PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT3738331

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
SERGEY SARDARYAN	01/01/2012

RECEIVING PARTY DATA

Name:	XCELOR LLC
Street Address:	500 W. MONROE ST.
Internal Address:	SUITE 2630
City:	CHICAGO
State/Country:	ILLINOIS
Postal Code:	60661

PROPERTY NUMBERS Total: 5

Property Type	Number
Application Number:	62204350
Application Number:	14877695
Application Number:	62204353
Application Number:	14877704
Application Number:	15014613

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:	3125857909
Email:	olga@inventionmine.com
Correspondent Name:	INVENTION MINE LLC
Address Line 1:	216 S. JEFFERSON ST.
Address Line 2:	SUITE 102
Address Line 4:	CHICAGO, ILLINOIS 60661

ATTORNEY DOCKET NUMBER:	XLR-71065US01
NAME OF SUBMITTER:	ROBERT J. IRVINE III
SIGNATURE:	/Robert J. Irvine III/
DATE SIGNED:	02/12/2016

Total Attachments: 14

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DEVELOPMENT AGREEMENT

This Development Agreement ("Agreement") is made and entered into on September 18, 2012 and effective as of January 1, 2012, between xColor LLC, having its offices at 500 West Monroe, Suite 2630, Chicago, Illinois 60661 ("Customer"), and LDA Technologies LLC, having its offices at 65-10460 No. 3 Road Richmond, BC V7A, Canada ("Developer"). Customer and Developer are hereinafter collectively referred as "Parties" and individually as "Party".

RECITALS

WHEREAS, an affiliate of Customer, CMT US Holdings LLC, entered into Term Sheets with Developer as of November 17, 2010, May 27, 2011, September 1, 2011, and December 1, 2011 (the "Term Sheets") under which Developer developed certain software/intellectual property for CMT US Holdings LLC;

WHEREAS, CMT US Holdings LLC and Developer jointly owned the software developed under the Term Sheets and have or will each transfer and assign all of their respective right, title, and interest in such software to Customer;

WHEREAS, Customer now intends to engage Developer as an independent contractor to develop software and hardware mutually agreed upon by the Parties (such: (i) software — including without limitation, computer programs, applications, and interfaces, whether in source code or object code, and all related documentation, developer's tools, and user and operational guides and manuals — and other material, including documentation, information (including technical information and confidential information), data, formulas, methodologies, materials, domain names, trademarks, service marks, trade dress, inventions, invention disclosures, original works of authorship, developments, concepts, improvements and trade secrets developed pursuant to this Agreement; and (ii) hardware including without limitation, HDL and Verilog code and physical circuitry developed pursuant to this Agreement, with such "software" and "hardware" being collectively referred to herein as the "Product"));
and

WHEREAS, Developer desires to develop the Product for Customer on the terms and conditions set forth in this Agreement.

NOW THEREFORE, the Parties agree to be legally bound as follows.

1.   **SCOPE OF THE SERVICES.**

(a)   The Parties agree that the Product will be developed in separate "projects" (collectively, the "Projects"). Each Project will be added to Exhibit A and Developer agrees to implement each such Project in the phases and according to the milestones set forth in Exhibit A. Developer and Customer agree that Developer may work on multiple Projects simultaneously.

(b)   The Parties agree that they will meet on a monthly basis to discuss the Projects (the "Monthly Meetings"). At each Monthly Meeting, Developer agrees to present and discuss completed milestones, and Developer and Customer will mutually agree upon milestones for the next month.

(c)   The Parties agree that they will also have a "special meeting" in December of each year in order to discuss anticipated Projects and fees for the following year.

(d)   The Product shall be subject to acceptance testing and acceptance by Customer; Developer shall correct and re-perform any Product that is not accepted.

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2. OWNERSHIP OF PRODUCT.

(a)   Customer shall own the exclusive right, title, and interest in and to the Product and any other materials developed pursuant to this Agreement or any of the activities contemplated hereby or carried out pursuant hereto or that is incorporated into any of the foregoing, and all intellectual property and other proprietary rights in and to the foregoing (collectively, the "Deliverables"). To the extent that, notwithstanding the foregoing, Developer obtains any right, title, or interest in or to any Deliverable, Developer hereby assigns to Customer all of Developer's right, title, and interest in and to any and all Deliverables. Developer further acknowledges that all original works of authorship which are made by Developer and included in the Deliverables and which are protectable by copyright are "works made for hire," as that term is defined in the United States Copyright Act.

(b)   Developer agrees to assist Customer, or its designee, at Customer's expense, in every proper way to secure Customer's rights in the Deliverables and any copyrights, patents, or other intellectual property rights relating thereto in any and all countries, including the disclosure to Customer of all pertinent information and data with respect thereto, the execution of all applications, specifications, oaths, assignments, and other instruments which Customer shall deem necessary in order to apply for and obtain such rights and in order to assign and convey to Customer, its successors, assigns and nominees the sole and exclusive rights, title and interest in and to such Deliverables, and any copyrights, patents, or other intellectual property rights relating thereto. If Customer is unable because of Developer's mental or physical incapacity or for any other reason to secure Developer's signature to apply for or to pursue any application for any United States or foreign patents or copyright or trademark registrations covering the Deliverables or original works of authorship assigned to Customer as above, then Developer irrevocably designates and appoints Customer and its duly authorized officers and agents as Developer's agent and attorney in fact, to act for and in Developer's behalf and stead to execute and file any such applications and to do all other lawfully permitted acts to further the prosecution and issuance of letters patent or copyright or trademark registrations thereon with the same legal force and effect as if executed by Developer. Developer shall not at any time hereafter claim or purport to claim directly or indirectly in any manner whatsoever any right, title, interest into, over or upon the Deliverables. Developer shall not take any action to jeopardize, encumber, limit, or interfere in any manner with Customer's ownership rights with respect to the Deliverables, or any derivative work thereof.

(c)   Developer shall (and shall cause its applicable affiliate(s) to) enter into written agreements with each affiliate, employee, agent, consultant, representative, or other person that is involved with the development of the Deliverables (collectively, "Authorized Persons") that incorporates the terms of this Section 2 so that each such Authorized Person is bound by such terms in the same manner that Developer is bound. Developer shall make Customer an express third-party beneficiary of each such agreement with such Authorized Person. Upon Customer's request, Developer shall provide Customer with copies of each such agreement with the Authorized Persons; provided that Developer may redact appropriate financial information.

(d)   Developer is not granted any license or other right to use or exploit all or any portion of the Deliverables, other than for the sole purpose of performing its obligations under this Agreement. Developer may request a partial or full license to use the Product, which such license may or may not be granted in the Customer's sole discretion.

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6. OWNERSHIP OF BACKGROUND TECHNOLOGY / DEVELOPER REPRESENTATIONS AND WARRANTIES.

(a)   Developer represents and warrants that it owns or holds a license to use and sublicense various preexisting development tools, routines, subroutines, and other programs, data, code, information, and any other material that Developer may include in the Deliverables. This material shall be referred to as "Background Technology." Developer retains all right, title, and interest, including all copyright, patent rights, and trade secret rights in the Background Technology. Subject to the payment of the fees set forth in Exhibit A, Developer hereby grants to Customer a non-exclusive, royalty-free, perpetual, irrevocable, sublicensable, worldwide license to use, reproduce, create derivative works of, adapt, and distribute the Background Technology in the Product developed for and delivered to Customer under this Agreement, and all updates and revisions thereto.

(b)   Developer represents and warrants that (i) the Deliverables delivered hereunder does not or shall not infringe, misappropriate, or conflict with any intellectual property or other right of any third party; (ii) the Deliverables transferred and assigned hereunder is Developer's original work and Developer has the power and authority to assign all right, title and interest in and to the Deliverables to Customer in accordance with this Agreement; (iii) Developer has no knowledge of any third-party intellectual property infringement claims, lawsuits, or demands arising under or in connection with the Deliverables; (iv) Developer has the right, authority, and power to enter into this Agreement; (v) no third-party consents, assignments, or licenses are necessary to perform under this Agreement or use or otherwise exploit the Deliverables; and (vi) Developer has no obligations to any employer (whether by law or by contract) that could in any way prohibit Developer from assigning the Deliverables to the Customer. Developer agrees to immediately notify Customer in writing if any facts or circumstances arise that would make any of the representations in this Agreement inaccurate in any way.

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(b)   Executed facsimile or .pdf signature pages of this Agreement and any related documents shall have the same legal force and effect as executed originals.

24.   **RETROACTIVE EFFECT**. The Parties agree that this Agreement shall have retroactive effect from January 1, 2012.

* * * * *

IN WITNESS WHEREOF, THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT ON THE DATE FIRST ABOVE WRITTEN

LDA Technologies LLC

By: _____
Name: Sergey Sardaryan
Title: _Co-owner_

By: _____
Name: Vahan Sardaryan
Title: _Co-owner_

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Execution Copy

IN WITNESS WHEREOF, THE PARTIES HAVE EXECUTED AND DELIVERED THIS
AGREEMENT ON THE DATE FIRST ABOVE WRITTEN

xCelor LLC

By: GTO LLC

By: _____
    Name: Jan-Dirk Lueders
    Title: Managing Member of GTO LLC

By: _____
    Name: Scott A. Casto
    Title: Managing Member of GTO LLC

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EXHIBIT A

Projects

Project	Fees	Description/Milestones
January and February 2012	$35,000/ paid on 1/26/12 and $35,000/ paid on 3/7/12	1. Build a platform on Arista switch FPGA. FPGA image should be able to use dedicated memory and work with 10 gigabit Ethernet ports connected to the FPGA. 2. Embedded operating system should be running on the FPGA, like it is done on Virtex 6 platforms. 3. Embedded operating system should implement a TCP/IP stack, and must be visible from external devices. 4. Communication between FPGA and main switch should be investigated. It could be either PCI Express, or Ethernet communication. This deliverable must ensure Customer has means to retrieve important information from switch, such as routes, and/or Customer has possibility to store data on switch's storage device.
March 2012	$71,000/paid on 3/28/12	Market feed development: 1. Made Niche TCP stack work with Customer's platform 2. Started porting of embedded software part of market feed handler 3. UDP multicast handler porting 80% done 4. Started research on book building algorithm on FPGA. TCP evaluation: 1. Made changes to run the existing IP on Stratix IV board (PLDA evaluation platform) 2. Integrated TOE into Customer's IP. Found couple of bugs in TOE that are reported to PLDA. Waiting for fixes 3. Started development of exchange connectivity protocols on FPGA. OUCH protocol login part almost done 4. Made good progress with simulation environment for both exchange protocols, and PLDA latency measurement
April 2012	$71,000/paid on 5/8/12	Market feed development: 1. Memory controllers on the switch optimized; now the memory access speed is comparable with Xilinx implementation. 2. Multicast handling and business logic porting mostly done 3. Embedded software porting 70% done 4. NASDAQ native re-broadcast feed generator designed, implementation started 5. Book building in FPGA algorithm being designed; shortlisted some ideas, need prototyping to choose the right ones 6. Control software on Arista host operating system 50% done;

		ported existing configuration part, CLI interface still TBD 7. Preliminary ideas on proprietary re-broadcasting protocol; TBD during Sergey's visit to Chicago TCP evaluation: 1. Implemented NASDAQ OUCH protocol on TOE; no orders, opens connection and heat beating for whole day 2. Simulation environment finalized. TPE latencies measured, fully suitable for use in future products 3. There is a small outstanding task for May: receive fully-functional TOE from PLDA and run tests again, plus measure its footprint on FPGA; we'll do them in parallel with other development
May 2012	$74,000/paid on 5/31/12	NASDAQ re-broadcaster on Arista switch: 1. Embedded software porting almost finished. GLIMPSE working, configuration received through PCI Express bus. Still pending some new features: broadcast address configuration, symbol groups, etc. 2. Additionally: implemented GLIMPSE through PLDA TCP offload engine. Now switch is able to start in less than 1 second, vs. 5+ seconds with software stack. This was also a good test for TOE itself. It is our choice whether to use software or hardware-accelerated GLIMPSE (in latter case we must purchase a license from PLDA) 3. All 3 native rebroadcast strategies now work and can be observed on capture files 4. We continue research on book building algorithms and proprietary re-broadcast feed. No final answer yet, but looks like we should do some "high-frequency-specific" symbols, which can be built in FPGA at the same speed, or faster than on general CPU. In generic case, if we count all possible stocks, including, for example, A-shares of big companies, we'll slow down dramatically. Final decision will be communicated soon 5. We redesigned the buffering logic on Customer's feed handlers. The reason is that switch must be more robust than the cards: if 1 channel loses a packet, all others should continue working normally. This feature is not particularly important on NASDAQ (unless customers do BX in parallel), but will become critical with ARCA, BATS and Direct Edge. Also this feature gives a small speed-up in processing. When done, 10 gig cards will also get this improvement. CME feed: 6. Initial feed analysis in progress 7. Started designing configurable FAST de-compressor (rules published by CME in special configuration file) 8. Started implementation of multicast support for CME (many channels, schemas different from what we had before) 9. Derivatives API design in progress
June 2012	$74,000/paid 7/9/12	Arista rebroadcast solution is done, the following milestones will be completed during July:

		1. We found a very good book building algorithm in FPGA! On most symbols (excluding weird ones like BRK.A, price ~100K) it has the same performance as newest CPU, or even better. So, we'll have a good proprietary rebroadcast format as well, and we can create custom ticker plants if customers need them. Implementation still in progress 2. Arista CLI in Python. CME feed handler: 1. Written a lot of code to parse CME feed in FPGA. Simulation in progress, will be putting it to real FPGA soon 2. First draft of derivatives support AP created. 3. Feed analysis in progress to define best decompression strategy.
July 2012	$82,000	Stratix V cards: 1. Ported all Stratix V from Arista switch to the new 10 gig cards 2. API library changes to transparently support new cards. Will eliminate all necessary porting work if Customer decides to replace some of its 1 gig cards by 10 gig, but keep others 3. Replaced costly operating system and Interniche TCP/IP stack by free SuperLoop component and older version of the same stack licensed by Altera: 35,000 savings in licensing costs. The changes will work on Arista switch as well 4. Optimizations done to increase the speed of NASDAQ Glimpse connection. Achieved speeds make the use of TCP offload engine unnecessary even on switch: when Customer begins selling Arista switches, savings on licensing fees will be really big. 5. Completely replaced IP protections schema, due to Altera's inability to deliver full IP encryption package. Current one is polynomial-based and protects Customer from customers who want to buy empty cards and replicate contents. 6. Redesigned the method of firmware loading; due to critical differences in design of new boards from PLDA. Now we load the image through PCI Express, card starts in fraction of second 7. Made PCI Express work with new Altera IP cores. Potentially it is PCIe 3 ready, but currently Altera has problems and we're using it in PCIe 2 mode. CME feed handler: 1. Implementation and simulation in progress for various FAST decompression routines in hardware 2. Protocol designed to describe the FAST decompression schema from software/CME's config files to hardware. This is basically a custom instruction generator that will allow FPGA to parse the messages and be independent on CME's daily changes to compression schemas 3. Networking part 80% done: line arbitration between A and B channels, configuration from CME's XML file, etc. 4. Good progress in API library development. Other matters: 1. Developed alerts in API library and 1 gig FPGA cards. Customer

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		still not running them, upgrade planned for next week 2. Upgraded all ARCA FPGA cards in Mahwah to have secure boot feature (no cold boot needed). Cartprop06 and chiprop03 not upgraded yet to allow IT team handle Aurora migration. FPGA upgrade can be finished any time
August 2012	$10,220	36 hours – NASDAQ/CFN project. Make Arista switch work in Aurora and collect the data necessary for NASDAQ project. 24 hours – API changes for Wolverine to deliver sequence numbers. 86 hours – Wolverine support, Twinax cable not working. Identified the problem, tried to develop the solution, proven to Wolverine that the problem is cable length. Escalated to Altera for a permanent solution, xCelor customers will want to use these cables in future.

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