

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION**

LUCIO DEVELOPMENT LLC,	§	
	§	
Plaintiff,	§	Case No: 1:19-cv-76
	§	
vs.	§	PATENT CASE
	§	
MELLANOX TECHNOLOGIES, INC.,	§	
	§	
Defendant.	§	
	§	
<hr style="width: 40%; margin-left: 0;"/>	§	

COMPLAINT

Plaintiff Lucio Development LLC (“Plaintiff” or “Lucio”) files this Complaint against Mellanox Technologies, Inc. (“Defendant” or “Mellanox”) for infringement of United States Patent No. 7,069,546 (hereinafter “the ‘546 Patent”).

PARTIES AND JURISDICTION

1. This is an action for patent infringement under Title 35 of the United States Code. Plaintiff is seeking injunctive relief as well as damages.
2. Jurisdiction is proper in this Court pursuant to 28 U.S.C. §§ 1331 (Federal Question) and 1338(a) (Patents) because this is a civil action for patent infringement arising under the United States patent statutes.
3. Plaintiff is a Texas limited liability company with its office address at 555 Republic Dr., Suite 200, Plano, Texas 75074.
4. On information and belief, Defendant is a California corporation with its principal place of business at 350 Oakmead Parkway, Suite 100, Sunnyvale, CA 94085.
5. This Court has personal jurisdiction over Defendant because Defendant has

committed, and continues to commit, acts of infringement in this District, has conducted business in this District, and/or has engaged in continuous and systematic activities in this District.

6. On information and belief, Defendant's instrumentalities that are alleged herein to infringe were and continue to be used, imported, offered for sale, and/or sold in this District.

VENUE

7. Venue is proper in this District pursuant to 28 U.S.C. §1400(b) because acts of infringement are occurring in this District and Defendant has a regular and established place of business in this District at 10801 N MoPac Expwy, Bldg 1, Ste 300, Austin, TX 78759.

COUNT I **(INFRINGEMENT OF UNITED STATES PATENT NO. 7,069,546)**

8. Plaintiff incorporates paragraphs 1 through 7 herein by reference.

9. This cause of action arises under the patent laws of the United States and, in particular, under 35 U.S.C. §§ 271, *et seq.*

10. Plaintiff is the owner by assignment of the '546 Patent with sole rights to enforce the '546 Patent and sue infringers.

11. A copy of the '546 Patent, titled "Generic Framework for Embedded Software Development," is attached hereto as Exhibit A.

12. The '546 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code.

13. On information and belief, Defendant has infringed and continues to infringe one or more claims, including at least Claim 1, of the '546 Patent by making, using, importing, selling, and/or offering for sale a software platform for embedded software development, which is covered by at least Claim 1 of the '546 Patent. Defendant has infringed and continues

to infringe the '546 Patent directly in violation of 35 U.S.C. § 271.

14. Defendant, sells, offers to sell, and/or uses embedded software development packages including, without limitation, the SwitchX Software Development Kit (SDK), and any similar products ("Product"), which infringe at least Claim 1 of the '546 Patent.

15. SwitchX SDK provides switching and routing functionality via a defined and documented set of Application Programming Interface (API). SwitchX SDK provides one or more generic application handler programs, each such program comprising computer program code for performing generic application functions common to multiple types of hardware modules used in a communication system. For example, SwitchX SDK provides one or more generic application handler programs such as Development System-Operating System (DVS-OS) (Linux-based OS) and includes code and libraries which are common, uniform and compatible with Mellanox's SwitchX-2, Switch-IB, Switch-IB 2, and Spectrum switch ICs. Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in connection with other elements herein.

SwitchX® Software Development Kit

The SwitchX Software Development Kit (SDK), compatible with Mellanox's SwitchX-2, Switch-IB™, Switch-IB 2, and Spectrum switch ICs, allows switch OEMs and Network Operating System (NOS) vendors to bring to market flexible, innovative and cost-effective switching solutions, to build InfiniBand, Ethernet or Virtual Protocol Interconnect (VPI) fabrics.



Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 1.

Advanced Features

The SwitchX SDK provides an interface to support multi-generation solutions. Policies such as QoS and ACLs can be implemented across the fabric. The SwitchX SDK also provides access to hardware resources locally and fabric wide to implement multiple switch partitions, bridging, switching, routing and virtual forwarding modes. When multiple switch partitions are implemented, a single switch device can have independent management planes; another feature exposed by the SwitchX APIs. The SwitchX SDK is topology aware for multipath implementations such as ECMP, LAG and Adaptive Routing.

Applications

The SwitchX SDK is designed for managing SwitchX-2, Switch-IB™, Switch-IB 2, and Spectrum in blade switches, top-of-rack (TOR) switches or large port count modular chassis aggregation switches providing Web 2.0, Cloud scale-out, HPC and storage infrastructure.

Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 2.

Easy Portability with Fast Time-to-Market

Mellanox SwitchX SDK includes a robust and portable device driver with two levels of APIs, so users can choose their level of integration. A minimal set of code is implemented in the kernel to allow for easy porting to various CPU architectures and operating systems. The SDK runs on top of x86 and PowerPC architectures, utilizing commercial Linux operating system distributions. Within the SDK, the device driver and API libraries are written in standard ANSI "C" language for easy porting to additional processor architectures and operating systems.

Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 1.



HIGHLIGHTS

BENEFITS

- Easily portable code base for fast time-to-market
- Linux development environment
- API Library written in ANSI "C"
- Flexible development environment
- Seamless integration with SwitchX Development Kit enabling development on CPU and OS of choice
- Reduced development cycles with Python scripts through development acceleration tool

KEY FEATURES

- Low-latency Ethernet and InfiniBand gateways and routers between protocols
- Multiple API levels for flexibility
- Support for VPI, virtualized and multichip implementations
- Support for Adaptive Routing/ Congestion Control/DoS

Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 1.

Development System-OS (DVS-OS)

Mellanox development systems come with pre-loaded DVS-OS. This lean operating

system allows developers to experience and exercise the SDK API. The DVS-OS is a Linux-based OS. It boots over ONIE, and includes the SDK library, a SAI library and other components to operate the switch system. More

information about ONIE and SAI can be found on the Open Compute Project (OCP) website.

Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 2.

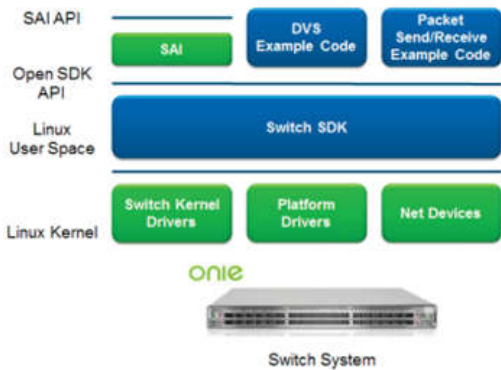


Figure 2. DVS-OS Architecture

Source: http://www.mellanox.com/relateddocs/prod_software/PB_SwitchX_SDK.pdf, page 2.



Open Network Install Environment

The Open Network Install Environment (ONIE) is an Open Compute Project open source initiative driven by a community to define an open "install environment" for bare metal network switches, such as existing ODM switches and the upcoming OCP Network Switch design. ONIE enables a bare metal network switch ecosystem where end users have a choice among different network operating systems. Founding members include Accton, Agema, Big Switch Networks, Broadcom, Cumulus Networks, Dell, Penguin Computing and Quanta. ONIE was contributed to the Open Compute Project.

ONIE is an open source "install environment", that acts as an enhanced boot loader utilizing facilities in a Linux/Busybox environment. This small Linux operating system allows end-users and channel partners to install the target network OS as part of data center provisioning, in the fashion that servers are provisioned.

ONIE enables switch hardware suppliers, distributors and resellers to manage their operations based on a small number of hardware SKUs. This in turn creates economies of scale in manufacturing, distribution, stocking, and RMA enabling a thriving ecosystem of both network hardware and operating system alternatives.

Source: <http://www.onie.org/about/>

SAI

Switch Abstraction Interface (SAI) defines a standard API that is hardware agnostic. The switch ASIC vendor implements a SAI driver for its hardware, exposing a consistent programming interface as defined by the SAI standard. This ensures that an application that is written on top of SAI can be used with different switch ASICs just by changing the SAI driver.

SAI is a user space model, usually built on top of an SDK. It is an open source project adopted by the Open Compute Project (OCP). Microsoft SONIC, Software for Open Networking in the Cloud, which powers Microsoft Azure, one of the largest clouds in the world, is built on top SAI. SONIC is fully open sourced on GitHub and is available to industrial collaborators, researchers, students, and innovators alike. As of November 2016, SAI has been also adopted by OpenSwitch, which is led by Dell and Snaproute as an open source operating system for switches.

Source: <http://www.mellanox.com/open-ethernet/software.php>

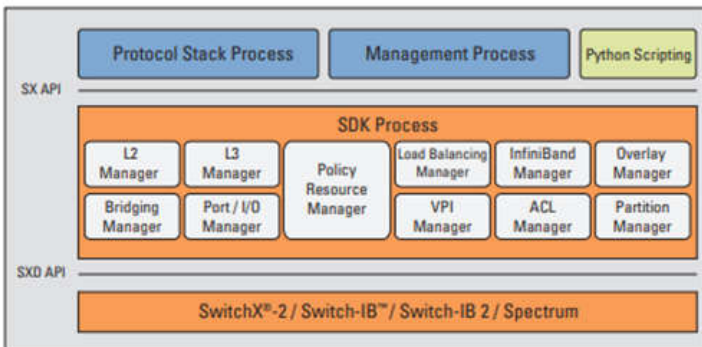


Figure 1. Mellanox Software Development Kit (SDK) Stack

Source: http://www.mellanox.com/relateddocs/prod_software/PB_SwitchX_SDK.pdf, page 1.

Easy Portability with Fast Time-to-Market

Mellanox SwitchX SDK includes a robust and portable device driver with two levels of APIs, so users can choose their level of integration. A minimal set of code is implemented in the kernel to allow for easy porting to various CPU architectures and operating systems. The SDK runs on top of x86 and PowerPC architectures, utilizing commercial Linux operating system distributions. Within the SDK, the device driver and API libraries are written in standard ANSI "C" language for easy porting to additional processor architectures and operating systems.

Source: http://www.mellanox.com/relateddocs/prod_software/PB_SwitchX_SDK.pdf, page 2.

16. SwitchX SDK generates specific application handler code to associate the generic application functions with specific functions of a device driver for at least one of the

types of the hardware modules. For example, in addition to the generic application handler code, SwitchX SDK also includes specific application handler code that is specific to the application (such as applications on Linux, Windows) and specific to particular hardware (such as SwitchX Evaluation Board hardware and others supported by Mellanox). Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in connection with other elements herein.

Development Acceleration Tool

The SwitchX SDK is complemented by a Python-based scripting tool, for development acceleration, which is designed to reduce development and porting time. The tool provides a Command Line Interface (CLI) to test SwitchX application interface (API) and functionality without writing a single line of code.

Source: http://www.mellanox.com/relateddocs/prod_software/PB_SwitchX_SDK.pdf, page 2.

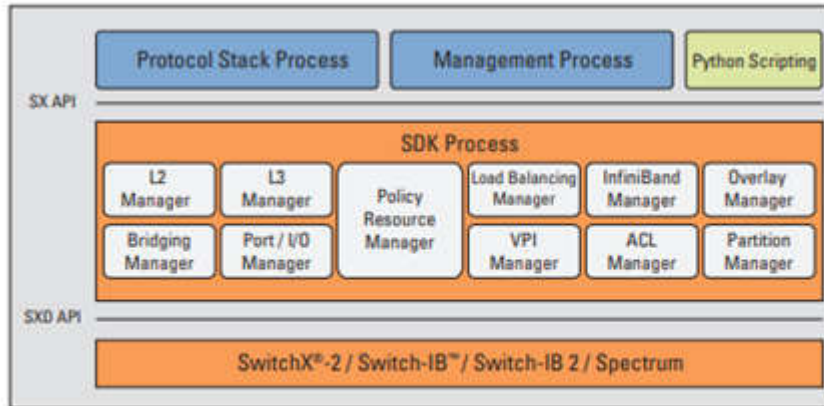
Easy Portability with Fast Time-to-Market

Mellanox SwitchX SDK includes a robust and portable device driver with two levels of APIs, so users can choose their level of integration. A minimal set of code is implemented in the kernel to allow for easy porting to various CPU architectures and operating systems. The SDK runs on top of x86 and PowerPC architectures, utilizing commercial Linux operating system distributions. Within the SDK, the device driver and API libraries are written in standard ANSI "C" language for easy porting to additional processor architectures and operating systems.

Source: http://www.mellanox.com/relateddocs/prod_software/PB_SwitchX_SDK.pdf, page 2.

The SwitchX Software Development Kit (SDK), compatible with Mellanox's SwitchX-2, Switch-IB™, Switch-IB 2, and Spectrum switch ICs, allows switch OEMs and Network Operating System (NOS) vendors to bring to market flexible, innovative and cost-effective switching solutions, to build InfiniBand, Ethernet or Virtual Protocol Interconnect (VPI) fabrics.

Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 1.



Source: **Figure 1. Mellanox Software Development Kit (SDK) Stack**
http://www.mellanox.com/relateddocs/prod_software/PB_SwitchX_SDK.pdf, page 1

Benefits Key Features **Open Ethernet API**

- SwitchX SDK API is Mellanox interface to manage its family of switching solutions. The protocol level interfaces are designed to be easily ported to any L2/L3 switch router protocol stack
- For the completeness of the development environment and tools, it is recommended to use the Evaluation Board software package containing the SDK TestX API tool and reference code

Source: http://www.mellanox.com/page/products_dyn?product_family=124&mtag=switch_sdk

17. SwitchX SDK generates specific application handler code and defines a specific element in the specific code to be handled by one of the generic application functions for that hardware module. For example, SwitchX SDK generates system-specific application handler code by defining specific elements such as functions and data structures corresponding to specific hardware modules (such as SwitchX Evaluation Board hardware supported by Mellanox) that extend or otherwise connect the system-specific application handler code and data structures made available by the generic application handler code. Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in connection with other elements herein.

Development Acceleration Tool

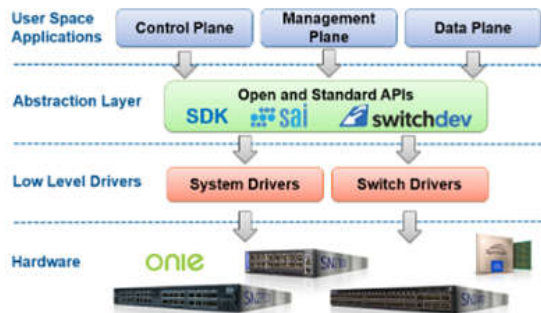
The SwitchX SDK is complemented by a Python-based scripting tool, for development acceleration, which is designed to reduce development and porting time. The tool provides a Command Line Interface (CLI) to test SwitchX application interface (API) and functionality without writing a single line of code.

This acceleration tool can be used as a debug tool or as an easy way to test the software and hardware capabilities before development starts. The syntax is straight forward, similar to the SDK API and help information is available with every command. It is provided as source code in the SDK package.

Development System-OS (DVS-OS)

Mellanox development systems come with pre-loaded DVS-OS. This lean operating system allows developers to experience and exercise the SDK API. The DVS-OS is a Linux-based OS. It boots over ONIE, and includes the SDK library, a SAI library and other components to operate the switch system. More information about ONIE and SAI can be found on the Open Compute Project (OCP) website.

Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 2.



Source: <http://www.mellanox.com/open-ethernet/software.php>

Open Ethernet Software

Open Ethernet is based on complete separation between hardware and software, such that the same software application should be capable of running on any Open Ethernet hardware platform. There are no restrictions, however, for the nature of these applications. They can be open source, community-development applications, commercial applications, or home-grown applications.

The software interfaces the switch hardware via an abstraction layer. There are a few different options for the abstraction layer on which the software application is built: SDK, SAI and Switchdev. All three options implement a model that represents the switch ASIC in software and that exposes an API to provide the functionality to drive and control the switch.

Source: <http://www.mellanox.com/open-ethernet/software.php>

Mellanox Onyx™ Ethernet Operating System

Mellanox Onyx (previously MLNX-OS Ethernet) is an extremely flexible and scalable switch operating system for next-generation data centers with storage, cloud, financial or media & entertainment fabrics. With built-in workflow automation, monitoring & visibility tools, enhanced high availability mechanisms, and more, Onyx simplifies network processes and workflows, increasing efficiencies and reducing operating expenses and time-to-service.

Source: <http://www.mellanox.com/open-ethernet/software.php>

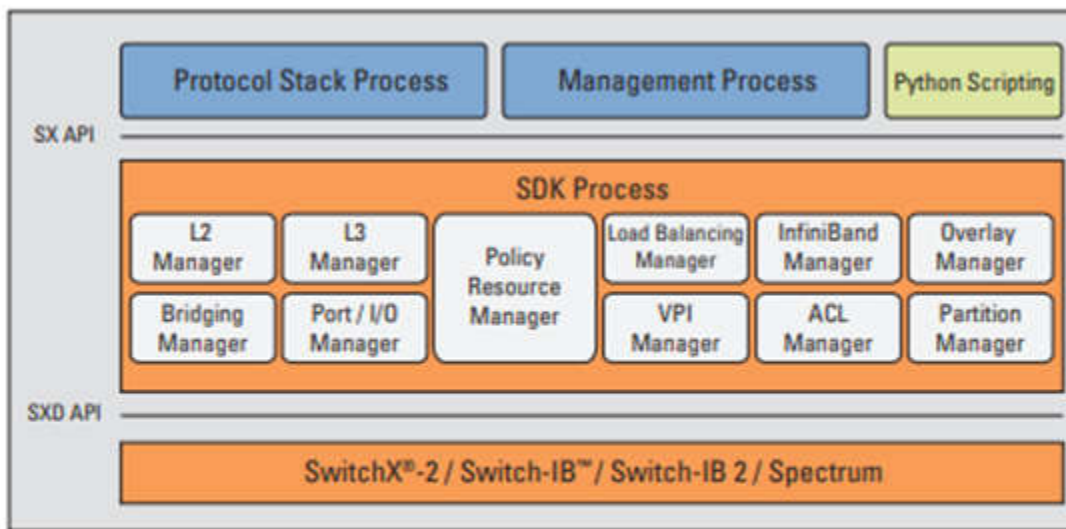


Figure 1. Mellanox Software Development Kit (SDK) Stack

Source: http://www.mellanox.com/relateddocs/prod_software/PB_SwitchX_SDK.pdf, page 1.

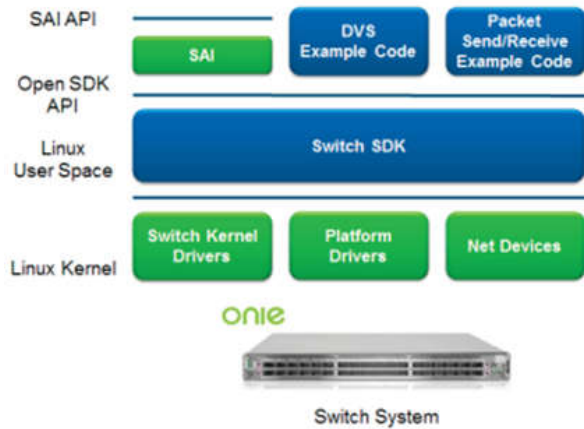


Figure 2. DVS-OS Architecture

Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 2.

SAI

Switch Abstraction Interface (SAI) defines a **standard** API that is hardware agnostic. The switch ASIC vendor implements a SAI driver for its hardware, exposing a consistent programming interface as defined by the SAI standard. This ensures that an application that is written on top of SAI can be used with different switch ASICs just by changing the SAI driver.

SAI is a user space model, usually built on top of an SDK. It is an open source project adopted by the Open Compute Project (OCP). Microsoft SONIC, Software for Open Networking in the Cloud, which powers Microsoft Azure, one of the largest clouds in the world, is built on top SAI. SONIC is fully open sourced on GitHub and is available to industrial collaborators, researchers, students, and innovators alike. As of November 2016, SAI has been also adopted by OpenSwitch, which is led by Dell and Snaproute as an open source operating system for switches.

Source: <http://www.mellanox.com/open-ethernet/software.php>

18. SwitchX SDK compiles the generic application handler programs together with the specific application handler code to produce machine-readable code to be executed by an embedded processor in the at least one of the types of the hardware modules. For example, when a specific application is needed for a particular hardware, the generic functions and the specific functions are compiled together to yield a machine readable code. Mellanox and/or its customers compile the generic functions and the specific functions using SwitchX SDK, IDE/Compiler supported by Mellanox. Certain elements of this limitation are illustrated in the screenshots below and in the screenshots referenced in connection with other elements herein.

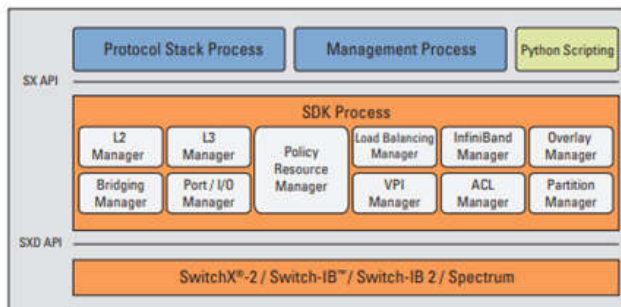


Figure 1. Mellanox Software Development Kit (SDK) Stack

Source: http://www.mellanox.com/relateddocs/prod_software/PB_SwitchX_SDK.pdf, page 1.

Development System-OS (DVS-OS)

Mellanox development systems come with pre-loaded DVS-OS. This lean operating system allows developers to experience and exercise the SDK API. The DVS-OS is a Linux-based OS. It boots over ONIE, and includes the SDK library, a SAI library and other components to operate the switch system. More information about ONIE and SAI can be found on the Open Compute Project (OCP) website.

Source: http://www.mellanox.com/related-docs/prod_software/PB_SwitchX_SDK.pdf, page 2.

19. Defendant’s actions complained of herein will continue unless Defendant is

enjoined by this court.

20. Defendant's actions complained of herein are causing irreparable harm and monetary damage to Plaintiff and will continue to do so unless and until Defendant is enjoined and restrained by this Court.

21. Plaintiff is in compliance with 35 U.S.C. § 287.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff asks the Court to:

(a) Enter judgment for Plaintiff on this Complaint on all causes of action asserted herein;

(b) Enter an Order enjoining Defendant, its agents, officers, servants, employees, attorneys, and all persons in active concert or participation with Defendant who receive notice of the order from further infringement of United States Patent No. 7,069,546 (or, in the alternative, awarding Plaintiff a running royalty from the time of judgment going forward);

(c) Award Plaintiff damages resulting from Defendant's infringement in accordance with 35 U.S.C. § 284;

(d) Award Plaintiff pre-judgment and post-judgment interest and costs; and

(e) Award Plaintiff such further relief to which the Court finds Plaintiff entitled under law or equity.

Dated: January 31, 2019

Respectfully submitted,

/s/ Jay Johnson

JAY JOHNSON

State Bar No. 24067322

D. BRADLEY KIZZIA

State Bar No. 11547550

KIZZIA JOHNSON, PLLC

1910 Pacific Ave., Suite 13000

Dallas, Texas 75201

(214) 451-0164

Fax: (214) 451-0165

jay@kjpllc.com

bkizzia@kjpllc.com

ATTORNEYS FOR PLAINTIFF

EXHIBIT A