UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NORTH CAROLINA
WESTERN DIVISION
No. 5:22-CV-102

SHAMROCK INNOVATIONS, LLC, Plaintiff, v. LENOVO (UNITED STATES), INC., Defendant.	**FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT** **JURY TRIAL DEMANDED**

Plaintiff Shamrock Innovations, LLC ("Shamrock" or "Plaintiff") files this Complaint for patent infringement under the patent laws of the United States, Title 35 of the United States Code, against Defendant Lenovo (United States), Inc. ("Lenovo" or "Defendant") that relates to the U.S. patents owned by Shamrock: 8,060,675 and 9,535,454 (collectively, the "Patents-in-Suit").

THE PARTIES

1. Plaintiff Shamrock Innovations, LLC is a limited liability company organized under the laws of the State of Illinois, with an office at 125 S. Clark St., 17th Fl. Chicago, IL 60603.

2. Upon information and belief, Lenovo (United States), Inc. is a Delaware corporation with a principal place of business at 1009 Think Place, Morrisville, NC 27560. On information and belief, Lenovo can be served through its registered agent, CT Corporation System, 160 Mine Lake Ct. Ste. 200, Raleigh, NC 27615. Lenovo is a leading manufacturer and seller of laptop computers, desktop computers, smartphones and tablets in the United States. Upon information and belief, Lenovo does business in the Eastern District of North Carolina, directly or through intermediaries.

3. Lenovo makes, uses, imports, sells and/or offers for sale computing devices, including laptop and desktop computers, and related applications and services.

JURISDICTION AND VENUE

4. This Complaint states causes of action for patent infringement arising under the patent laws of the United States, 35 U.S.C. § 100 *et seq.*, and, more particularly 35 U.S.C. § 271.

5. This Court has subject matter jurisdiction of this action under 28 U.S.C. §§ 1331 and 1338(a) in which the district courts have original and exclusive jurisdiction of any civil action for patent infringement.

6. This Court has general and specific personal jurisdiction over Lenovo, consistent with due process, because Lenovo maintains its principal place of business in North Carolina and this District.

7. Lenovo, directly and/or through subsidiaries and agents (including distributors, retailers, and others), makes, imports, ships, distributes, offers for sale, sells, uses, and advertises (including offering products and services through its website, https://www.lenovo.com/us/en/, as well as other retailers) its products and/or services in the United States and the Eastern District of North Carolina.

8. Lenovo, directly and/or through its subsidiaries and agents (including distributors, retailers, and others), has purposefully and voluntarily placed one or more of its infringing products and/or services, as described below, into the stream of commerce with the expectation that they will be purchased and used by consumers in the Eastern District of North Carolina. These infringing products and/or services have been and continue to be purchased and used by consumers in the Eastern District of North Carolina. Lenovo has committed acts of patent infringement within the Eastern District of North Carolina.

9. Venue as to Lenovo is proper in this District under §1400(b), which provides that "any civil action for patent infringement may be brought in the judicial district where the defendant resides, or where the defendant has committed acts of infringement and has a regular and established place of business."

BACKGROUND FACTS REGARDING THE SHAMROCK PATENTS

10. Shamrock is the owner of record and assignee of each of U.S. Patent Nos. 8,060,675 ("the '675 Patent") and 9,535,454 ("the '454 Patent") (collectively the "Patents-in-Suit").

11. Shamrock purchased the Patents-in-Suit as of December 14, 2017, including all rights to sue for infringement thereof.

12. The Patents-in-Suit list Frank Ahern, Desi Rhoden, Jeff Doss and Charles Mollo as the inventors. These named inventors are serial innovators in the fields of wireless telecommunications, consumer electronics, and embedded technology.

13. The patented technology was developed to address data transfer performance issues in data processing and computing devices, and the technology was coined Split-Bridge™. The inspiration for Split-Bridge™ was to achieve low cost, high-speed serial data communications between a parallel system bus and remote devices.

14. Split-Bridge™ technology is the predecessor to the Serial ATA standardized technology, which is currently used in an estimated 500 million devices shipped annually around the world.

THE PATENTS-IN-SUIT AND CLAIMS-IN-SUIT

15. Shamrock has the exclusive right to sue and the exclusive right to recover damages for infringement of the Patents-in-Suit during all relevant time periods.

16. On November 15, 2011, the ’675 Patent entitled “Computing Module with Serial Data Connectivity” was duly and legally issued by the USPTO. A copy of the ’675 Patent is attached hereto as Exhibit A.

17. On January 3, 2017, the ’454 Patent entitled “Computing Module with Serial Data Connectivity” was duly and legally issued by the USPTO. A copy of the ’454 Patent is attached hereto as Exhibit B.

18. The claims of the Patents-in-Suit, including the asserted claims, when viewed as a whole, including as an ordered combination, are not merely the recitation of well-understood, routine, or conventional technologies or components. The claimed inventions were not well-known, routine, or conventional at the time of the invention, and represent specific improvements over the prior art and prior existing systems and methods.

19. At the time of the patented inventions, computing systems were limited in their ability to be divided into modular components due to technical limitations with the technology that was used to transfer data within computer systems.

20. At the time of the invention of the Patents-in-Suit, the prior art methods used to transfer data within computer systems were inferior. The most common way to transfer data in computer systems was a PCI bus which utilized a parallel connection. However, the traditional PCI bus was slow and not easily extended over distance. *See e.g.,* ‘675 Pat.,1:40-58; ‘454 Pat. 1:34-42. Parallel transmission of data in consumer computing is slower than serial transmission as, by necessity, it must be performed at a lower frequency. Data sent in parallel must be sent in synchronization. In order to ensure synchronicity, as well as to avoid crosstalk between parallel signal lines, transmission must be done at a relatively low frequency. Serial data transmission can be performed at much higher frequencies, which results in a higher net transfer rate, creating

a faster connection. At the time of the inventions, serial data transfer was a less common way to transfer data in a computer system. While the typical operation of a traditional serial bus was faster than a parallel PCI bus, the transferred data necessarily included extensive amounts of additional information as it required the addition of an extensive header of information for every data transmission on the bus. As such, serial connections required considerable bandwidth to transfer all this data. But in traditional computing, only small amounts of data typically need to be transferred, and so such a high-bandwidth connection was impractical for those types of applications. *See e.g.,* '675 Pat. 2:22-29; 2:49:54; '454 Pat. 2:16-23; 2:44-49. Transferring all the additional information necessarily sent in a traditional serial connection made the system slower than if the serial connection only had to transfer the same amount of data as required by a parallel PCI bus.

21. The claims of the Patents-in-Suit are directed to specific improvements in computer functionality and capabilities over this prior art. Among other things, the claimed inventions improve the functionality of data transfer, creating a low-cost and high-speed serial data communication between a parallel system bus and remote devices. They combine the speed of a serial connection with the more effective bandwidth of the parallel PCI system in a manner not previously implemented. *See e.g.,* '675 Pat. 2:57-62; 3:16-32; '454 Pat. 2:53-58; 3:12-29.

22. At the time of the invention, parallel PCI buses were incompatible with any existing protocols for serial buses. It was not known how to combine a PCI bus with a serial connection in the way disclosed by the claims of the Patents-in-Suit. The claims, and the ordered combination of the claims of the Patents-in-Suit, present a novel solution for a new and innovative high-speed but low-cost alternative way to transfer data. They disclose a protocol for a new serial bus which mimics the protocol of a PCI bus. *See e.g.,* '675 Pat. 4:5-24; '454 Pat.

4:3-23. The claims of the Patents-in-Suit disclose an improvement to the traditional PCI bus—short parallel data is serialized only for transmission, and then deserialized once it reaches its destination. This allows the data to be kept in a lower-bandwidth form, and be faster than both traditional serial and parallel connections.

23. The claims, and the ordered combination of the claims of the Patents-in-Suit, claim additional advantages over traditional PCI buses for the transfer of data. Traditional PCI bus connections cannot be easily spread across distances, both due to the short physical cables required by a parallel connection and because the brains of the PCI bridge were only present on only one side of the connection. However, as disclosed in the claims of the Patents-in-Suit, the bridge connection is split into two separate and distinct pieces where each side of the bridge has full functionality. *See e.g.,* '675 Pat. 3:16-4:4; '454 Pat. 3:12-4:2. And, the disclosed serial connection allows for longer cables than those required by parallel connections. As such, the claims, and the ordered combination of the claims of the Patents-in-Suit allow for modular computing components to be spread further apart than in a traditional PCI bus. Combined with the increased speed of the data transmission discussed in paragraph 22, the novel invention in the claims of the Patents-in-Suit allow for the separation of what was at the time believed to be inseparable parts of a computer system—such as a computing module and a storage device.

24. As noted in the Patents-in-Suit, the claimed technologies comprise innovative systems and methods which are faster and allow for multiple efficiencies resulting in a better user experience and reduced costs. *See e.g.,* '675 Pat. 4:37-43; '454 Pat. 4:36-45. By utilizing the claimed technology of the Patents-in-Suit, a computer system can practicably be separated into interconnected modules, as data can be transferred quickly and efficiently between separate modules via the high-speed serial link which was not previously possible. *See e.g.,* '675 Pat.

3:19-22; ‘454 Pat 3:15-19. This type of modular computer system allows for the selective upgrade of only one part of the computing system, instead of replacement of the whole unit.

25. In view of these specific improvements, the inventions of the asserted claims, when such claims are viewed as a whole and in ordered combination, are not routine, well-understood, or conventional. The claimed solutions amount to an inventive concept for resolving the particular problems and inefficiencies noted above.

DEFENDANTS’ KNOWLEDGE OF THE PATENTS-IN-SUIT AND CONTINUED INFRINGEMENT DESPITE THAT KNOWLEDGE

26. On March 16, 2018 Shamrock, through counsel, sent a letter to Ira Blumberg, VP of Litigation and IP of Lenovo by email and Federal Express. Attached to the letter were copies of the ‘675 and ‘454 patents. Lenovo has been aware of the ‘675 and ‘454 patents since no later than that date.

27. In addition to identifying these Patents-in-Suit, Shamrock’s March 16, 2018 letter also identified numerous exemplary Lenovo products and methods practiced by those products that infringe its claims, including all Lenovo computers that include a Serial ATA interface and several specific Lenovo computer models available at that time.

28. Also on March 16, 2018 Shamrock, through counsel, sent illustrative claim charts to Lenovo, specifically charting infringement of the ‘454 and ‘675 patents by fifteen Lenovo computer models available at that time.

29. Lenovo has not agreed to enter into a licensing agreement with Shamrock.

30. This Complaint serves as additional notice to Lenovo of the Patents-in-Suit and the manner in which they are infringed.

31. Despite knowledge of the Patents-in-Suit and knowledge of the manner in which the Patents-in-Suit are infringed as demonstrated in the provided claim charts, Lenovo has continued to infringe and/or induce the infringement of the Patents-in-Suit.

INFRINGING PRODUCTS

32. Lenovo made, used, offered for sale, sold, and/or imported into the United States computers which include a Serial ATA interface. These devices are collectively referred to as "Accused Lenovo Computers" and include, but are not limited to, the following models: at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

33. The Accused Lenovo Computers are all Lenovo computers that include a Serial ATA interface that were offered for sale, sold, and/or imported into the United States. Accused Lenovo Computers have a Serial ATA connection between the computing module and its data storage. There are Serial ATA interfaces at both the processor and the data storage unit. Both Serial ATA interfaces infringe the claims of the patents-in-suit in the same way.

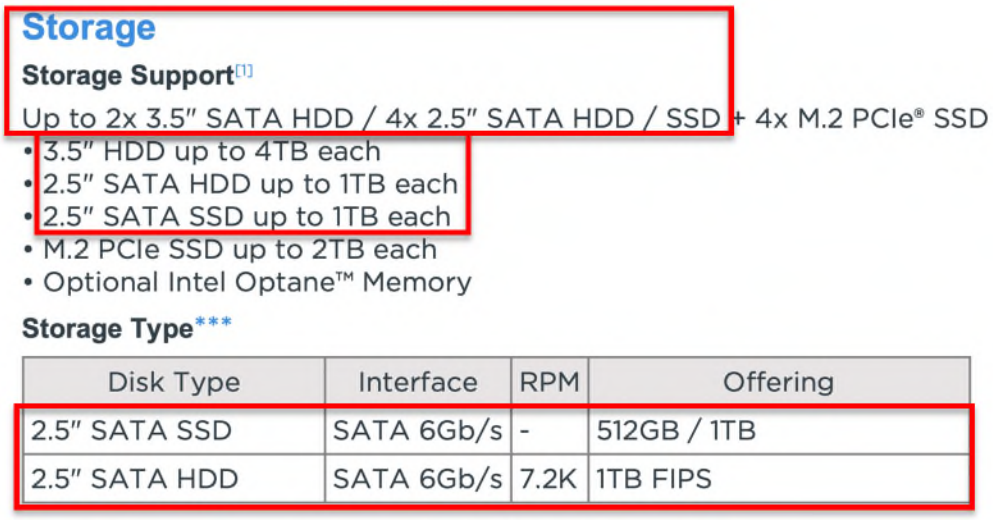
34. For the '675 Patent's method claim, the use of the method claims took place in the U.S between the period that is six years before the filing date of this complaint and the expiration of the Patents-in-Suit. For the '454 Patent, the Accused Lenovo Computers were those made, sold, imported, and offered for sale in the U.S after the notice date, March 16, 2018 and before the expiration date.

35. Lenovo has been, and now is, directly infringing claims of the '675 Patent under 35 U.S.C. § 271(a) by operating the below accused computing devices in this District and elsewhere in the United States in a manner that practices every step in the methods claimed in the '675 Patent, including, for example, Lenovo's use of said methods during set-up, testing, and demonstration of its computing devices.

36. Lenovo has been, and now is, directly infringing claims of the '454 Patent under 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the below accused computing devices in this District and elsewhere in the United States that include the systems claimed in the '454 Patent and/or by using the methods claimed in the Patents-in-Suit, including, for example, Lenovo's use of said systems during set-up, testing, and demonstration of its computing devices.

37. Lenovo has been, and now is, inducing the direct infringement of claims of the Patents-in-Suit pursuant to U.S.C. § 271(b) at least by one or more of making, using, offering for

sale, selling and/or importing the below accused computing devices in this District and elsewhere in the United States that were designed and intended to use and/or practice the methods and processes covered by the Patents-in-Suit. Further, Lenovo has induced infringement by, for example, providing user guides and other support materials and services to its users and by advertising features that are used, and benefits that are achieved through use of the Patents-in-Suit. Technical support materials and user guides for the Accused Lenovo Computers are available at https://pcsupport.lenovo.com/sg/en/, which instruct and encourage users to use and/or practice the methods of processes covered by the Patents-in-Suit through the storing or reading of data on a storage device. As one example, Lenovo advertises the Serial ATA storage capabilities of the ThinkStation P340 Tower Workstation on the product listing for sale, in the technical specifications, and in the user guide.[1] For example, a screenshot of the specification that identifies Serial ATA for the ThinkStation P340 Tower Workstation is shown below.



Storage

Storage Support[1]

Up to 2x 3.5″ SATA HDD / 4x 2.5″ SATA HDD / SSD + 4x M.2 PCIe® SSD

- 3.5″ HDD up to 4TB each
- 2.5″ SATA HDD up to 1TB each
- 2.5″ SATA SSD up to 1TB each
- M.2 PCIe SSD up to 2TB each
- Optional Intel Optane™ Memory

Storage Type***

Disk Type	Interface	RPM	Offering
2.5″ SATA SSD	SATA 6Gb/s	-	512GB / 1TB
2.5″ SATA HDD	SATA 6Gb/s	7.2K	1TB FIPS

[2]

[1] https://www.lenovo.com/us/en/p/workstations/thinkstation-p-series/thinkstation-p340-tower/wmd00000410; https://psref.lenovo.com/syspool/Sys/PDF/ThinkStation/ThinkStation_P340_Tower/ThinkStation_P340_Tower_Spec.PDF; https://download.lenovo.com/pccbbs/thinkcentre_pdf/p340_tw_ug_en.pdf?linkTrack=PSP:ProductInfo:UserGuide

[2] https://psref.lenovo.com/syspool/Sys/PDF/ThinkStation/ThinkStation_P340_Tower/ThinkStation_P340_Tower_Spec.PDF

The ThinkStation P340 Tower Workstation User Manual, for example, also directs Lenovo customers to use the product in an infringing manner by encouraging users to "[b]ack up your data on the storage drive regularly;" and "[c]lean up files and free up storage drive space and memory space occasionally to prevent performance problems."[3] Other user manuals for the other Accused Lenovo Computers comprise similar inducing statements.

38. Despite Lenovo's awareness of the Patents-in-Suit, Lenovo has continued these acts of inducement with specific intent to cause and encourage direct infringement of the Patents-in-Suit with willful blindness that such activities occurred, are still occurring, and constitute direct infringement of the Patents-in-Suit.

COUNT I: INFRINGEMENT OF U.S. PAT. 8,060,675 CLAIM 7

39. Shamrock reasserts and realleges paragraphs 1 through 38 of this Complaint as though set forth fully here.

40. Claim 7 of the '675 Patent provides:

Preamble to Claim 7	A method comprising:
Element A	asynchronously, serially transferring first serial data, corresponding to first parallel bus data, from a first module to a second module using a serial link;
Element B	asynchronously, serially receiving second serial data, corresponding to second parallel bus data, from the second module using the serial link; and
Element C	generating a first clock signal, for use by the first module, using the second serial data.

41. Lenovo directly infringes Claim 7 by operating its computing devices, including computers which include a Serial ATA interface ("Accused Lenovo Computers"), in a manner that practices every step in the claimed method. The Accused Lenovo Computers include, for

[3] https://download.lenovo.com/pccbbs/thinkcentre_pdf/p340_tw_ug_en.pdf?linkTrack=PSP:ProductInfo:UserGuide

example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

42. Lenovo's Accused Lenovo Computers meet each and every element of Claim 7 of the '675 Patent.

43. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

44. Accused Lenovo Computers asynchronously and serially transfer a first serial data (e.g., outgoing serial data "TX"), corresponding to first parallel bus data, from a first module (e.g.,

computing module) to a second module (e.g., data storage device) using a serial link. As the transport layer in a Serial ATA connection maintains no context of ATA commands or previous FIS (frame information structures) content, no definite phase relationship between data previously received and the new data arriving over the serial link exists, and thus the transmission occurs asynchronously. Parallel data is transformed into serial data in the Physical layer of the Serial ATA interface in the first module before it is transferred to the second module as first serial data (e.g., TX).

45. Accused Lenovo Computers asynchronously and serially receive second serial data (e.g., incoming serial data "RX"), corresponding to second parallel bus data, from the second module (e.g., data storage device) using the serial link. As the transport layer in a Serial ATA connection maintains no context of ATA commands or previous FIS content, no definite phase relationship between data previously received and the new data arriving over the serial link exists, and thus serial data is received asynchronously. The second serial data (e.g., RX) corresponds to parallel data that was transformed into serial data in the Physical layer of the Serial ATA interface of the second module before being received by the first module.

46. Accused Lenovo Computers generate a first clock signal, for use by the first module (e.g., computing module), using the second serial data (e.g., incoming serial data "RX"). The clock signal (e.g., "recovered clock") is derived from the incoming high speed second serial data so the first module (e.g., computing module) can determine when parallel data has been properly formed from the incoming serial data.

47. The technology claimed in Claim 7 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

48. Lenovo had knowledge of the ’675 Patent and allegations of how the Accused Lenovo Computers infringe Claim 7 of the ’675 Patent since at least as early as March 16, 2018.

49. Direct infringement of Claim 7 of the ’675 Patent under 35 U.S.C. § 271(a) occurred when Lenovo operated its computing devices, including computers which include a Serial ATA interface (“Accused Lenovo Computers”), in a manner that practiced every step in the claimed method.

50. Additionally, Lenovo induced direct infringement of Claim 7 of the ’675 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers that that were designed and intended to practice the methods and processes covered by Claim 7 of the ’675 Patent. With knowledge of the ’675 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’675 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

51. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

COUNT II: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 1

52. Shamrock reasserts and realleges paragraphs 1 through 51 of this Complaint as though set forth fully here.

53. Claim 1 of the ’454 Patent provides:

Preamble	A system, comprising:
Element A	a connector configured to be connectable to a serial link; and

Element B	a module coupled to the connector, wherein the module is operable to receive first serial data transmitted over the serial link through the connector and transmit second serial data to the serial link through the connector, and wherein the module includes:
Element C	a receiver operable to receive the first serial data from the serial link through the connector;
Element D	a first circuit configured to deserialize the first serial data to generate deserialized data;
Element E	a decoder configured to decode the deserialized data;
Element F	a first buffer operable to store data that has been deserialized and decoded by the first circuit and the decoder, respectively;
Element G	a second buffer operable to receive data, wherein the second buffer is in data communication with a second circuit that is configured to serialize data received via the second buffer to generate the second serial data; and
Element H	a transmitter operable to transmit the second serial data to the serial link through the connector;
Element I	wherein the module is configured to determine whether an amount of data stored in the first buffer equals or exceeds a fill amount associated with a storage capacity of the first buffer; and
Element J	wherein the module is operable to generate a flow control signal in response to the amount of data stored in the first buffer equaling or exceeding the fill amount, and wherein the module is further configured to transmit the flow control signal through the serial link and the connector without passing the flow control signal through the second buffer.

54. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface ("Accused Lenovo Computers"). The Accused Lenovo Computers include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340

SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

55. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers that meet each and every element of Claim 1 of the ’454 Patent.

56. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

57. Accused Lenovo Computers include a connector configured to be connectable to the Serial ATA serial link of its internal data storage device. The connector in Accused Lenovo Computers can be, for example, a direct connection or a cable.

58. Accused Lenovo Computers include a module (e.g., computing module) coupled to the connector, to transmit data to and from its internal disk drive. The module (e.g., computing module) is operable to receive and transmit serial data over the serial link through the connector. The Serial ATA interface in the computing module receives and transmits data in serial form.

59. Accused Lenovo Computers include a module (e.g., computing module) which has a receiver. The receiver in the Serial ATA interface is operable to receive inbound serial data from the serial link though the connector (e.g., inbound high-speed differential signals "RX").

60. Accused Lenovo Computers include a module (e.g., computing module) which has a first circuit configured to deserialize the first serial data to generate deserialized data. The Physical layer in the Serial ATA interface is a circuit which deserializes inbound data for use by the module. The data received and deserialized by the Physical layer is then sent to the Link Layer.

61. Accused Lenovo Computers include a module (e.g., computing module) which has a decoder configured to decode the deserialized data. The Link layer in the Serial ATA interface includes a decoder which decodes the encoded 8b/10b deserialized character stream received from the Physical layer.

62. Accused Lenovo Computers include a module (e.g., computing module) which has a first buffer, e.g., the receive FIFO. The receive FIFO is operable to store data that has been decoded by the Link layer and deserialized by the Physical layer.

63. Accused Lenovo Computers include a module (e.g., computing module) which has a second buffer, e.g., the transmit FIFO. The transmit FIFO then communicates received parallel data to the Physical layer. The Physical layer is configured to serialize the received parallel data and generate second serial data for transmit.

64. Accused Lenovo Computers include a module (e.g., computing module) which has a transmitter. The transmitter in the Serial ATA interface is operable to transmit outbound serial data from the serial link though the connector (e.g., outbound high-speed differential signals TX).

65. Accused Lenovo Computers include a module (e.g., computing module) which is configured to determine whether an amount of data stored in the first buffer equals or exceeds a

fill amount associated with a storage capacity of the first buffer. The computing module is configured to determine whether an amount of data stored in the receive FIFO equals or exceeds a fill amount, or "high water mark", so as to avoid buffer overflow.

66. Accused Lenovo Computers include a module (e.g., computing module) which generates a flow control signal in response to the amount of data stored in the first buffer equaling or exceeding the fill amount, and wherein the module is further configured to transmit the flow control signal through the serial link and the connector without passing the flow control signal through the second buffer. The computing module is operable to generate flow control signals (e.g., "HOLDp") in response to the amount of data stored in the receive FIFO so as to avoid buffer overflow. The computing module is configured to transmit the flow control signal through the serial link and connector on the back channel—i.e. without passing control signals through the second buffer.

67. The technology claimed in Claim 1 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

68. Lenovo had knowledge of the '454 Patent and allegations of how the Accused Lenovo Computers infringe Claim 1 of the '454 Patent since at least as early as March 16, 2018.

69. Direct infringement of claim 1 of the '454 Patent under 35 U.S.C. § 271(a) occurred when Lenovo made, imported, used, sold and/or offered for sale the Accused Lenovo Computers that meet Claim 1 of the '454 Patent.

70. Additionally, Lenovo induced direct infringement of Claim 1 of the '454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers that that were designed and intended to practice the system covered by Claim

1 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

71. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

COUNT III: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 2

72. Shamrock incorporates by reference the allegations set forth in paragraphs 1 to 71 of this Complaint as though set forth in full herein.

73. Claim 2 of the ’454 Patent provides:

Preamble to Claim 2	The system of claim 1, wherein:
Element A	the system is configured to transmit the first serial data and the second serial data asynchronously over the serial link.

74. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface (“Accused Lenovo Computers”). The Accused Lenovo Computers include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3

Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

75. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers that meet each and every element of Claim 2 of the ’454 Patent.

76. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

77. Accused Lenovo Computers are configured to transmit the first serial data and the second serial data asynchronously over its Serial ATA link. As the transport layer in a Serial ATA connection maintains no context of ATA commands or previous FIS (frame information structure) content, no definite phase relationship between data previously received and the new data arriving over the serial link exists, and thus the transmission of serial data occurs asynchronously.

78. The technology claimed in Claim 2 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

79. Lenovo had knowledge of the ’454 Patent and allegations of how the Accused Lenovo Computers infringe Claim 2 of the ’454 Patent since at least as early as March 16, 2018.

80. Direct infringement of claim 1 of the ’454 Patent under 35 U.S.C. § 271(a) occurred when Lenovo made, imported, used, sold and/or offered for sale the Accused Lenovo Computers that meet Claim 2 of the ’454 Patent.

81. Additionally, Lenovo induced direct infringement of Claim 2 of the ’454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers that that were designed and intended to practice the system covered by Claim 2 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

82. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

COUNT IV: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 3

83. Shamrock reasserts and realleges paragraphs 1 through 82 of this Complaint as though set forth fully here.

84. Claim 3 of the ’454 Patent provides:

Preamble to Claim 3	The system of claim 1, wherein:
Element A	the data received by the second buffer comprises parallel data.

85. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface (“Accused Lenovo Computers”). The Accused Lenovo Computers include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad

X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

86. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers that meet each and every element of Claim 3 of the ’454 Patent.

87. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

88. The data received by the second buffer, e.g., the transmit FIFO, in Accused Lenovo Computers comprise parallel data. The transmit FIFO receives data from the module in parallel form. The transmit FIFO sends the parallel data to the Physical layer for serialization.

89. The technology claimed in Claim 3 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a

technological problem rooted in computer technology.

90. Lenovo had knowledge of the ’454 Patent and allegations of how the Accused Lenovo Computers infringe Claim 3 of the ’454 Patent since at least as early as March 16, 2018.

91. Direct infringement of claim 3 of the ’454 Patent under 35 U.S.C. § 271(a) occurred when Lenovo made, imported, used, sold and/or offered for sale the Accused Lenovo Computers that meet Claim 3 of the ’454 Patent.

92. Additionally, Lenovo induced direct infringement of Claim 3 of the ’454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers that that were designed and intended to practice the system covered by Claim 3 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

93. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

COUNT V: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 4

94. Shamrock reasserts and realleges paragraphs 1 through 93 of this Complaint as though set forth fully here.

95. Claim 4 of the ’454 Patent provides:

Preamble to Claim 4	The system of claim 1, wherein:
Element A	the module is further operable to repeatedly transmit the second serial data through the serial link and the connector without receiving acknowledgement during transmission.

96. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface ("Accused Lenovo Computers"). The Accused Lenovo Computers include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

97. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers that meet each and every element of Claim 4 of the '454 Patent.

98. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

99. Accused Lenovo Computers are operable to repeatedly transmit the second serial data through the serial link and the connector without receiving acknowledgement during transmission. The Transport layer in a Serial ATA connection maintains no context of previous FIS (frame information structure) data and is not cognizant of how frames are transmitted or received. The Transport layer also maintains no context in terms of ATA commands. The Accused Lenovo Computers do not receive acknowledgement that frames have been transmitted or received.

100. The technology claimed in Claim 4 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

101. Lenovo had knowledge of the ’454 Patent and allegations of how the Accused Lenovo Computers infringe Claim 4 of the ’454 Patent since at least as early as March 16, 2018.

102. Direct infringement of Claim 4 of the ’454 Patent under 35 U.S.C. § 271(a) occurred when Lenovo made, imported, used, sold and/or offered for sale the Accused Lenovo Computers that meet Claim 4 of the ’454 Patent.

103. Additionally, Lenovo induced direct infringement of Claim 4 of the ’454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers that that were designed and intended to practice the system covered by Claim 4 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

104. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock

has been and continues to be injured and has sustained damages.

COUNT VI: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 6

105. Shamrock reasserts and realleges paragraphs 1 through 104 of this Complaint as though set forth fully here.

106. Claim 6 of the ’454 Patent provides:

Preamble to Claim 6	The system of claim 1, wherein:
Element A	the module is further operable to transmit the first serial data over the serial link and to transfer the second serial data over the serial link using differential signals.

107. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface (“Accused Lenovo Computers”). The Accused Lenovo Computers include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a,

ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

108. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers that meet each and every element of Claim 6 of the ’454 Patent.

109. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

110. Accused Lenovo Computers are operable to transmit the first serial data over the serial link and to transfer the second serial data over the serial link using differential signals. The outbound signals from the Serial ATA interface, e.g., outbound signals “TX”, are high-speed differential signals.

111. The technology claimed in Claim 6 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

112. Lenovo had knowledge of the ’454 Patents and allegations of how the Accused Lenovo Computers infringe Claim 6 of the ’454 Patent since at least as early as March 16, 2018.

113. Direct infringement of Claim 6 of the ’454 Patent under 35 U.S.C. § 271(a) occurred when Lenovo made, imported, used, sold and/or offered for sale the Accused Lenovo Computers that meet Claim 6 of the ’454 Patent.

114. Additionally, Lenovo induced direct infringement of Claim 6 of the ’454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused

Lenovo Computers that that were designed and intended to practice the system covered by Claim 6 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

115. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

COUNT VII: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 7

116. Shamrock reasserts and realleges paragraphs 1 through 115 of this Complaint as though set forth fully here.

117. Claim 7 of the ’454 Patent provides:

Preamble to Claim 7	The system of claim 1, wherein:
Element A	the flow control signal is configured to be used to control transmission of the first serial data over the serial link to prevent overflow of the first buffer.

118. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface (“Accused Lenovo Computers”). The Accused Lenovo Computers include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower

Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

119. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers that meet each and every element of Claim 7 of the ’454 Patent.

120. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

121. Accused Lenovo Computers generate a flow control signal, e.g., $HOLD_{P,}$ that is configured to be used to control transmission of the first serial data over the serial link to prevent overflow of the first buffer, e.g., the receive FIFO. When the receive FIFO has reached it maximum capacity it sends a $HOLD_{P,}$ signal indicating the receiver is not ready to receive more data, halting the transmission of additional data.

122. The technology claimed in Claim 7 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

123. Lenovo had knowledge of the ’454 Patent and allegations of how the Accused Lenovo Computers infringe Claim 7 of the ’454 Patent since at least as early as March 16, 2018.

124. Direct infringement of claim 3 of the ’454 Patent under 35 U.S.C. § 271(a) occurred when Lenovo made, imported, used, sold and/or offered for sale the Accused Lenovo Computers that meet Claim 7 of the ’454 Patent.

125. Additionally, Lenovo induced direct infringement of Claim 7 of the ’454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers that that were designed and intended to practice the system covered by Claim 7 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

126. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

COUNT VIII: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 15

127. Shamrock reasserts and realleges paragraphs 1 through 126 of this Complaint as though set forth fully here.

128. Claim 15 of the ’454 Patent provides:

Preamble to Claim 15	The system of claim 1, wherein:
Element A	the system comprises a hard disk drive.

129. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface and a hard disk drive (“Accused

Lenovo Computers with Hard Disk Drive"). The Accused Lenovo Computers with Hard Disk Drive include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

130. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers with Hard Disk Drive that meet each and every element of Claim 15 of the '454 Patent.

131. Upon information and belief, Accused Lenovo Computers with Hard Disk Drive include Serial ATA interfaces on both the computing module and on its hard disk drive.

132. Accused Lenovo Computers with Hard Disk Drive include a hard disk drive storage device.

133. The technology claimed in Claim 15 was not well understood, routine, or

conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

134. Lenovo had knowledge of the ’454 Patent and allegations of how the Accused Lenovo Computers with Hard Disk Drive infringe Claim 15 of the ’454 Patent since at least as early as March 16, 2018.

135. Additionally, Lenovo induced direct infringement of Claim 15 of the ’454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers with Hard Disk Drive that that were designed and intended to practice the system covered by Claim 15 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

136. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

COUNT IX: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 16

137. Shamrock reasserts and realleges paragraphs 1 through 136 of this Complaint as though set forth fully here.

138. Claim 16 of the ’454 Patent provides:

Preamble to Claim 16	The system of claim 1, further comprising:
Element A	an interface included in the module coupled to the first buffer and operable to receive the data stored in the first buffer;
Element B	a bus coupled to the module and configured to receive the data from the interface; and
Element C	a processor coupled to the bus.

139. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface ("Accused Lenovo Computers"). The Accused Lenovo Computers include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q, ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

140. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers that meet each and every element of Claim 16 of the '454 Patent.

141. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

142. Accused Lenovo Computers include an interface, e.g., the Serial ATA interface, coupled to the first buffer, e.g., the receive FIFO, and is operable to receive the data stored in the first buffer. The Serial ATA interface is coupled to the receive FIFO and receives the stored data.

143. Accused Lenovo Computers include a bus, e.g., a serial link, coupled to the module and configured to receive the data from the interface. The data is transferred from the Serial ATA interface across a serial link.

144. Accused Lenovo Computers include a processor, e.g., a Central Processing Unit coupled to the bus that processes received data.

145. The technology claimed in Claim 16 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

146. Lenovo had knowledge of the ’454 Patent and allegations of how the Accused Lenovo Computers infringe Claim 16 of the ’454 Patent since at least as early as March 16, 2018.

147. Additionally, Lenovo induced direct infringement of Claim 16 of the ’454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers that that were designed and intended to practice the system covered by Claim 16 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by using these devices by, as an example, directing and controlling end users’ storing of data onto data storage devices.

148. As a direct and proximate result of Lenovo’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

COUNT X: INFRINGEMENT OF U.S. PAT. 9,535,454 CLAIM 17

149. Shamrock reasserts and realleges paragraphs 1 through 148 of this Complaint as though set forth fully here.

150. Claim 17 of the ’454 Patent provides:

Preamble to Claim 17	The system of claim 1, wherein:
Element A	the module is further configured to generate a clock signal, for use by the module, using the first serial data.

151. Lenovo made, used, sold, offered for sale, and/or imported computing devices, including computers which include a Serial ATA interface and a hard disk drive (“Accused Lenovo Computers”). The Accused Lenovo Computers include, for example, at least the ideaPad 110, ideaPad 310, ideaPad 510, ideaPad 520, ideaPad 700, ideaPad MIIX 700, ideaPad Y700, ideaPad Y720, ThinkPad E570, ThinkPad T470, ThinkPad P50, ThinkPad 13, ThinkPad E470, ThinkPad L470, ThinkPad X270, ideaPad 3, ideaPad 3i, ideaPad Gaming 3, ideaPad Gaming 3i, ThinkPad E14, ThinkPad E15, ThinkPad L15, Legion 5, Legion 5i, Legion 5i Gaming, Legion Y540, ThinkStation P340 SFF Workstation, ThinkStation P340 Tower Workstation, ThinkStation P520 Tower Workstation, ThinkStation P520c Tower Workstation, ThinkStation P720 Tower Workstation, ThinkStation P920 Tower Workstation, ThinkStation P350 Tower Workstation, ideaCentre 3 Desktop Tower, ideaCentre 3i Desktop Tower, ideaCentre 310s Desktop Tower, ideaCentre AIO 3i, ideaCentre 5 Desktop Tower, ideaCentre 5i Desktop Tower, ideaCentre mini 5i Desktop Tower, ideaCentre Creator 5i Tower, ideaCentre 510a, ideaCentre AIO 5i, ThinkCentre M70c, ThinkCentre M70c ES, ThinkCentre M70q, ThinkCentre M70s, ThinkCentre M70a, ThinkCentre M70t, ThinkCentre M920, ThinkCentre M75s, ThinkCentre M75q, ThinkCentre M80t, ThinkCentre M80s, ThinkCentre M80q,

ThinkCentre M80t, ThinkCentre M90s, ThinkCentre M90a, Yoga A940 AIO, Legion Tower 5 Gaming Computer, Legion Tower 5i Gaming Computer, and Legion Tower 7i Gaming Computer.

152. Lenovo made, used, sold, offered for sale, and/or imported the Accused Lenovo Computers that meet each and every element of Claim 17 of the ’454 Patent.

153. Upon information and belief, Accused Lenovo Computers include Serial ATA interfaces on both the computing module and on its data storage device, for example a hard disk drive or a solid state drive.

154. Accused Lenovo Computers are configured to generate a clock signal using the first serial data (e.g., incoming serial data “RX”). The clock signal (e.g., “recovered clock”) is derived from the incoming high speed second serial data for use by the module (e.g., a computing module) to determine when parallel data has been properly formed from the incoming serial data.

155. The technology claimed in Claim 17 was not well understood, routine, or conventional at the time that the application was filed and provided a technological solution to a technological problem rooted in computer technology.

156. Lenovo had knowledge of the ’454 Patent and allegations of how the Accused Lenovo Computers infringe Claim 17 of the ’454 Patent since at least as early as March 16, 2018.

157. Direct infringement of Claim 17 of the ’454 Patent under 35 U.S.C. § 271(a) occurred when Lenovo made, imported, used, sold and/or offered for sale the Accused Lenovo Computers that meet Claim 17 of the ’454 Patent.

158. Additionally, Lenovo induced direct infringement of Claim 17 of the ’454 Patent under 35 U.S.C. § 271(b) when Lenovo made, imported, used, sold and/or offered for sale Accused Lenovo Computers that that were designed and intended to practice the system covered by Claim

17 of the ’454 Patent. With knowledge of the ’454 Patent and knowledge of the infringing nature of Accused Lenovo Computers (or, at a minimum, willful blindness thereto), Lenovo has encouraged end users to directly infringe the ’454 Patent by, as an example, directing and controlling end users’ storing of data onto data storage devices.

159. As a direct and proximate result of Defendant’s acts of patent infringement, Shamrock has been and continues to be injured and has sustained damages.

WILLFUL INFRINGEMENT

160. Lenovo has infringed and continues to infringe the above identified claims of the Patents-in-Suit despite its knowledge of the ’675 and ’454 Patents at least as early as March 16, 2018; specific knowledge of how Lenovo’s accused products infringed the ’675 and ‘454 Patents since March 16, 2018; and the objectively high likelihood that its actions constitute patent infringement.

161. Lenovo’s infringement of the Patents-in-Suit is willful and deliberate and its actions constitute egregious misconduct, including refusing to take a license, having knowledge of the patents-in-suit and notice of the infringement but having no reasonable factual basis for non-infringement or invalidity. This willful misconduct by Lenovo entitles Shamrock to enhanced damages under 35 U.S.C. § 284 and to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

JURY DEMAND

Shamrock demands a trial by jury on all issues that may be so tried.

REQUEST FOR RELIEF

WHEREFORE, Plaintiff Shamrock requests that this Court enter judgment in its favor and against Defendant Lenovo as follows:

A. Adjudging, finding, and declaring that Lenovo has infringed the above-identified claims of each of the Patents-in-Suit under 35 U.S.C. § 271;

B. Awarding the past and future damages arising out of Lenovo's infringement of the Patents-in-Suit to Shamrock in an amount no less than a reasonable royalty, together with prejudgment and post-judgment interest, in an amount according to proof;

C. Adjudging, finding, and declaring that Lenovo's infringement is willful and awarding enhanced damages and fees as a result of that willfulness under 35 U.S.C. § 284;

D. Adjudging, finding, and declaring that the Patents-in-Suit are valid and enforceable;

E. Awarding attorney's fees, costs, or other damages pursuant to 35 U.S.C. §§ 284 or 285 or as otherwise permitted by law; and

F. Granting Shamrock such other further relief as is just and proper, or as the Court deems appropriate.

This the 21st day of June, 2022.

/s/ Robert J. Morris

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CERTIFICATE OF SERVICE

I hereby certify that, on the 21st day of June, 2022, the foregoing First Amended Complaint for Patent Infringement was electronically filed with the Clerk of Court using the CM/ECF system, which will send notification to the attorneys of record for Lenovo (United States), Inc.

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