IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

PARITY NETWORKS LLC, *Plaintiff*, v. MELLANOX TECHNOLOGIES, INC., *Defendant.*	§ § § § § § § § §	CIVIL ACTION NO. 6:20-cv-00051 **JURY TRIAL DEMANDED**

ORIGINAL COMPLAINT

Plaintiff Parity Networks LLC ("Plaintiff" or "Parity Networks"), by and through its attorneys, for its Original Complaint against Mellanox Technologies, Inc. ("Defendant" or "Mellanox"), and demanding trial by jury, hereby alleges as follows:

I. NATURE OF THE ACTION

1. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 271, *et seq.*, to enjoin and obtain damages resulting from Defendant's unauthorized use, sale, and offer to sell in the United States of products, methods, processes, services and/or systems that infringe Parity Networks' United States patents, as described herein.

2. Mellanox manufactures, provides, uses, sells, offers for sale, imports, and/or distributes infringing products and services; and encourages others to use its products and services in an infringing manner, including their customers, as set forth herein.

3. Parity Networks seeks past and future damages and prejudgment and post-judgment interest for Mellanox's past infringement of the Patents-in-Suit, as defined below.

II. PARTIES

4. Plaintiff Parity Networks is a limited liability company organized and existing under the laws of the State of Delaware. Parity Networks' registered agent for service of process in Texas is InCorp Services, Inc., 815 Brazos Street, Suite 500, Austin, Texas 78701.

5. On information and belief, Defendant Mellanox is a corporation organized under the laws of California, with an established place of business in this District at 10801 N MoPac Expressway, Building 1, Suite 300, Austin, Texas 78759. Mellanox's registered agent for service of process in Texas is Corporation Service Company, 211 E. 7th Street, Suite 620, Austin, Texas 78701.

III. JURISDICTION AND VENUE

6. This is an action for patent infringement which arises under the Patent Laws of the United States, namely, 35 U.S.C. §§ 271, 281, 283, 284 and 285.

7. This Court has exclusive jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a).

8. On information and belief, venue is proper in this District pursuant to 28 U.S.C. §§ 1391(b), 1391(c), and 1400(b) because Mellanox has a regular and established place of business in this district, transacted business in this District, and has committed and/or induced acts of patent infringement in this district.

9. On information and belief, Defendant Mellanox is subject to this Court's specific and general personal jurisdiction pursuant to due process and/or the Texas Long Arm Statute, due at least to its substantial business in this forum, including: (i) at least a portion of the infringements alleged herein; and (ii) regularly doing or soliciting business, engaging in other persistent courses of conduct, and/or deriving substantial revenue from goods and services provided to individuals in Texas and in this Judicial District.

IV. FACTUAL ALLEGATIONS

PATENTS-IN-SUIT

10. Parity Networks is the owner of all right, title and interest in and to U.S. Patent No. 6,553,005 (the "'005 Patent," attached as Exhibit 1), entitled "Method and Apparatus for Load Apportionment among Physical Interfaces in Data Routers," issued on April 22, 2003.

11. Parity Networks is the owner of all right, title and interest in and to U.S. Patent No. 7,719,963 (the "'963 Patent," attached as Exhibit 2), entitled "System for Fabric Patent Control," issued on May 18, 2010.

12. Parity Networks is the owner of all right, title and interest in and to U.S. Patent No. 7,103,046 (the "'046 Patent," attached as Exhibit 3), entitled "Method and Apparatus for Intelligent Sorting and Process Determination of Data Packets Destined to a Central Processing Unit of a Router or Server on a Data Packet Network," issued on September 5, 2006.

13. Together, the foregoing patents are referred to herein as the "Patents-in-Suit." Parity Networks is the assignee of the Patents-in-Suit and has all rights to sue for infringement and collect past and future damages for the infringement thereof.

DEFENDANT'S ACTS

14. Mellanox is a global provider of data networking products and solutions and provides hardware and software directed to switching and routing network data to its customers in the United States, including in this District.

15. Mellanox implements a variety of network operating systems ("NOS") on its ethernet switches. In particular, Mellanox implements its "Onyx" NOS on its switches. Onyx is the successor to Mellanox's "MLNX-OS Ethernet" operating system and "[f]eatur[es] a robust Layer 3 protocols stack, built-in workflow automation, monitoring & visibility tools, and high availability mechanisms." https://www.mellanox.com/page/mlnx_onyx?mtag=onyx_software.

Presently, Mellanox supports at least the following four versions of Onyx on its switches: Onyx v3.8.2110; Onyx v3.8.2102; Onyx v3.8.2008; Onyx v3.8.1208; Onyx v3.8.1174; Onyx v3.8.1118; and Onyx v3.8.1112. *See* https://docs.mellanox.com/category/onyx.

16. Mellanox also implements the "Cumulus Linux" NOS on its ethernet switches. Cumulus Linux is "purpose-built for automation, scalability, and flexibility using web-scale principles found in the world's largest data centers." https://www.mellanox.com/page/cumulus_linux?ssn=o6glbqks34ji83tlp00tqcupu4. Presently, Mellanox supports at least the following four versions of Cumulus Linux on its switches: Onyx v3.8.2110; Onyx v3.8.2102; Onyx v3.8.2008; Onyx v3.8.1208; Onyx v3.8.1174; Onyx v3.8.1118; and Onyx v3.8.1112. *See* https://docs.mellanox.com/category/onyx

17. In that regard, Mellanox makes, uses, and sells switches running the Mellanox Onyx and Cumulus Linux NOSs. For example, Mellanox makes, uses, sells, and offers for sale the SN2000 series of switches (including the SN2010, SN2100, SN2410, SN2700, and SN2740), the SN3000 series of switches (including the SN3800, SN3700, SN3700C, SN3510, and SN3420) the SX1012 and SX1012X switches, which can be purchased[1] with the Onyx or Cumulus Linux NOS. The SN2000 series of switches "builds the industry's highest density 25GbE and 100GbE switching solutions [and] provides optimized hardware for spine, leaf, top-of-rack (ToR) and storage switching."

https://www.mellanox.com/page/products_dyn?product_family=251&mtag=sn2000. Similarly, the SN3000 series of switches were "built for the modern datacenter [and] combine high performance packet processing, rich datacenter features, cloud network scale and visibility with

[1] At least some of these products have been "end-of-lifed," but may still be commercially available and/or were sold during the relevant damages period. *See* https://www.mellanox.com/sites/default/files/related-docs/eol/Mellanox_EOL_products.xlsx.

flexible form factors." https://www.mellanox.com/page/products_dyn?product_family=280&mtag=sn3000_label

18. The Cumulus Linux NOS supports a type of bonding known as link aggregation that utilizes a packet's characteristics, including source IP address and destination IP address, to choose a set of egress ports, such as those defined by a link aggregation group ("LAG"). Specifically, a hash is calculated that is used together with equal cost multi-pathing ("ECMP"), to determine which path a particular packet follows in the switch, as described below:

Bonding - Link Aggregation

Linux bonding provides a method for aggregating multiple network interfaces (*slaves*) into a single logical bonded interface (*bond*). Cumulus Linux supports two bonding modes:

- The IEEE 802.3ad link aggregation mode, which allows one or more links to be aggregated together to form a *link aggregation group* (LAG), such that a media access control (MAC) client can treat the link aggregation group as if it were a single link.
- The balance-xor mode, where the bonding of slave interfaces are static and all slave interfaces are active for load balancing and fault tolerance purposes. This is useful for MLAG deployments.

The benefits of link aggregation include:

- Linear scaling of bandwidth as links are added to LAG
- Load balancing
- Failover protection

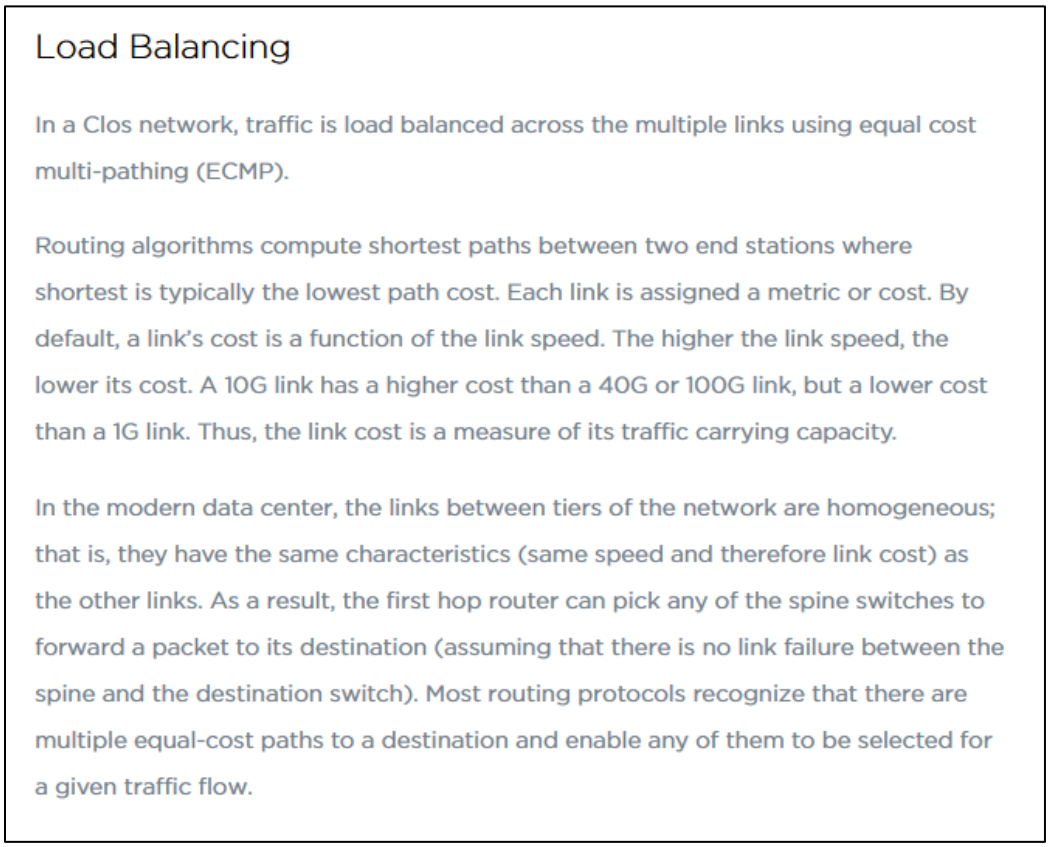
Hash Distribution

Egress traffic through a bond is distributed to a slave based on a packet hash calculation, providing load balancing over the slaves; many conversation flows are distributed over all available slaves to load balance the total traffic. Traffic for a single conversation flow always hashes to the same slave.

The hash calculation uses packet header data to pick which slave to transmit the packet to:

- For IP traffic, IP header source and destination fields are used in the calculation.
- For IP + TCP/UDP traffic, source and destination ports are included in the hash calculation.

Cumulus Linux, v 3.6, Bonding Link Aggregation, available at: https://docs.cumulusnetworks.com/version/cumulus-linux-36/Layer-2/Bonding-Link-Aggregation/



Load Balancing

In a Clos network, traffic is load balanced across the multiple links using equal cost multi-pathing (ECMP).

Routing algorithms compute shortest paths between two end stations where shortest is typically the lowest path cost. Each link is assigned a metric or cost. By default, a link's cost is a function of the link speed. The higher the link speed, the lower its cost. A 10G link has a higher cost than a 40G or 100G link, but a lower cost than a 1G link. Thus, the link cost is a measure of its traffic carrying capacity.

In the modern data center, the links between tiers of the network are homogeneous; that is, they have the same characteristics (same speed and therefore link cost) as the other links. As a result, the first hop router can pick any of the spine switches to forward a packet to its destination (assuming that there is no link failure between the spine and the destination switch). Most routing protocols recognize that there are multiple equal-cost paths to a destination and enable any of them to be selected for a given traffic flow.

Cumulus Linux, v 3.6, Network Topology, available at: https://docs.cumulusnetworks.com/version/cumulus-linux-36/Layer-3/Network-Topology/.

19. Further, Mellanox's Onyx NOS supports quality of service ("QoS") classification for queuing packets into specific categories. Specifically, Onyx supports 802.1X authentication, an IEEE standard for port-based network access control, for queuing packets according to category. This classification process and supported trust levels are described by Mellanox:

QoS Classification

QoS classification assigns a QoS class to the packet. The QoS class of the packet is indicated internally in the switch using the switch-priority parameter (8 possible values).

Switch-priority affects the packet buffering and transmission scheduling. There are 8 possible values for switch-priority. The classification is based on the PCP and DEI fields in the VLAN tag, the DSCP field in the IP header. In addition, the default value can be configured for the incoming port. And the switch-priority of the packet also can be reconfigured by the ACL.

The switch-priority of the packet is used for priority fields re-marking at the egress.

Trust Levels

QoS classification depends on the port configuration for QoS trust level which determines which packet header fields derive the switch-priority. The following trust states are supported:

- Trust port
  - Based on port default settings
- Trust L2 (PCP,DEI)
  - Based on packet PCP,DEI fields for VLAN tagged packets
  - Else, based on the port default setting for VLAN un-tagged packets
- Trust L3 (DSCP)
  - Based on packet DSCP field for IP packets
  - Else, based on port default setting for non-IP
- Trust both
  - Based on packet DSCP for IP packets
  - Else, based on packet PCP,DEI for VLAN tagged packets
  - Else, based on the port default setting

Mellanox Onyx User Manual, Rev. 3.8.2110, Quality of Service (QoS), available at: https://docs.mellanox.com/pages/viewpage.action?pageId=19812480.

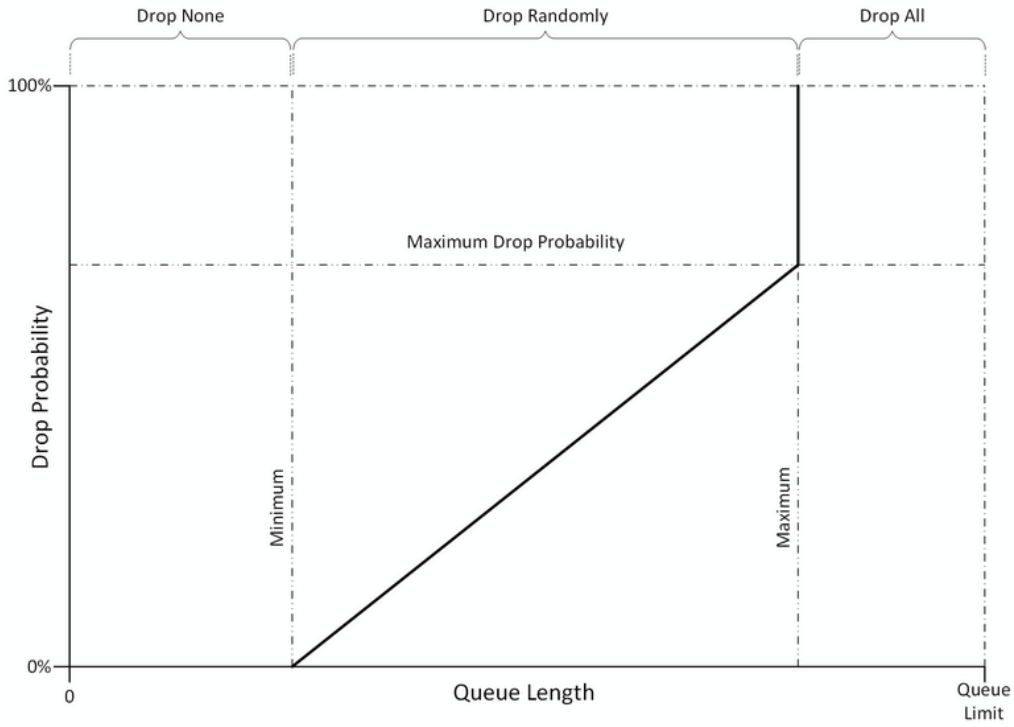
20. The Onyx NOS further supports QoS features that are designed to minimize or avoid congestion in a switch. Specifically, Onyx supports random early detection ("RED") and weighted random early detection ("WRED"). RED and WRED are queuing disciplines that are designed to avoid congestion and prevent the switch's buffer from filling up by dropping incoming packets based on how full a queue is and specified minimum and maximum threshold values for queue length. This process is generally depicted in the graphic below:

RED and ECN

Random early detection (RED) is a mechanism that randomly drops packets before the switch buffer fills up in case of congestion. Explicit congestion notification (ECN) is used for congestion control protocols (TCP and RoCE CC – DCQCN) to handle congestion before packets are dropped. RED and ECN can be configured separately or concurrently per traffic class.

Relative RED/ECN is supported on TC queues. This allows the thresholds of the drop/mark actions to behave relatively to the dynamic thresholds configured for the shared buffer.

RED/ECN drop profiles are defined according to 2 parameters as shown in the following figure:



- Minimum – a threshold that defines the average queue length below which the packets are not dropped/marked
- Maximum – a threshold that defines the average queue length above which the packets are always dropped/marked

Mellanox Onyx User Manual, Rev. 3.8.2110, Quality of Service (QoS), available at: https://docs.mellanox.com/pages/viewpage.action?pageId=19812480

21. Mellanox instructs its customers regarding the implementation and operation of the accused instrumentalities, including at https://mymellanox.force.com/support/VF_SerialSearch, https://academy.mellanox.com/en/, and https://community.mellanox.com/s/.

22. On information of belief, Defendant Mellanox also implements contractual protections in the form of license and use restrictions with its customers to preclude the unauthorized reproduction, distribution and modification of its software.

23. Moreover, on information and belief, Defendant Mellanox implements technical precautions to attempt to thwart customers who would circumvent the intended operation of Mellanox's products.

24. Defendant Mellanox had knowledge of the Patents and the infringing as early as the date when Parity Networks effected service of the Complaint.

V. COUNTS OF PATENT INFRINGEMENT

COUNT ONE
INFRINGEMENT OF U.S. PATENT NO. 6,553,005

25. Parity Networks incorporates by reference its allegations in Paragraphs 1-24 as if fully restated in this paragraph.

26. Parity Networks is the assignee and owner of all right, title and interest to the '005 Patent. Parity Networks has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

27. On information and belief, Defendant Mellanox, without authorization or license from Parity Networks, has been and is presently directly infringing at least claim 1 of the '005 Patent, as infringement is defined by 35 U.S.C. § 271(a), including through making, using (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '005 Patent. Defendant Mellanox is thus liable for direct infringement of the '005 Patent pursuant to 35 U.S.C. § 271(a).

28. Exemplary infringing products include Mellanox switches utilizing the Onyx or Cumulus Linux network operating systems, including the SN2000 series (e.g. the SN2010, SN2100, SN2410, SN2700, and SN2740) and SN3000 series (e.g. the SN3800, SN3700, SN3700C, SN3510, and SN3420) of switches, which use link aggregation, equal-cost multi-path

routing, and hashing functions to determine the route and egress port used by particular packets such that packets with common source/destination address pairs use a common egress port.

29. On information and belief, Defendant Mellanox, without authorization or license from Parity Networks, has been and is presently indirectly infringing at least claim 1 of the ’005 Patent, including actively inducing infringement of the ’005 Patent under 35 U.S.C. § 271(b). Such inducements include without limitation, with specific intent to encourage the infringement, knowingly inducing consumers to use infringing articles and methods that Mellanox knows or should know infringe one or more claims of the ’005 Patent. Mellanox instructs its customers to make and use the patented inventions of the ’005 Patent by operating Mellanox’s products in accordance with Mellanox’s specifications. Mellanox specifically intends its customers to infringe by implementing, among others, link aggregation, equal-cost multi-path routing, and hashing functions to determine the route and egress port used by particular packets such that packets with common source/destination address pairs use a common egress port.

30. On information and belief, Defendant Mellanox, without authorization or license from Parity Networks, has been and is presently indirectly infringing at least claim 1 of the ’005 Patent, including contributory infringement of the ’005 Patent under 35 U.S.C. § 271(c) and/or § 271(f), either literally and/or under the doctrine of equivalents, by selling, offering for sale, and/or importing into the United States, the infringing products. Mellanox knows that the infringing products (i) constitute a material part of the inventions claimed in the ’005 Patent; (ii) are especially made or adapted to infringe the ’005 Patent; (iii) are not staple articles or commodities of commerce suitable for non-infringing use; and (iv) are components used for or in switches to implement, among others, link aggregation, equal-cost multi-path routing, and hashing functions

to determine the route and egress port used by particular packets such that packets with common source/destination address pairs use a common egress port.

31. As a result of Mellanox's infringement of the '005 Patent, Parity Networks has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement under 35 U.S.C. § 284, but in no event, less than a reasonable royalty.

COUNT TWO
INFRINGEMENT OF U.S. PATENT NO. 7,719,963

32. Parity Networks incorporates by reference its allegations in Paragraphs 1-31 as if fully restated in this paragraph.

33. Parity Networks is the assignee and owner of all right, title and interest to the '963 Patent. Parity Networks has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

34. On information and belief, Defendant Mellanox, without authorization or license from Parity Networks, has been and is presently directly infringing at least claim 1 of the '963 Patent, as infringement is defined by 35 U.S.C. § 271(a), including through making, using (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '963 Patent. Defendant Mellanox is thus liable for direct infringement of the '963 Patent pursuant to 35 U.S.C. § 271(a).

35. Exemplary infringing products include Mellanox switches utilizing the Mellanox Onyx or Cumulus Linux network operating systems, including the SN2000 series (e.g. the SN2010, SN2100, SN2410, SN2700, and SN2740) and SN3000 series (e.g. the SN3800, SN3700, SN3700C, SN3510, and SN3420) of switches, which support using a WRED algorithm on packet queues to drop packets as a function of queue size (or buffer) in order to manage congestion in the switch.

36. On information and belief, at least since the filing of the Original Complaint, Defendant Mellanox, without authorization or license from Parity Networks, has been and is presently indirectly infringing at least claim 1 of the ’963 Patent, including actively inducing infringement of the ’963 Patent under 35 U.S.C. § 271(b). Such inducements include without limitation, with specific intent to encourage the infringement, knowingly inducing consumers to use infringing articles and methods that Mellanox knows or should know infringe one or more claims of the ’963 Patent. Mellanox instructs its customers to make and use the patented inventions of the ’963 Patent by operating Mellanox’s products in accordance with Mellanox’s specifications. Mellanox specifically intends its customers to infringe by, among others, designing and fabricating its switches and routers to use a WRED algorithm on packet queues to drop packets as a function of queue size (or buffer) in order to manage congestion in the switch.

37. On information and belief, Defendant Mellanox, without authorization or license from Parity Networks, has been and is presently indirectly infringing at least claim 1 of the ’963 Patent, including contributory infringement of the ’963 Patent under 35 U.S.C. § 271(c) and/or § 271(f), either literally and/or under the doctrine of equivalents, by selling, offering for sale, and/or importing into the United States, the infringing products. Mellanox knows that the infringing products (i) constitute a material part of the inventions claimed in the ’963 Patent; (ii) are especially made or adapted to infringe the ’963 Patent; (iii) are not staple articles or commodities of commerce suitable for non-infringing use; and (iv) are components used for or in switches and routers to implement a WRED algorithm on packet queues to drop packets as a function of queue size (or buffer) in order to manage congestion in the switch.

38. As a result of Mellanox's infringement of the '963 Patent, Parity Networks has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement under 35 U.S.C. § 284, but in no event, less than a reasonable royalty.

COUNT THREE
INFRINGEMENT OF U.S. PATENT NO. 7,103,046

39. Parity Networks incorporates by reference its allegations in Paragraphs 1-38 as if fully restated in this paragraph.

40. Parity Networks is the assignee and owner of all right, title and interest to the '046 Patent. Parity Networks has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

41. On information and belief, Defendant Mellanox, without authorization or license from Parity Networks, has been and is presently directly infringing at least claim 1 of the '046 Patent, as infringement is defined by 35 U.S.C. § 271(a), including through making, using (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '046 Patent. Defendant Mellanox is thus liable for direct infringement of the '046 Patent pursuant to 35 U.S.C. § 271(a).

42. Exemplary infringing products include Mellanox switches utilizing the Mellanox Onyx network operating system, including the SN2000 series (e.g. the SN2010, SN2100, SN2410, SN2700, and SN2740), SN3000 series (e.g. the SN3800, SN3700, SN3700C, SN3510, and SN3420), SX1012, and SX1012X switches. These products include one or more packet processors that categorize packets into categories based on the source of the packet and the packets are placed in a queue and processed by a CPU based on a priority of those categories.

43. On information and belief, at least since the filing of the Original Complaint, Defendant Mellanox, without authorization or license from Parity Networks, has been and is

presently indirectly infringing at least claim 1 of the ’046 Patent, including actively inducing infringement of the ’046 Patent under 35 U.S.C. § 271(b). Such inducements include without limitation, with specific intent to encourage the infringement, knowingly inducing consumers to use infringing articles and methods that Mellanox knows or should know infringe one or more claims of the ’046 Patent. Mellanox instructs its customers to make and use the patented inventions of the ’046 Patent by operating Mellanox’s products in accordance with Mellanox’s specifications. Mellanox specifically intends its customers to infringe by, among others, designing and fabricating its switches and routers to utilize one or more packet processors that categorize packets into categories based on the source of the packet, place the packets into queues, and process the packets via a CPU based on a priority of those categories.

44. On information and belief, Defendant Mellanox, without authorization or license from Parity Networks, has been and is presently indirectly infringing at least claim 1 of the ’046 Patent, including contributory infringement of the ’046 Patent under 35 U.S.C. § 271(c) and/or § 271(f), either literally and/or under the doctrine of equivalents, by selling, offering for sale, and/or importing into the United States, the infringing products. Mellanox knows that the infringing products (i) constitute a material part of the inventions claimed in the ’046 Patent; (ii) are especially made or adapted to infringe the ’046 Patent; (iii) are not staple articles or commodities of commerce suitable for non-infringing use; and (iv) are components used for or in its switches and routers to utilize one or more packet processors that categorize packets into categories based on the source of the packet, place the packets into queues, and process the packets via a CPU based on a priority of those categories.

45. As a result of Mellanox's infringement of the '046 Patent, Parity Networks has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement under 35 U.S.C. § 284, but in no event, less than a reasonable royalty.

VI. JURY DEMAND

46. Plaintiff Parity Networks demands a trial by jury of all matters to which it is entitled to trial by jury, pursuant to FED. R. CIV. P. 38.

VII. PRAYER FOR RELIEF

WHEREFORE, Parity Networks prays for judgment and seeks relief against Defendant as follows:

A. That the Court determine that one or more claims of the Patents-in-Suit is infringed by Defendant Mellanox, either literally or under the doctrine of equivalents;

B. That the Court award damages adequate to compensate Parity Networks for the patent infringement that has occurred, together with prejudgment and post-judgment interest and costs, and an ongoing royalty for continued infringement;

C. That the Court award enhanced damages pursuant to 35 U.S.C. §284; and

D. That the Court award such other relief to Parity Networks as the Court deems just and proper.

DATED: January 24, 2020

Respectfully submitted,

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