	7,924,736	DSL System Estimation
US	Pending	13/084,829		DSL System Estimation
US	Issued	11/995,195	7,830,955	Adaptive Margin and Band Control
US	Issued	12/940,970	8,031,761	Adaptive Margin and Band Control
US	Issued	12/375,216	8,428,225	METHOD AND APPARATUS FOR ANALYZING AND MITIGATING NOISE IN A DIGITAL SUBSCRIBER LINE
US	Pending	14/162,133		METHOD AND APPARATUS FOR ANALYZING AND MITIGATING NOISE IN A DIGITAL SUBSCRIBER LINE
US	Issued	12/444,381	8,340,279	Interference Cancellation System
US	Issued	12/445,278	8,842,527	HIGH SPEED MULTIPLE USER MULTIPLE LOOP DSL SYSTEM
US	Issued	12/517,525	8,363,788	DSL Ring Signal Compatibility
US	Issued	11/897,683	8,045,629	DSL DATA COLLECTION SYSTEM
US	Allowed	12/226,910		Methods and apparatus to combine data from multiple sources to characterize communication systems
US	Issued	12/226,939	8,644,169	Methods and apparatus to perform line testing at customer premises
US	Pending	12/226,911		Video Streaming Diagnostics
US	Pending	13/512,262		DETECTION OF WIRING DEFECTS
US	Pending	13/254,454		DSL Noise Cancellation
US	Pending	13/376,742		METHOD AND APPARATUS FOR DSL PERFORMANCE ENHANCEMENT IN A DSL NETWORK
US	Issued	12/402,339	8,730,785	METHOD AND APPARATUS FOR REDUCING NOISE IN A COMMUNICATION SYSTEM
US	Pending	14/242,164		METHOD AND APPARATUS FOR REDUCING NOISE IN A COMMUNICATION SYSTEM
US	Issued	13/696,798	8,792,620	NON-INVASIVE DIAGNOSTIC TRANSMISSION LINE TESTING
US	Pending	14/341,659		NON-INVASIVE DIAGNOSTIC TRANSMISSION LINE TESTING
US	Pending	13/511,632		Device Abstraction Proxy
US	Pending	13/610,195		Device Abstraction Proxy
US	Pending	13/995,900		Systems and Methods for Jointly Optimizing WAN and LAN Network Communications
US	Pending	13/995,901		MANAGEMENT CENTER FOR COMMUNICATION SYSTEM
US	Issued	12/028,738	8,489,344	CUSTOMER PREMISES EQUIPMENT HOME NETWORK SYSTEM AUGMENTATION WITH REMOTE



US	Issued	13/554,945	8,589,093	GUIDANCE AND LOCAL SET UP AND MONITORING HOME NETWORK SYSTEM AUGMENTATION WITH REMOTE GUIDANCE AND LOCAL SET UP AND MONITORING Method and Apparatus for Reducing the Power of a Signal Electromagnetically Coupled from a PLC Medium to a DSL Medium
US	Pending	14/365,604		SYSTEM FOR DIAGNOSING AND OPTIMIZING VECTORED DSL LINES METHOD, APPARATUS, AND SYSTEM FOR OPTIMIZING PERFORMANCE OF A COMMUNICATION UNIT BY A REMOTE SERVER
US	Pending	14/385,679		SYSTEMS AND METHODS FOR TRAFFIC AGGREGATION ON MULTIPLE WAN BACKHAULS AND MULTIPLE DISTINCT LAN NETWORKS
US	Pending	14/356,581		SYSTEMS AND METHODS FOR TRAFFIC LOAD BALANCING ON MULTIPLE WAN BACKHAULS AND MULTIPLE DISTINCT LAN NETWORKS
US	Pending	14/362,584		APPARATUS, SYSTEMS AND METHODS OF COMMON MODE BASED DIAGNOSTICS
US	Pending	14/362,585		METHODS AND SYSTEMS FOR CHARACTERIZING LINE MICRO-FILTER STATES & POSITIONING LINE FAULTS RELATIVE TO A NETWORK INTERFACE DEVICE
US	Pending	14/384,366		SELT AND DELT BASED DIAGNOSTIC METHODS & SYSTEMS FOR TWISTED PAIR TELEPHONE LINES
US	Pending	14/384,379		SELT BASED DIAGNOSTIC METHODS & SYSTEMS FOR TWISTED PAIR TELEPHONE LINES
WO	Pending	PCT/US2012/033379		APPARATUS SYSTEM AND METHODS OF COMMON-MODE REJECTION RATIO BASED DIAGNOSTICS
WO	Pending	PCT/US2012/033387		DIAGNOSTIC METHODS FOR TWISTED PAIR TELEPHONE LINES BASED ON LINE
US	Pending	14/384,368		DATA DISTRIBUTION ANALYSIS METHOD AND SYSTEM FOR PERFORMANCE ESTIMATION OF A COMMUNICATION LINK
WO	Pending	PCT/US2012/033545		METHOD AND SYSTEM FOR PERFORMANCE MEASUREMENT OF
WO	Pending	PCT/US2012/046810		
WO	Pending	PCT/US2012/046811		

WO	Pending	PCT/US12/59395
WO	Pending	PCT/US2012/059391
WO	Pending	PCT/US2013/033682
WO	Pending	PCT/US12/058157
WO	Pending	PCT/US2012/057152
WO	Pending	PCT/US12/060115
WO	Pending	PCT/US2013/034697
WO	Pending	PCT/US2013/061195
WO	Pending	PCT/US12/65890
WO	Pending	PCT/US2013/053057
WO	Pending	PCT/US2013/028750
WO	Pending	PCT/US2013/026236
WO	Pending	PCT/US2013/062691
WO	Pending	PCT/US2013/037805
WO	Pending	PCT/US2013/064994
WO	Pending	PCT/US2013/041016
WO	Pending	PCT/US2013/057672
WO	Pending	PCT/US2013/075874

A COMMUNICATION LINK  
 METHOD AND SYSTEM FOR  
 LATENCY MEASUREMENT IN  
 COMMUNICATION  
 SYSTEMS  
 METHOD AND SYSTEM FOR  
 CONNECTIVITY DIAGNOSTICS IN  
 COMMUNICATION SYSTEMS  
 METHOD AND APPARATUS FOR  
 IMPLEMENTING WIRELESS SYSTEM  
 DISCOVERY AND CONTROL USING  
 A STATE-SPACE  
 OPTIMIZED CONTROL SYSTEM FOR  
 AGGREGATION OF MULTIPLE  
 BROADBAND CONNECTIONS OVER  
 RADIO INTERFACES  
 METHOD AND SYSTEM FOR USING  
 A DOWNLOADABLE AGENT FOR A  
 COMMUNICATION SYSTEM,  
 DEVICE, OR LINK  
 Management System and Methods of  
 Managing Time-Division Duplex (TDD)  
 Transmission over Copper  
 METHOD AND APPARATUS FOR  
 CLOUD SERVICES FOR ENHANCING  
 BROADBAND EXPERIENCE  
 APPARATUS, SYSTEMS AND  
 METHODS FOR IMPLEMENTING  
 IMPULSE NOISE MITIGATION VIA  
 SOFT SWITCHING  
 SYSTEMS, METHODS, AND  
 APPARATUSES FOR OPTIMIZING  
 DSL LINE CONFIGURATIONS AND  
 PARAMETERS IN A DSL SYSTEM  
 Method and Apparatus for Continuous  
 Access Network Monitoring and Packet  
 Loss Estimation  
 SYSTEMS AND METHODS FOR  
 MANAGING MIXED DEPLOYMENTS  
 OF VECTORED AND NON-  
 VECTORED VDSL  
 CHURN PREDICTION IN A  
 BROADBAND NETWORK  
 System and Method for Validating  
 Broadband Service Recommendation  
 Methods, Systems, and Apparatuses for  
 implementing Upstream Power Control  
 for DSL  
 Automatic Broadband Information  
 Correlation & Record Generation  
 DSL Neighborhood Diagnostics  
 Low Power System and Method for DSL  
 Lines  
 Systems, Methods, and Apparatuses for  
 Implementing Distributed Wireless Data

WO	Pending	PCT/US2013/068943	Sharing and Control Systems
WO	Pending	PCT/US2014/013793	Method and Apparatus for Diagnosing and Configuring a Broadband Connection Via an Alternate Communication Path
WO	Pending	PCT/US2014/012998	Systems, Methods, and Apparatuses for Identifying Cable-Level Faults in a Copper Plant of a DSL System
WO	Pending	PCT/US2014/016118	METHOD AND APPARATUS FOR CLOUD SERVICES FOR ENHANCING BROADBAND EXPERIENCE
WO	Pending	PCT/US2014/040402	CHURN PREDICTION IN A BROADBAND NETWORK
WO	Pending	PCT/US2014/044912	METHOD AND APPARATUS FOR IMPROVING BROADBAND EXPERIENCE USING CLOUD BASED RECOMMENDATION ENGINE
WO	Pending	PCT/US2014/040404	METHOD AND APPARATUS FOR WI-FI DEVICE TYPE IDENTIFICATION AND DEVICE TYPE BASED DIAGNOSTICS AND OPTIMIZATION
WO	Pending	PCT/US2014/053008	METHOD AND APPARATUS FOR GENERATING POLICIES FOR IMPROVING NETWORK SYSTEM PERFORMANCE
WO	Pending	PCT/US2014/053002	SYSTEMS, METHODS AND APPARATUSES FOR IMPLEMENTING VIRTUALIZATION OF ACCESS NODE FUNCTIONS
WO	Pending	PCT/US2014/053002	Systems, Methods, and Apparatuses for Implementing Persistent Management Agent (PMA) Functions for the Control and Coordination of DPU and DSLAM Components