PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT4256899

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
MAGNACOM LTD.	05/09/2016

RECEIVING PARTY DATA

Name:	AVAGO TECHNOLOGIES GENERAL IP (SINGAPORE) PTE. LTD.
Street Address:	1 YISHUN AVENUE 7
City:	SINGAPORE
State/Country:	SINGAPORE
Postal Code:	968723

PROPERTY NUMBERS Total: 97

Property Type	Number
Application Number:	14291065
Application Number:	13755043
Application Number:	14100060
Application Number:	13755052
Application Number:	13755054
Application Number:	13755065
Application Number:	14461090
Application Number:	14481108
Application Number:	14659797
Application Number:	14713091
Application Number:	14739557
Application Number:	14836366
Application Number:	14848519
Application Number:	14847841
Application Number:	14551466
Application Number:	14479428
Application Number:	13755061
Application Number:	14524078
Application Number:	14537193
Application Number:	14641895

Property Type	Number
Application Number:	14472550
Application Number:	14686254
Application Number:	14641778
Application Number:	14941728
Application Number:	14948465
Application Number:	13756010
Application Number:	13755068
Application Number:	13756469
Application Number:	13921665
Application Number:	13921710
Application Number:	13921813
Application Number:	13922329
Application Number:	13755050
Application Number:	14016732
Application Number:	14040983
Application Number:	14064351
Application Number:	14074878
Application Number:	14187436
Application Number:	13756079
Application Number:	14187532
Application Number:	13755021
Application Number:	14187478
Application Number:	14551393
Application Number:	13754964
Application Number:	13755060
Application Number:	14057098
Application Number:	14635736
Application Number:	13921749
Application Number:	14951579
Application Number:	13755001
Application Number:	14215282
Application Number:	13755008
Application Number:	14064314
Application Number:	13755011
Application Number:	14052862
Application Number:	13755014
Application Number:	13755018
Application Number:	13755025

Property Type	Number
Application Number:	13755026
Application Number:	14052848
Application Number:	13755028
Application Number:	14041064
Application Number:	13755039
Application Number:	14057080
Application Number:	14537149
Application Number:	13755972
Application Number:	14833427
Application Number:	14222738
Application Number:	14326708
Application Number:	14329100
Application Number:	14472538
Application Number:	14492133
Application Number:	14609655
Application Number:	14967671
Application Number:	14047328
Application Number:	14064334
Application Number:	14215448
Application Number:	14287258
Application Number:	14472559
Application Number:	14079304
Application Number:	14461487
Application Number:	14052859
Application Number:	14093588
Application Number:	14079465
Application Number:	14298373
Application Number:	14522826
Application Number:	14563046
Application Number:	14564187
Application Number:	14600310
Application Number:	14687861
Application Number:	14704260
Application Number:	14809408
Application Number:	14832094
Application Number:	14843217
Application Number:	14851162
Application Number:	14541312

Property Type	Number
Application Number:	13754998

CORRESPONDENCE DATA

Fax Number:

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: 970-288-0731
Email: kathy.manke@broadcom.com
Correspondent Name: KATHY MANKE
Address Line 1: 4380 ZIEGLER ROAD
Address Line 4: FORT COLLINS, COLORADO 80525

NAME OF SUBMITTER:	KATHY MANKE
SIGNATURE:	/Kathy Manke/
DATE SIGNED:	02/02/2017

Total Attachments: 18

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INTELLECTUAL PROPERTY PURCHASE AGREEMENT

(Israel)

This Intellectual Property Purchase Agreement (the "IPPA") is made and entered into effective as of May 9, 2016 at 1 p.m. PDT (the "Effective Date") by and between **Avago Technologies General IP (Singapore) Pte. Ltd.**, a Singapore company having its principal place of business at 1 Yishun Avenue 7, Singapore 968723 ("Purchaser"), and **MagnaCom Ltd.**, an Israeli company having its registered address at 9 Bareket Street, Petach-Tikvah, Israel ("Seller").

(Hereinafter, Purchaser and Seller are each referred to as a "Party," and collectively as the "Parties.")

WHEREAS, Purchaser acquired Seller on March 7, 2016 and immediately prior to entering into this IPPA and prior to the Effective Date of this IPPA, Purchaser has entered into a share purchase agreement pursuant to which it sold all of the issued and outstanding capital of Seller to Avago Technologies Israel Ltd.;

WHEREAS, Purchaser and its corporate affiliates, including, without limitation, Seller, are in the process of integrating the Avago and MagnaCom businesses;

WHEREAS, Seller owns patents, trademarks, and other applications thereof, whether registered or unregistered, trade secrets, know-how, confidential information, copyrights, customer relationship intangibles, and all other intellectual and intangible property rights owned, created, generated, or derived by Seller;

WHEREAS, as part of the integration of the Avago and MagnaCom businesses, Purchaser wishes to purchase the Purchased Intellectual Property as such term is defined herein; and

WHEREAS, Seller wishes to sell all of its rights, title, and interest in the Purchased Intellectual Property to Purchaser;

NOW, THEREFORE, in consideration for the promises and performance of the terms and conditions contained in this IPPA, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree to the following:

1. **DEFINITIONS.**

The following definitions are used in this IPPA:

(a) "Intellectual Property" shall mean all (i) patents, patent applications (including provisional thereof), inventions, the patent rights to all inventions and discoveries claimed therein, any and all related patents, divisionals, continuations, continuations-in-part, reissues, reexaminations, substitutions and any counterparts arising from any of the foregoing rights, including without limitation, information relating to the conception and/or reduction to practice of any of the foregoing rights; (ii) common law rights of passing off in relation to any unauthorized use of the MagnaCom branding intellectual property; (iii) trade secrets, know-how, and confidential information; (iv) copyrights, works of authorship, moral rights, and mask works; (v) trademarks, insignia, logos, service marks, trade dress, trade names, other brand source identifiers and domain names; and (vi) all other worldwide common law and statutory intellectual and intangible property rights, whether registered or unregistered.

(b) "Purchased Intellectual Property" shall mean any Intellectual Property owned, created, generated, or derived by Seller; whether or not such rights are filed, perfected or recorded, as defined herein; including, without limitation, all such items indicated in Exhibit A of this IPPA, but excluding the Excluded Intellectual Property.

(b) "Purchased Patents" shall mean all patents, patent applications (including provisional thereof), inventions, the patent rights to all inventions and discoveries claimed therein, any and all related patents, extensions, divisionals, continuations, continuations-in-part, reissues, reexaminations, substitutions and any counterparts arising from any of the foregoing rights, including without limitation, information relating to the conception and/or reduction to practice of any of the foregoing rights, under Purchased Intellectual Property.

(c) "Excluded Intellectual Property" shall mean the intellectual property as listed or described in Exhibit B of this IPPA.

(d) "Purchased Trademarks" shall mean all trademarks, insignia, and logos under Purchased Intellectual Property together with the goodwill of the business symbolized thereby.

2. ASSIGNMENTS, GRANTS, AND DELIVERABLES.

(a) Assignment of Purchased Intellectual Property.

As of the Effective Date, Seller hereby sells, assigns, transfers, and conveys to Purchaser all of Seller's rights, title, and interest in and to the Purchased Intellectual Property. The Parties acknowledge and agree that the Excluded Intellectual Property shall be excluded from the sale of the Purchased Intellectual Property hereunder.

(b) Assignment of Causes of Action.

As of the Effective Date, Seller hereby sells, assigns, transfers, and conveys to Purchaser all of Seller's rights, title, interests to (a) sue for past, current and future infringements of the Purchased Intellectual Property, including the right to license and to collect and receive any damages, royalties, injunctive relief, and/or settlements for such infringements of such Purchased Intellectual Property, and (b) sue under any past, current or future patent causes of action relating to any of the inventions or discoveries described or claimed in the Purchased Intellectual Property.

(c) Deliverables. On the Effective Date, or at such time and date to be mutually agreed, Seller shall deliver to Purchaser all materials, files, and documentation, that pertain to the Purchased Intellectual Property that are requested by purchaser.

3. PAYMENT AND DELIVERY.

(a) Payment.

In consideration for the assignments and deliverables referenced in Section 2, Purchaser shall pay to Seller the amount representing the fair market value of the Purchased Intellectual Property as determined by Ernst & Young in their valuation report to be completed and delivered to the Parties within thirty (30) days of the Effective Date (the "Purchase Price"). Within forty five (45) days of the Effective Date, Purchaser shall pay the Purchase Price to Seller by entering into a promisory note in the amount of the Purchase Price on the terms of and subject to the Intercompany Note, dated February 1, 2016 to which Buyer is a party, and subject to such other additional terms and conditions as Buyer and Seller shall agree.

The Parties acknowledge that they are familiar with the terms of the Intercompany Note and they hereby agree to be bound by such terms and further agree to sign any documents, instruments, or schedules required to formalize the issuance of indebtedness under and pursuant to such Intercompany Note.

(b) Intellectual Property Purchase Price Adjustment.

The Parties acknowledge and agree that the Purchase Price represents the fair market value of the Purchased Intellectual Property. If at any time during the period within 120 days after the Effective Date, the Parties determine that the Purchased Intellectual Property was not sold for its actual fair market value as at the Effective Date, the Parties agree to adjust the Purchase Price and, as necessary, modify the promissory note to reflect the actual value of the Purchased Intellectual Property as at the Effective Date.

4. **ASSISTANCE, FEES.**

(a) Further Assistance in Effectuating Transfer of Rights.

At the reasonable request of Purchaser and without demanding further consideration from Purchaser, Seller agrees to do and perform such acts and things as may be reasonably necessary for effecting completely the consummation of the transfer of ownership in and to the Purchased Intellectual Property as contemplated hereby including, without limitation, instructing its affiliates, as necessary, to transfer legal title to the Purchased Intellectual Property to Purchaser.

(b) Further Assistance in Prosecution Matters.

Seller agrees, upon the reasonable request of Purchaser, to do all things necessary, proper, or advisable to give effect to the assignment and recording of the transfer of the Purchased Intellectual Property to Purchaser under this IPPA, including without limitation the execution, acknowledgment and recordation of specific oaths, declarations, assignments, and other documents on a country-by-country basis, to assist in obtaining, perfecting, and/or sustaining the Purchased Intellectual Property. Such assistance may also include providing, and obtaining from the respective authors or creators of the Purchased Intellectual Property (to the extent such authors or creators are then employed by Seller), prompt production of pertinent facts and documents, execution of petitions, oaths, powers of attorney, declarations of use or other papers and other assistance reasonably necessary for filing patent applications, complying with any renewals, any duty of disclosure, and conducting prosecution, reexamination, reissue, interference or other priority proceedings, renewals, declarations of use, opposition proceedings, cancellation proceedings, and the like with respect to the Purchased Intellectual Property. Seller's agreement to render any of the foregoing assistance is subject to Purchaser's payment of all reasonable expenses of Seller incurred in connection therewith, and the availability of Seller's personnel.

(c) Maintenance and Other Fees.

Seller shall be responsible for all invoices, expenses, and fees pending to outside prosecution counsel or agents existing on the Effective Date in connection with the Purchased Intellectual Property.

Purchaser shall be responsible for all taxes and fees relating to purchase of the Purchased Intellectual Property, other than income taxes and withholding taxes imposed on Seller. Purchaser will in a timely manner remit to the appropriate taxing authorities all taxes, levies or other imposts as required by law, including any withholding taxes imposed on this payment to Seller, and shall provide Seller with written evidence that such payment was made. Seller and Purchaser shall cooperate with each other and take all commercially reasonable steps to (i) file certificates and other documentation with taxing

authorities and/or (ii) legitimately obtain a reduction or elimination of, or credit for, any taxes, levies or other imposts arising from transactions contemplated by this IPPA.

From and after the Effective Date, subject to the limitations and provisions under Section 4(d) of this IPPA, Purchaser shall be solely responsible for any acts and actions required with respect to any of the Purchased Intellectual Property and Seller shall have no responsibility nor liability to Purchaser for any acts or actions not taken by Purchaser following the Effective Date.

(d) In-House and Outside Prosecution Files.

Except as set forth in this IPPA, Purchaser shall be responsible for all reasonable costs and expenses associated with any transfer of prosecution-related files from Seller to Purchaser.

On the Effective Date, or at such time and date to be mutually agreed, Seller shall send to Purchaser as requested each prosecution (docket) file in its possession for each of the Purchased Patents and Purchased Trademarks. On or with commercially reasonable promptness after the Effective Date, Seller shall also notify outside counsel responsible for the preparation and/or prosecution of any of the Purchased Patents and Purchased Trademarks informing such outside counsel that Seller has assigned all of its right, title and interest in and to any files maintained by such firm for the purpose of the preparation and prosecution of the Purchased Patents and Purchased Trademarks to Purchaser and directing that such outside counsel (i) immediately take direction from Purchaser regarding sending all copies of such files to Purchaser as may be requested; (ii) not retain copies of such files if requested to transfer such files; and (iii) invoice Seller for all pending costs and expenses pending on the Effective Date. From and after such notification, Purchaser shall be responsible for all actions necessary to secure such files and Purchaser shall be responsible for all normal and customary fees charged by such outside counsel in securing such files from such firms. If necessary, Seller agreed to thereafter assist Purchaser in procuring all such files from all such outside counsel and foreign associate firms.

On the Effective Date, Seller shall also send Purchaser originals of all assignment agreements for the Purchased Patents.

5. WARRANTIES.

(A) Seller hereby warrants to Purchaser as follows:

(1) Authority. Seller has the full, sole, and exclusive right and authority to enter into this IPPA and to carry out its obligations hereunder.

(2) Conduct. To Seller's knowledge, none of Seller or its representatives has engaged in any conduct, or omitted to perform any necessary act, the result of which would invalidate any of the Purchased Intellectual Property.

(3) Validity and Enforceability. The Purchased Patents and Purchased Trademarks have never been found invalid or unenforceable for any reason in any administrative, arbitration, judicial or other proceeding.

(4) Other. Seller agrees: (i) not to challenge the validity or enforceability of the Purchased Patents; and (ii) not to assist any third party (absent Purchaser's express written consent) in any analysis concerning the infringement or non-infringement of the Purchased Patents and/or Purchased Trademarks, or to challenge the validity or enforceability of the Purchased Patents and/or Purchased Trademarks.

(5) No Other Intellectual Property. Seller warrants that to the best of its knowledge the Purchased Intellectual Property includes all the trade secrets, know-how, confidential information, copyrights, trademarks, and patents owned by Seller except for the Excluded Intellectual Property.

(B) Purchaser hereby warrants to Seller as follows:

(1) Authority. Purchaser has the full, sole, and exclusive right and authority to enter into this IPPA and to carry out its obligations hereunder.

(C) Except as expressly provided in this Section 5, nothing in this IPPA shall be construed as:

(1) a warranty or representation by any Party as to the validity, enforceability, or scope of any patent or trademark; or

(2) a requirement that any Party shall file any patent application, secure any patent, or maintain any patent in force (except as provided in Section 4 of this IPPA); or

(3) an obligation to bring or prosecute actions or suits against third parties for infringement of any patent or trademark; or

(D) AS TO THE SUBJECT MATTER OF THIS IPPA, AND EXCEPT AS EXPRESSLY PROVIDED IN THIS SECTION 5, NO PARTY MAKES ANY OTHER REPRESENTATIONS OR WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, OR ASSUMES ANY RESPONSIBILITIES WHATSOEVER WITH RESPECT TO THE COMMERCIAL SUCCESS, USE, SALE, OR OTHER DISPOSITION BY OR FOR ANY OTHER PARTY (OR ITS SUBSIDIARIES) OF PRODUCTS INCORPORATING OR MADE BY THE USE OF THE PURCHASED INTELLECTUAL PROPERTY.

6. **MISCELLANEOUS.**

(a) Limitation on Consequential Damages. NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR LOSS OF PROFITS, OR ANY OTHER INDIRECT, SPECIAL, CONSEQUENTIAL, PUNITIVE OR INCIDENTAL DAMAGES, HOWEVER CAUSED, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. THE PARTIES ACKNOWLEDGE THAT THESE LIMITATIONS ON POTENTIAL LIABILITIES WERE AN ESSENTIAL ELEMENT IN SETTING CONSIDERATION UNDER THIS IPPA. THE AGGREGATE LIABILITY FOR ANY AND ALL CLAIMS RELATED TO OR ARISING UNDER THIS IPPA SHALL NOT EXCEED THE CONSIDERATION TO BE PAID BY PURCHASER TO SELLER UNDER THIS IPPA.

(b) Compliance with Laws. Notwithstanding anything contained in this IPPA to the contrary, the obligations of the Parties shall be subject to all laws, present and future, of any government having jurisdiction over the Parties and this transaction, and to orders, regulations, directions or requests of any such government.

(c) Confidentiality of Terms. For ten (10) years after the Effective Date, the Parties hereto shall keep the terms, but not the existence, of this IPPA confidential and shall not now or hereafter divulge any of this information to any third party except: (a) with the prior written consent of the other Party, such consent shall not be unreasonably withheld; or (b) as otherwise may be required by law or legal process; provided that, in (b) above, (i) the disclosing Party shall use all legitimate and legal means available to minimize the disclosure to third parties, including without limitation seeking a confidential treatment request or protective order whenever appropriate or available; and (ii) the disclosing Party shall, to the extent practical, provide the other Party with at least ten (10) days prior written notice of such disclosure.

(d) Governing Law and Dispute Resolution. Any claim arising under or relating to this IPPA shall not be governed by the provisions of the 1980 United Nations Convention on Contracts for the International Sale of Goods or the United Nations Convention on the Limitation Period in the International Sale of Goods, as amended; rather, these rights and obligations shall be governed in all respects by the laws of the State of California, U.S.A. exclusively, without regard to its conflict-of-law provisions. The courts located within California shall have exclusive jurisdiction to adjudicate any disputes arising out of or in connection with this IPPA; *provided, however,* that Seller shall have the right to seek relief in any court of competent jurisdiction to prevent or enjoin any unauthorized use, disclosure, misappropriation, or infringement of any of the Purchased Intellectual Property. The Parties hereby consent to the personal jurisdiction of the courts located in California for the resolution of disputes hereunder. The prevailing Party in any legal proceedings brought by one Party against the other Party and arising out of or in connection with this IPPA shall be entitled to recover its legal expenses, including court costs and reasonable attorney's fees.

(e) Entire Agreement. The terms and conditions of this IPPA, including its exhibits, constitutes the entire agreement between the Parties with respect to the subject matter hereof, and merges and supersedes all prior and contemporaneous agreements, understandings, negotiations and discussions. Neither of the Parties shall be bound by any conditions, definitions, warranties, understandings, or representations with respect to the subject matter hereof other than as expressly provided herein. The section headings contained in this IPPA are for reference purposes only and shall not affect in any way the meaning or interpretation of this IPPA. No oral explanation or oral information by either Party hereto shall alter the meaning or interpretation of this IPPA. No amendments or modifications shall be effective unless in writing signed by authorized representatives of both Parties. These terms and conditions will prevail notwithstanding any different, conflicting or additional terms and conditions which may appear on any purchase order, acknowledgment or other writing not expressly incorporated into this IPPA. This IPPA may be executed in counterparts, all of which, taken together, shall be regarded as one and the same instrument. Said counterparts together shall constitute one and the same instrument. Such counterparts may be exchanged by fax, or scanned and exchanged by electronic mail, followed up with hard copy, but shall be effective upon receipt of fax/electronic mail as applicable.

(f) Notices. All notices required or permitted to be given hereunder shall be in writing, shall make reference to this IPPA, and shall be delivered by hand, or dispatched by prepaid air courier or by registered or certified airmail, postage prepaid, addressed as follows:

If to Seller:	If to Purchaser:
MagnaCom Ltd.	Avago Technologies General IP (Singapore) Pte. Ltd.
9 Bareket Street Petach-Tikvah, Israel	1 Yishun Avenue 7 Singapore 768923
Attn: Corporate Secretary	Attn: Corporate Secretary

Such notices shall be deemed served when received by addressee or, if delivery is not accomplished by reason of some fault of the addressee, when tendered for delivery. Either Party may give written notice of a change of address and, after notice of such change has been received, any notice or request shall thereafter be given to such Party at such changed address.

(g) Relationship of Parties. The Parties hereto are independent contractors. Neither Party has any express or implied right or authority to assume or create any obligations on behalf of the other or to bind the other to any contract, agreement or undertaking with any third party. Nothing in this IPPA shall be construed to create a partnership, joint venture, employment or agency relationship between Seller and Purchaser.

(h) Severability. The terms and conditions stated herein are declared to be severable. If any paragraph, provision, or clause in this IPPA shall be found or be held to be invalid or unenforceable in any jurisdiction in which this IPPA is being performed, the remainder of this IPPA shall be valid and enforceable and the Parties shall use good faith to negotiate a substitute, valid and enforceable provision which most nearly effects the Parties' intent in entering into this IPPA.

(i) Waiver. Failure by either Party to enforce any term of this IPPA shall not be deemed a waiver of future enforcement of that or any other term in this IPPA or any other agreement that may be in place between the Parties.

(j) Drafted Jointly. Each of the Parties has participated in the negotiation and drafting of this IPPA. In the event that any ambiguity or question of intent or interpretation arises, this IPPA shall be construed as if drafted jointly by all Parties and no rule of construction, presumption or burden of proof shall arise favoring one Party concerning the interpretation of ambiguous provisions or otherwise by virtue of one Party's presumed authorship of this IPPA or any provision hereof.

(k) Equitable Remedies. Each of the Parties acknowledges and agrees that material breach of the obligations hereunder could cause irreparable harm and significant injury that would be difficult to ascertain and may not be compensable by damages alone. Accordingly, the Parties agree that, in addition to any and all legal remedies, for claims regarding rights in the Purchased Intellectual Property, an aggrieved Party may seek remedies by specific performance, injunction or other appropriate equitable relief.

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IN WITNESS WHEREOF, each of the Parties has caused this IPPA to be executed in duplicate originals by its duly authorized representative.

AVAGO TECHNOLOGIES GENERAL IP (SINGAPORE) PTE. LTD.

By: _____

Name: Boaz Eitan
Title: Director
Date: 5/9/16

MAGNACOM LTD.

By: _____

Name:
Title:
Date: _____

IN WITNESS WHEREOF, each of the Parties has caused this IPPA to be executed in duplicate originals by its duly authorized representative.

AVAGO TECHNOLOGIES GENERAL IP (SINGAPORE) PTE. LTD.	MAGNACOM LTD.
By: _____	By: _____
Name:	Name:
Title: Director	Title:
Date: _____	Date: _____

EXHIBIT A

PURCHASED INTELLECTUAL PROPERTY

includes

Patents

MHM No.	Title	Status	Filed	App No.	Pat. No.	Issued	Proj pub
N/A	Apparatus and Method For Efficient Utilization of Bandwidth	Expired	6/20/2012	61/662,085	N/A	N/A	N/A
26396US01	Modulation Scheme Based on Partial Response (v.2.0)	Expired	11/14/2012	61/726,099	N/A	N/A	N/A
26149US01	Modulation Scheme Based on Partial Response (v.2.1)	Expired	11/26/2012	61/729,774	N/A	N/A	N/A
25968US01	Modulation Scheme Based on Partial Response (v.2.2)	Expired	12/28/2012	61/747,132	N/A	N/A	N/A
26533US01	High Spectral Efficiency over Non-Linear, AWGN Channels	Expired	2/24/2013	61/768,532	N/A	N/A	N/A
26636US01	High Spectral Efficiency over Non-Linear, AWGN Channels	Expired	4/3/2013	61/807,813	N/A	N/A	N/A
27224US01	Combined Transmission Precompensation and Nonlinearity Mitigation	Expired	8/15/2013	61/866,076	N/A	N/A	N/A
27495US01	Adaptive Nonlinear Model Learning	Expired	9/9/2013	61/875,174	N/A	N/A	N/A
27749US01	Reception of Inter-Symbol Correlated Signals Using Symbol-By-Symbol Soft-Output Demodulator	Expired	11/1/2013	61/898,997	N/A	N/A	N/A
27763US01	Modulation and Reconstruction Approaches for Achieving High Spectral Efficiency over non-linear, AWGN channels (WAM paper for Google)	Expired	11/2/2013	61/903,701	N/A	N/A	N/A
27916US01	High Spectral Efficiency over Non-Linear, AWGN Channels	Expired	1/13/2014	61/926,666	N/A	N/A	N/A
27920US01	Communication Methods and Systems for Nonlinear Multi-User Environments	Expired	1/21/2014	61/929,679	N/A	N/A	N/A
27932US01	Sequence Estimation of Inter-Carrier Interference for Mitigating the Impact of Doppler Spread	Expired	1/28/2014	61/932,604	N/A	N/A	N/A
28099US01	Acquisition of Nonlinearity in Electronic Communication Devices	Expired	4/29/2014	61/985586	N/A	N/A	N/A
28100US01	Signal Acquisition in a Multimode Environment	Expired	5/6/2014	61/989,122	N/A	N/A	N/A
28297US01	Orthogonal Frequency Division Multiplexing Over Nonlinear Channels (Baseline)	Expired	7/29/2014	62/030,145	N/A	N/A	N/A
28305US01	Orthogonal Frequency Division Multiplexing Over Nonlinear Channels (more redactions)	Expired	8/5/2014	62/033,149	N/A	N/A	N/A
28304US01	Orthogonal Frequency Division Multiplexing Over Nonlinear Channels (some redactions)	Expired	8/14/2014	62/037177	N/A	N/A	N/A
28319US01	Multiple Input Multiple Output Communications Over Nonlinear Channels Using Orthogonal Frequency Division Multiplexing (Baseline)	Expired	8/27/2014	62/042286	N/A	N/A	N/A
28353US01	Signal Shaping for OFDM Communications	Expired	8/27/2014	62/042356	N/A	N/A	N/A
28354US01	Single Carrier Communications Harnessing Nonlinearity	Expired	8/27/2014	62/042458	N/A	N/A	N/A
28355US01	OFDM Communications Harnessing Nonlinearity (Qualcomm presentation)	Expired	8/27/2014	62/042405	N/A	N/A	N/A
28349US01	Communications in a Multi-User Environment	Expired	9/2/2014	62/044457	N/A	N/A	N/A

28438US01	Multiple Input Multiple Output Communications Over Nonlinear Channels Using Orthogonal Frequency Division Multiplexing	Expired	9/9/2014	62/047721	N/A	N/A	N/A
28439US01	Single Carrier Communications Harnessing Nonlinearity (	Expired	9/10/2014	62/048329	N/A	N/A	N/A
28437US01	Multiple Input Multiple Output Communications Over Nonlinear Channels Using Orthogonal Frequency Division Multiplexing	Expired	9/12/2014	62/049428	N/A	N/A	N/A
28726US01	Communicatoin System and Method (White paper)	Expired	1/2/2015	62/099,336	N/A	N/A	N/A
28739US01	Method and System for Multi-Carrier Communications (QCOM)	Expired	1/13/2015	62/102.752	N/A	N/A	N/A
28924US01	Transmitter Signal Shaping	Pending	3/2/2015	62/126,881	N/A	N/A	N/A
29181US01	Signal Shaping for Code Division Multiple Access Systems	Pending	5/11/2015	62/159,610	N/A	N/A	N/A
60194US01	Systems and Methods for Multi-Mode Communications	Pending	11/13/2015	62,266,345	N/A	N/A	N/A
60303US01	Distortion Mitigating Multi-Carrier Receiver	Pending	12/11/2015	62/266345	N/A	N/A	N/A
26150US02	Low-Complexity, Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/754,964	8582637	11/12/2013	
26151US02	Design and Optimization of Partial Response Pulse Shape Filter	Granted	1/31/2013	13/754,998	8897387	11/25/2014	
26152US02	Constellation Map Optimization for Highly Spectrally Efficient Communications	Granted	1/31/2013	13/755,001	8675769	3/18/2014	
26153US02	Dynamic Filter Adjustment for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,008	8571131	10/29/2013	
26156US02	Timing Synchronization for Reception of Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,011	8559494	10/15/2013	
26157US02	Signal Reception Using Non-Linearity-Compensated, Partial Response Feedback	Granted	1/31/2013	13/755,014	8559496	10/15/2013	
26158US02	Feed Forward Equalization for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,018	8599914	12/3/2013	
26159US02	Decision Feedback Equalizer for Highly Spectrally Efficient Communications	Granted	1/31/2013	13/755,021	8665941	3/4/2014	
26160US02	Decision Feedback Equalizer with Multiple Cores for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,025	8873612	10/28/2014	
26161US02	Decision Feedback Equalizer Utilizing Symbol Error Rare Biased Adaptation Function for Highly Spectrally Efficient Communications	Granted	1/31/2013	13/755,026	8559498	10/15/2013	
26163US02	Coarse Phase Estimation for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,028	8548097	10/1/2013	
26164US02	Fine Phase Estimation for Highly Spectrally Efficient Communications	Granted	1/31/2013	13/755,039	8565363	10/22/2013	
26165US02	Multi-Mode Transmitter for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,972	8744003	6/3/2014	
26166US02	Joint Sequence Estimation of Symbol and Phase with High Tolerance of Nonlinearity	Granted	1/31/2013	13/755,043	8605832	12/10/2013	
26168US02	Adaptive Non-Linear Model for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,050	8553821	10/8/2013	
26169US02	Pilot Symbol-Aided Sequence Estimation for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,052	8824599	9/2/2014	
26170US02	Reduced State Sequence Estimation with Soft Decision Outputs	Granted	6/20/2013	13/922,329	8666000	3/4/2014	
26171US02	M & S for Corrupt Symbol Handling for Providing High Reliability	Granted	1/31/2013	13/755,054	8571146	10/29/2013	

	Sequences						
26172US02	M & S for Forward Error Correction Decoding with Parity Check for use in Low Complexity Highly-Spectrally Efficient Communications	Granted	1/31/2013	13/755,060	8566687	10/22/2013	
26174US02	M & S for Quality of Service (QOS) Awareness in a Single Channel Communication System	Pending	1/31/2013	13/755,061			TBD
26467US02	Pilot Symbol Generation for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,079	8665992	3/4/2014	
26468US02	Timing Pilot Generation for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/755,065	8548072	10/1/2013	
26469US02	Multi-Mode Receiver for Highly-Spectrally-Efficient Communications	Granted	1/31/2013	13/756,010	8842778	9/23/2014	
26470US02	Forward Error Correction with Parity Check Encoding for use in Low Complexity Highly-Spectrally Efficient Communications	Granted	1/31/2013	13/755,068	8572458	10/29/2013	
26480US02	Highly-Spectrally-Efficient Receiver	Granted	1/31/2013	13/756,469	8526523	9/3/2013	
26552US02	Highly-Spectrally-Efficient Transmission Using Orthogonal Frequency Division Multiplexing	Granted	6/19/2013	13/921,665	8781008	7/15/2014	
26650US02	Highly-Spectrally-Efficient Reception Using Orthogonal Frequency Division Multiplexing	Granted	6/19/2013	13/921,710	8737458	5/27/2014	
26651US02	CON OF: Communication Methods and Systems for Nonlinear Multi-User Environments	Granted	6/19/2013	13/921,749	8831124	9/9/2014	
26652US02	Multi-Mode Orthogonal Frequency Division Multiplexing Receiver for Highly-Spectrally-Efficient Communications	Granted	6/19/2013	13/921,813	8681889	3/25/2014	
26167US02	Hypothesis Generation Based on Multidimensional Slicing	Granted	11/13/2013	14/079,304	8811548	8/19/2014	
27764US01	Hypothesis Generation Based on Multidimensional Slicing	Granted	11/13/2013	14/079,465	8804879	8/12/2014	
28007US01	Nonlinearity Compensation For Reception of OFDM Signals	Granted	6/6/2014	14/298,373	8891701	11/18/2014	
27224US02	Combined Transmission Precompensation and Nonlinearity Mitigation	Pending	8/15/2014	14/461,090			published
27495US02	Adaptive Nonlinear Model Learning	Pending	9/9/2014	14/481,108			published
27749US02	Reception of Inter-Symbol Correlated Signals Using Symbol-by-Symbol Soft Demodulator	Granted	10/24/2014	14/522,826	9118519	8/25/2015	
28466US01	Dynamic Configuration of Modulation and Demodulation	Granted	12/8/2014	14/563,046	9276619	3/21/2016	
28318US01	High Performance Sequence Estimation and Method of Operation (M-Viterbi)+C125	Granted	12/9/2014	14/564,187	9191247	11/17/2015	
27920US02	Communication Methods and Systems for Multi-User Nonlinear Environments	Granted	1/20/2015	7/20/2016	9130637	9/8/2015	
28099US02	Acquisition of Nonlinearity in Electronic Communication Devices	Pending	3/15/2015	14/659,797			published
28353US02	Transmitter Signal Shaping	Granted	4/15/2015	14/687,861	9246523	1/26/2016	
28100US02	Signal Acquisition in a Multimode Environment	Pending	5/5/2015	14/704,260			published
28942US01	Distortion Reduction Scheme for Transmission of Data	Pending	5/15/2015	14,713,091			11/5/2016
28923US01	Digital Emulation for a Desired Transmission Response	Pending	6/15/2015	14/739,557			12/15/2016

28297US02	Orthogonal Frequency Divsion Multiplexing Based Communications Over Nonlinear Channels	Pending	7/27/2015	14/809,408	1/9/2016
28354US02	Single Carrier Communications Harnessing Nonlinearity	Pending	8/21/2015	14/832,094	2/21/2017
28319US02	MIMO over Nonlinear Channels Using OFDM	Pending	8/26/2015	14/836,366	2/27/2017
28349US02	Communications in a Multi-User Environment	Pending	9/2/2015	14/843,217	3/10/2016
29908US01	Distortion Mitigation Scheme for Network Operation	Pending	9/9/2015	14/848,519	3/9/2017
29918US01	Transmitter Distortion Management	Pending	9/11/2015	14/851,162	3/11/2017
26150WO01	Low-Complexity, Highly-Spectrally-Efficient Communications	Filed	6/14/2013	PCT/IB2013/001860	
26165WO01	Multi-Mode Transmitter for Highly-Spectrally-Efficient Communications	Filed	6/14/2013	PCT/IB2013/002081	
26469WO01	Multi-Mode Receiver for Highly-Spectrally-Efficient Communications	Filed	6/14/2013	PCT/IB2013/001930	
26480WO01	Highly-Spectrally-Efficient Receiver	Filed	6/14/2013	PCT/IB2013/001970	
26552WO01	Highly-Spectrally-Efficient Transmission Using Orthogonal Frequency Division Multiplexing	Filed	6/19/2013	PCT/IB2013/001866	
26166WO01	Joint Sequence Estimation of Symbol and Phase with High Tolerance of Nonlinearity	Filed	6/20/2013	PCT/IB2013/001923	
26168WO01	Adaptive Non-Linear Model for Highly-Spectrally-Efficient Communications	Filed	6/20/2013	PCT/IB2013/001878	
26650WO01	Highly-Spectrally-Efficient Reception Using Orthogonal Frequency Division Multiplexing	Filed	6/20/2013	PCT/IB2013/002383	
27224WO01	Combined Transmission Precompensation and Receiver Nonlinearity Mitigation	Filed	8/15/2014	PCT/IB2014/002449	
27495WO01	Adaptive Nonlinear Model Learning	Filed	9/9/2014	PCT/IB2014/002688	
27920WO01	Communication Methods and Systems for Nonlinear Multi-User Environments	Filed	1/21/2015	PCT/US2015/012159	
28099WO01	Acquisition of Nonlinearity in Electronic Communication Devices	Filed	4/29/2015	PCT/US2015/028122	
28297WO01	Orthogonal Frequency Divsion Multiplexing Based Communications Over Nonlinear Channels	Filed	7/28/2015	PCT/US2015/42351	
28319WO01	MIMO over Nonlinear Channels Using OFDM	Filed	8/26/2015	PCT/US2015/46934	
28353WO01	Transmitter Signal Shaping	Filed	8/26/2015	PCT/US2015/46965	
28349WO01	Communications in a Multi-User Environment	Filed	9/2/2015	PCT/US2015/48036	
26150CN01 PWD93180	Low-Complexity, Highly-Spectrally-Efficient Communications	Allowed	6/20/2013	201310364164.8	
26480CN01	Highly-Spectrally-Efficient Receiver	Filed	6/14/2013	201380041271.5	
26552CN01	Highly-Spectrally-Efficient Transmission Using Orthogonal Frequency Division Multiplexing	Filed	6/19/2013	201380041352.5	
26168CN01	Adaptive Non-Linear Model for Highly-Spectrally-Efficient Communications	Filed	6/20/2013	201380041406.8	
26650CN01	Highly-Spectrally-Efficient Reception Using Orthogonal Frequency Division Multiplexing	Filed	6/20/2013	201380042013.9	
26166CN01	Joint Sequence Estimation of Symbol and Phase with High Tolerance of Nonlinearity	Filed	6/20/2013	201380042032.1	

26469CN01	Multi-Mode Receiver for Highly-Spectrally-Efficient Communications	Filed	6/14/2013	201380042435.6		
26165CN01	Multi-Mode Transmitter for Highly-Spectrally-Efficient Communications	Filed	6/15/2013	201380043457.4		
26150EP01	Low-Complexity, Highly-Spectrally-Efficient Communications	Filed	6/14/2013	13806280.7		
26469EP01	Multi-Mode Receiver for Highly-Spectrally-Efficient Communications	Filed	6/14/2013	13806419.1		
26165EP01	Multi-Mode Transmitter for Highly-Spectrally-Efficient Communications	Filed	6/14/2013	13807399.4		
26650EP01	Highly-Spectrally-Efficient Reception Using Orthogonal Frequency Division Multiplexing	Filed	6/20/2013	13812878.0		
26166EP01	Joint Sequence Estimation of Symbol and Phase with High Tolerance of Nonlinearity	Filed	6/20/2013	13822179.1		
26480EP01	Highly-Spectrally-Efficient Receiver	Filed	6/14/2013	13822356.5		
26552EP01	Highly-Spectrally-Efficient Transmission Using Orthogonal Frequency Division Multiplexing	Filed	6/19/2013	13823230.1		
26168EP01	Adaptive Non-Linear Model for Highly-Spectrally-Efficient Communications	Filed	6/20/2013	13823700.3		
26168KR01	Adaptive Non-Linear Model for Highly-Spectrally-Efficient Communications	Filed	6/20/2013	10-2015-7001543		
26480US03	CON OF: Highly-Spectrally-Efficient Receiver	Granted	9/3/2013	14/016,732	8675782	3/18/2014
26163US03	CON OF: Coarse Phase Estimation for Highly-Spectrally-Efficient Communications	Granted	9/30/2013	14/041,064	9106292	8/11/2015
26468US03	CON OF: Timing Pilot Generation for Highly-Spectrally-Efficient Communications	Granted	9/30/2013	14/040,983	8824572	9/2/2014
26168US03	CON OF: Adaptive Non-Linear Model for Highly-Spectrally-Efficient Communications	Granted	10/7/2013	14/047,328	8824611	9/2/2014
26161US03	CON OF: DFE Utilizing Symbol Error Rare Biased Adaptation Function for Highly Spectrally Efficient Communications	Granted	10/7/2013	14/052,848	8885698	11/11/2014
26156US03	CON OF: Timing Synchronization for Reception of Highly-Spectrally-Efficient Communications	Granted	10/14/2013	14/052,862	9071305	6/30/2015
26157US03	CON OF: Signal Reception Using Non-Linearity-Compensated, Partial Response Feedback	Granted	10/14/2013	14/052,859	8976853	3/10/2015
26164US03	CON OF: Fine Phase Estimation for Highly Spectrally Efficient Communications	Granted	10/18/2013	14/057,080	8885786	11/11/2014
26172US03	CON OF: M & S for FEC Decoding with Parity Check for use in Low Complexity Highly-Spectrally Efficient Communications	Granted	10/18/2013	14/057,098	8972836	3/3/2015
26153US03	CON OF: Dynamic Filter Adjustment for Highly-Spectrally-Efficient Communications	Granted	10/28/2013	14/064,314	8982984	3/17/2015
26470US03	CON OF: FEC with Parity Check Encoding for use in Low Complexity Highly-Spectrally Efficient Communications	Granted	10/28/2013	14/064,351	9003258	4/7/2015
26171US03	CON OF: M & S for Corrupt Symbol Handling for Providing High Reliability Sequences	Granted	10/28/2013	14/064,334	9166834	10/20/2015
26150US03	CON OF: Low-Complexity, Highly-Spectrally-Efficient Communications	Granted	11/8/2013	14/074,878	9231628	1/5/2016

26158US03	CON OF: Feed Forward Equalization for Highly-Spectrally-Efficient Communications	Granted	12/2/2013	14/093,558	9166833	10/20/2015	
26166US03	CON OF: Joint Sequence Estimation of Symbol and Phase with High Tolerance of Nonlinearity	Granted	12/9/2013	14/100,060	8976911	3/10/2015	
26170US03	CON OF: Reduced State Sequence Estimation with Soft Decision Outputs	Granted	2/24/2014	14/187,436	8948321	2/3/2015	
26467US03	CON OF: Pilot Symbol Generation for Highly-Spectrally-Efficient Communications	Pending	2/24/2014	14/187,532			published
26159US03	CON OF: Decision Feedback Equalizer for Highly Spectrally Efficient Communications	Granted	2/24/2014	14/187,478	8897405	11/25/2014	
26152US03	CON OF: Constellation Map Optimization for Highly Spectrally Efficient Communications	Granted	3/17/2014	14/215,282	9137057	9/15/2015	
26480US04	CON OF: Highly-Spectrally-Efficient Receiver	Granted	3/17/2014	14/215,448	9100795	9/8/2015	
26652US03	CON OF: Highly-Spectrally-Efficient Transmission Using Orthogonal Frequency Division Multiplexing	Granted	3/24/2014	14/222,378	9088469	7/21/2015	
26650US03	CON OF: Highly-Spectrally-Efficient Reception Using Orthogonal Frequency Division Multiplexing	Granted	5/27/2014	14/287,258	9124399	9/1/2015	
26165US03	CON OF: Multi-Mode Transmitter for Highly-Spectrally-Efficient Communications	Granted	5/30/2014	14/291,065	9270416	2/23/2016	
27764US02	CON OF: Hypotheses Generation Based on Multidimensional Slicing	Granted	7/9/2014	14/326,708	9215102	12/15/2015	
26552US03	CON OF: Highly-Spectrally-Efficient Transmission Using Orthogonal Frequency Division Multiplexing	Granted	7/11/2014	14/329,100	9219632	12/22/2015	
26167US03	CON OF: Hypotheses Generation Based on Multidimensional Slicing	Granted	8/18/2014	14/461,487	9088400	7/21/2015	
26169US03	CON OF: Pilot Symbol-Aided Sequence Estimation for Highly-Spectrally-Efficient Communications	Pending	8/29/2014	14/472,550			any time now
26168US04	CON OF: Adaptive Non-Linear Model for Highly-Spectrally-Efficient Communications	Granted	8/29/2014	14/472,559	9252822	2/2/2016	
26468US04	CON OF: Timing Pilot Generation for Highly-Spectrally-Efficient Communications	Granted	8/29/2014	14/472,538	9100071	8/4/2015	
26651US03	CON OF: Multi-Mode Orthogonal Frequency Division Multiplexing Transmitter for Highly-Spectrally-Efficient Communications	Pending	9/8/2014	14/479,428			published
26469US03	CON OF: Multi-Mode Receiver for Highly-Spectrally-Efficient Communications	Granted	9/22/2014	14/492,133	9130627	9/8/2015	
26160US03	CON OF: Decision Feedback Equalizer with Multiple Ccores for Highly-Spectrally-Efficient Communications	Pending	10/27/2014	14/524,078			published
26161US04	CON OF: Decision Feedback Equalizer Utilizing Symbol Error Rate Biased Adaptation Function for Highly Spectrally Efficient Communications	Pending	11/10/2014	14/537,193			published
26164US04	CON OF: Fine Phase Estimation for Highly-Spectrally Efficient Communications	Granted	11/10/2014	14/537149	9209843	12/9/2015	
28007US02	CON OF: Nonlinearity Compensation For Reception of OFDM Signals	Granted	11/14/2014	14,541,312	9270512	2/23/2016	
26159US04	CON OF: Decision Feedback Equalizer for Highly Spectrally Efficient Communications	Granted	11/24/2014	14/551,393	9264179	2/16/2016	

26151US03	CON OF: Desgin and Optimization of Partial Response Pulse Shaped Filter	Pending	11/24/2014	14/551,466	published
26170US04	CON OF: Reduced State Sequence Estimation with Soft Decision Outputs	Allowed	1/30/2015	14/609,655	published
26172US04	CON OF: M & S for FEC Decoding with Parity Check for use in Low Complexity Highly-Spectrally Efficient Communications	Pending	3/2/2015	14/635,736	any time now
26157US04	CON OF: Signal Reception Using Non-Linearity-Compensated, Partial Response Feedback	Pending	3/9/2015	14/641,778	published
26166US04	CON OF: Joint Sequence Estimation of Symbol and Phase with High Tolerance of Nonlinearity	Allowed	3/9/2015	14/641,895	published
28006US02	CON OF: Throughput Scaling in a Receiver	Pending	4/14/2015	14/686,254	published
27749US03	CON OF: Reception of Inter-Symbol Correlated Signals Using Symbol-by-Symbol Soft-Output Demodulator	Pending	8/24/2015	14/833,427	2/18/2016
27920US03	CON OF: Communication Methods and Systems for Nonlinear Multi-User Environments	Pending	9/8/2015	14,847,841	any time now
28318US02	CON OF: High Performance Sequence Estimation and Method of Operation (M-Viterbi)	Pending	11/16/2015	14/941,728	6/9/2016
27920US04	CON OF: Communication Methods and Systems for Nonlinear Multi-User Environments	Pending	11/23/2015	14/948,465	any time now
26651US04	CON OF: Multi-Mode Orthogonal Frequency Division Multiplexing Transmitter for Highly-Spectrally-Efficient Communications	Pending	11/25/2015	14/951,579	any time now
27764US03	CON OF: Hypotheses Generation Based on Multidimensional Slicing	Pending	12/14/2015	14/967,671	any time now

Trademarks

Mark/Name	Design	Status/Status Date	Mark/Name/AN/RN	Design
WAM	WAM	Allowed - Intent to Use Notice of Allowance Issued July 14, 2015	WAM SN: 86091572	WAM
PAE-BOOSTER	PAE-Booster	Pending - Non-Final Action Mailed July 12, 2015	PAE-BOOSTER SN: 86585153	PAE-Booster
OFD-WAM	OFD-WAM	Pending - Non-Final Action Mailed June 28, 2015	OFD-WAM SN: 86567086	OFD-WAM

** End of Exhibit A **

EXHIBIT B

Excluded Intellectual Property

None.