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

ACQIS LLC,
a Texas limited liability company,

Plaintiff,

v.

LENOVO GROUP LTD., a China corporation, LENOVO PC HK LIMITED, a China corporation, LCFC (HEFEI) ELECTRONICS TECHNOLOGY CO., LTD., a China corporation, LENOVO INFORMATION PRODUCTS (SHENZHEN) CO. LTD., a China corporation, LENOVO (BEIJING) INFORMATION TECHNOLOGY LTD., a China corporation, LENOVO CENTRO TECNOLOGICO S DE R.L. DE CV, a Mexico corporation,

Defendants.

Civil Action No. 6:20-CV-00967

JURY TRIAL DEMANDED

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff ACQIS LLC ("Plaintiff" or "ACQIS"), by its attorneys, hereby alleges patent infringement against Defendants Lenovo Group Ltd., Lenovo PC HK Limited, LCFC (Hefei) Electronics Technology Co., Ltd., Lenovo Information Products (Shenzhen) Co. Ltd., Lenovo (Beijing) Information Technology Co., Ltd., Lenovo Centro Tecnológico S. de R.L. de C.V (collectively "Defendants" or "Lenovo") as follows:

INTRODUCTION

1. This is an action for patent infringement under the United States Patent Laws, 35 U.S.C. § 1 *et seq*. Beginning in the late 1990s, Dr. William Chu founded ACQIS and invented a

variety of pioneering computer technologies that employed serial transmission along low voltage differential signal (LVDS) channels to dramatically increase the speed at which data can be transmitted while also reducing power consumption and noise. Dr. Chu's inventions have become foundational in the computer industry, and are found in a variety of data transmission systems, including PCI Express (PCIe) and/or USB 3.x[1] transactions.

2. Lenovo has infringed and continues to infringe, directly and/or indirectly, the following patents owned by ACQIS: U.S. Patent Nos. 9,529,768 ("'768 patent"), 9,703,750 ("'750 patent"), 8,756,359 ("'359 patent"), 8,626,977 ("'977 patent"), RE44,739 ("'739 patent"), 8,977,797 ("'797 patent"), 9,529,769 ("'769 patent"), RE45,140 ("'140 patent"), and RE44,654 ("'654 patent") (collectively, the "ACQIS Patents"). Copies of the ACQIS Patents are attached to this First Amended Complaint as Exhibits 1-9.

3. Specifically, Lenovo has directly and/or indirectly infringed and continues to infringe the ACQIS Patents through: (1) the manufacture, use, offering to sale, and/or sale in the United States, and/or the importation into the United States, of infringing Lenovo-brand computer products; (2) the practice of claimed methods of the ACQIS Patents by manufacturing, using and/or testing Lenovo-brand computer products in the United States; (3) the importation into the United States of Lenovo-brand computer products made abroad using ACQIS's patented processes; and (4) the inducement of third parties to engage in the activity described above with knowledge of the ACQIS Patents and of the third parties' infringing actions.

4. ACQIS seeks damages and other relief for Lenovo's infringement of the ACQIS Patents. ACQIS is entitled to past damages because, without limitation, it has provided actual notice to Lenovo and for method claims which do not require marking.

[1] As used herein, "USB 3.x" refers to USB 3.0 and subsequent versions, including USB 3.1, USB 3.2, and any other subsequent versions.

THE PARTIES

5. Plaintiff ACQIS LLC, is a limited liability company organized and existing under the laws of the State of Texas, with offices at 411 Interchange Street, McKinney, Texas 75071. A related entity, ACQIS Technology, Inc., is a corporation organized under the laws of the State of Delaware, having its principal place of business at 1503 Grant Road, Suite 100, Mountain View, California 94040. ACQIS LLC is operated from California, where its President, Dr. William Chu, resides. Dr. Chu is also the Chief Executive Officer of ACQIS Technology, Inc.

6. Lenovo Group Limited is a Chinese company with its principal place of business in Hong Kong at 23rd Floor, Lincoln House, Taikoo Place, 979 King's Road, Quarry Bay, Hong Kong Island, Hong Kong S.A.R. Lenovo Group Limited is the parent company of a multinational conglomerate that operates under the name "Lenovo" and is a global leader in the personal and business computer market. Lenovo purports to be a US$50 billion Fortune Global 500 company, with 63,000 employees and operating in 180 markets around the world.

7. Lenovo PC HK Limited is a wholly-owned subsidiary of Lenovo Group Limited and a Chinese company with its principal place of business in Hong Kong at 23rd Floor, Lincoln House, Taikoo Place, 979 King's Road, Quarry Bay, Hong Kong Island, Hong Kong S.A.R. Lenovo PC HK Limited is listed on at least one infringing Lenovo-brand product and on various manufacturing certification certificates applicable to products sold in the United States. Lenovo Group Limited's 2019/2020 Annual Report indicates that Lenovo PC HK Limited distributes IT products.

8. LCFC (Hefei) Electronics Technology Co., Ltd. is a wholly-owned subsidiary of Lenovo Group Limited and a Chinese company with a manufacturing center at NO.1-3188, Yungu Road, Hefei Export Processing Zone, Anhui Province Hefei, China. Publicly available import

data indicates that LCFC (Hefei) Electronics Technology Co., Ltd. imports notebook computers into the United States. Lenovo Group Limited's 2019/2020 Annual Report indicates that LCFC (Hefei) Electronics Technology Co., Ltd. manufactures and distributes IT products.

9. Lenovo Information Products (Shenzhen) Co. Ltd., a Chinese company, 1/#1 Great Wall Technology Building Science & Industry Park, Nanshan District. Shenzhen, China 518057. Publicly available import data indicates that Lenovo Information Products (Shenzhen) Co. Ltd., is a prolific importer of Lenovo products, including laptop and desktop computers, into the United States.

10. Lenovo (Beijing) Information Technology Ltd. is a wholly-owned subsidiary of Lenovo Group Limited and is a Chinese company with its principal place of business at 3406 Room in No. 6 Chuangye Road, Shangdi Information Industry Base, Haidan District, Beijing China, 100085. It is listed as a manufacturer of Lenovo products on various manufacturing certification certificates applicable to products sold in the United States. Lenovo Group Limited's 2019/2020 Annual Report indicates that Lenovo (Beijing) Information Technology Ltd. distributes IT products.

11. Lenovo Centro Tecnológico S. de R.L. de C.V is a Mexican company with its principal place of business at No. 316, Boulevard Escobedo Apodaca, Technology Park Apodaca, Nuevo Leon, P.O. 66600, México. It is listed as Lenovo's Monterrey, México manufacturing center on the Lenovo website. Publicly available import data indicates that Lenovo Centro Tecnológico is a prolific importer of Lenovo products, including desktop computers, into the United States and specifically into Houston, Texas. A Lenovo-brand ThinkStation P330 SFF desktop and Lenovo ThinkSystem SR650 server which were purchased in the U.S. and delivered

to this District are both marked as "Made in Mexico" with the ThinkStation P330 SFF specifically labeled as "Made in Monterrey."

12. Defendants are part of the same corporate structure and distribution chain (together with other Lenovo subsidiaries, affiliates, and intermediaries) with respect to the manufacture, use, offering to sell, and/or sale of infringing Lenovo-brand computer products and with respect to the importation into the United States of infringing Lenovo-brand computer products and of Lenovo-brand computer products made abroad using patented processes claimed in the ACQIS Patents.

JURISDICTION AND VENUE

13. This is an action for patent infringement under the United States patent laws, 35 U.S.C. § 101 *et seq*.

14. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

15. This Court has personal jurisdiction over the Defendants consistent with the requirements of the Due Process Clause of the United States Constitution and the Texas Long Arm Statute. On information and belief, Defendants have purposefully manufactured and/or distributed Lenovo-brand computer products that infringe the ACQIS Patents, or that were made abroad using patented processes claimed in the ACQIS Patents, through established distribution channels with the expectation that those products would be sold in the United States, State of Texas, and in this District. Further, Defendants have (themselves and/or through the activities of subsidiaries, affiliates, or intermediaries) committed and continue to commit acts of patent infringement in the United States, State of Texas and this District, including by making, using, offering to sell, and/or selling infringing Lenovo-brand computer products in the United States, State of Texas and this

District; importing infringing Lenovo-brand computer products and/or Lenovo-brand computer products made abroad using ACQIS's patented processes into the United States for sale in the State of Texas and this District; and/or inducing others to commit acts of patent infringement in the United States, State of Texas and this District. Accordingly, Lenovo has established minimum contacts within Texas and purposefully availed itself of the benefits of Texas, and the exercise of personal jurisdiction over Lenovo would not offend traditional notions of fair play and substantial justice. In addition, or in the alternative, this Court has personal jurisdiction over Lenovo pursuant to Federal Rule of Civil Procedure 4(k)(2).

16. Venue is proper in this District pursuant to 28 U.S.C. § 1391(c)(3) because Defendants do not reside in the United States and thus may be sued in any judicial district in the United States pursuant to 28 U.S.C. § 1391(c)(3).

FACTUAL BACKGROUND

Dr. Chu and the ACQIS Patents

17. Dr. William Chu has been a prolific innovator in the computing industry since the 1970s.

18. In 1976, Dr. Chu received his Ph.D. in Electrical Engineering from the University of California, Berkeley. Dr. Chu then began working in semiconductor design for American Microsystems, Inc. from 1976 to 1977, and then for Zilog, Inc. from 1977 to 1982.

19. In 1982, Dr. Chu founded Verticom, Inc., which developed innovative technologies relating to video transmission over telephone lines. Verticom also developed graphics products for the PC computer-aided design (CAD) market. Verticom's success resulted in its stock being listed on the NASDAQ exchange in 1997. In 1998, Verticom was acquired by Western Digital Imaging, Inc.

20. Dr. Chu served as Vice President of Engineering for Western Digital from 1988 to 1991, overseeing a development team in the desktop and portable graphics chip division. In the course of his work at Western Digital, Dr. Chu in 1988 started the company's portable graphics chip business, which became #1 in the portable graphics chip market by 1991. Dr. Chu also led Western Digital to achieve the #1 market share in the PC graphics market in 1990.

21. After Western Digital, Dr. Chu worked for Acumos, Inc. from 1991 to 1992 as a Vice President managing engineering for computer graphics chip development. Acumos was acquired by Cirrus Logic, Inc. in 1992.

22. Dr. Chu then worked for Cirrus Logic from 1992 to 1997, first as a General Manager in the Desktop Graphics Division and later as Co-President of the Graphics Chip Business Unit. During Dr. Chu's time at Cirrus Logic, the company achieved #1 market share in the PC graphics chip market.

23. In 1998, Dr. Chu founded ACQIS Technology, Inc. to pursue his vision of developing a small, portable computer module that could be interchangeably connected with a variety of different peripheral consoles. In the course of this development effort, Dr. Chu recognized the need for a better interconnection between the core computing module and a peripheral console. Such interconnections traditionally conveyed peripheral component interconnect (PCI) bus transactions in parallel using a large number of signal channels and connector pins. This made it difficult to employ LVDS channels, which are more "cable friendly," consume less power, and generate less noise. Dr. Chu wanted to develop an interconnection system that was scalable, used connectors with low pin counts, was power-efficient, high performing, and easily extendible for future computing needs and technologies. This development work resulted in a large family of patents now owned by ACQIS, which disclose and claim a

variety of pioneering inventions relating to improved, high-performance and low-power consuming interconnection technologies for computer modules.

24. After several decades in the industry, Dr. Chu is now a named inventor of approximately forty-one (41) U.S. Patents.

25. Among the patent portfolio covering Dr. Chu's inventions and owned by ACQIS are the ACQIS Patents asserted in this case.

26. The '768 patent, entitled "Computer System Including CPU or Peripheral Bridge Directly Connected to a Low Voltage Differential Signal Channel that Communicates Serial Bits of a Peripheral Component Interconnect Bus Transaction in Opposite Directions," was duly and legally issued on December 27, 2016, from a patent application filed March 13, 2014, with William W.Y. Chu as the sole named inventor. The '768 patent claims priority to U.S. Provisional Patent Application No. 60/134,122, filed on May 14, 1999.

27. The '750 patent, entitled "Computer System Including CPU or Peripheral Bridge Directly Connected to a Low Voltage Differential Signal Channel that Communicates Serial Bits of a Peripheral Component Interconnect Bus Transaction in Opposite Directions," was duly and legally issued on July 11, 2017, from a patent application filed October 9, 2014, with William W.Y. Chu as the sole named inventor. The '750 patent claims priority to U.S. Provisional Patent Application No. 60/134,122, filed on May 14, 1999.

28. The '359 patent, entitled "Computer System Including CPU or Peripheral Bridge to Communicate Serial Bits of Peripheral Component Interconnect Bus Transaction and Low Voltage Differential Signal Channel to Convey the Serial Bits," was duly and legally issued on June 17, 2014, from a patent application filed January 17, 2013, with William W.Y. Chu as the

sole named inventor. The '359 patent claims priority to U.S. Provisional Patent Application No. 60/134,122, filed on May 14, 1999.

29. The '977 patent, entitled "Computer System Including CPU or Peripheral Bridge to Communicate Serial Bits of Peripheral Component Interconnect Bus Transaction and Low Voltage Differential Signal Channel to Convey the Serial Bits," was duly and legally issued on January 7, 2014, from a patent application filed July 27, 2012, with William W.Y. Chu as the sole named inventor. The '977 patent claims priority to U.S. Provisional Patent Application No. 60/134,122, filed on May 14, 1999.

30. The '739 patent, entitled "Data Security Method and Device for Computer Modules," was duly and legally issued on January 28, 2014, from a patent application filed May 21, 2013, with William W.Y. Chu as the sole named inventor. The '739 patent claims priority to U.S. Patent Application No. 11/056,604, filed on February 10, 2005.

31. The '797 patent, entitled "Method of Improving Peripheral Component Interface Communications Utilizing a Low Voltage Differential Signal Channel," was duly and legally issued on March 10, 2015, from a patent application filed October 10, 2012, with William W.Y. Chu as the sole named inventor. The '797 patent claims priority to U.S. Provisional Patent Application No. 60/134,122, filed on May 14, 1999.

32. The '769 patent, entitled "Computer System Including CPU or Peripheral Bridge Directly Connected to a Low Voltage Differential Signal Channel that Communicates Serial Bits of a Peripheral Component Interconnect Bus Transaction In Opposite Directions," was duly and legally issued on December 27, 2016, from a patent application filed February 26, 2016, with William W.Y. Chu as the sole named inventor. The '769 patent claims priority to U.S. Patent Application No. 11/097,694, filed on March 31, 2005.

33. The ’140 patent, entitled “Data Security Method and Device for Computer Modules,” was duly and legally issued on September 16, 2014, from a reissue application filed December 17, 2013, with William W.Y. Chu as the sole named inventor. The ’140 patent is a reissue of U.S. Patent No. 6,643,777, which issued on November 4, 2003, from a patent application filed May 14, 1999. The ’140 patent claims priority to U.S. Patent Application No. 09/312,199, filed on May 14, 1999.

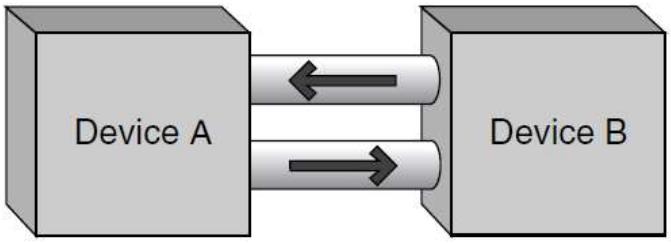
34. The ’654 patent, entitled “Data Security Method and Device for Computer Modules,” was duly and legally issued on December 17, 2013, from a reissue application filed October 10, 2012, with William W.Y. Chu as the sole named inventor. The ’654 patent is a reissue of U.S. Patent No. 6,643,777, which issued on November 4, 2003, from a patent application filed May 14, 1999. The ’654 patent claims priority to U.S. Patent Application No. 09/312,199, filed on May 14, 1999.

35. The inventions claimed in the ACQIS Patents enable computers to operate faster with better efficiency through faster interconnections including between the core computing power modules and any connected consoles.

36. The claims in the ACQIS Patents generally relate to computers and computer systems that employ CPUs coupled to LVDS channels that convey various types of data (*e.g.*, PCI bus transactions, USB 3.x data, and/or digital video data) in a serial bit stream using pairs of unidirectional channels to convey the data in opposite directions.

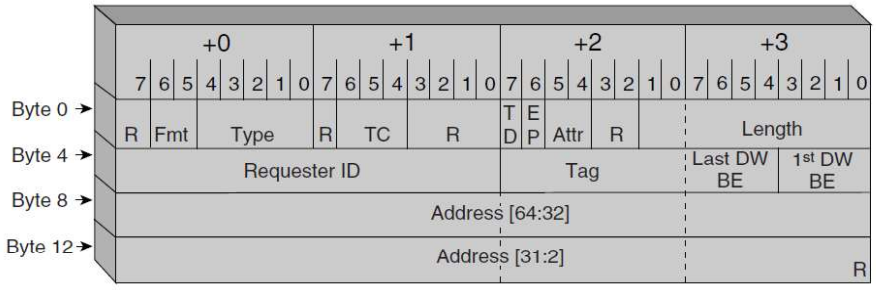
37. Over the years, Dr. Chu’s inventive developments have become more and more widely used in computing technologies. One prime example is the computing industry’s adoption of PCI Express, which post-dates Dr. Chu’s inventions but embodies Dr. Chu’s patented interconnection invention by using “high speed, low voltage, differential serial pathway for two

devices … to communicate simultaneously by implementing dual unidirectional paths between two devices[.]"



See Introduction to PCI Express – A Hardware and Software Developers Guide, Intel Press (2003), at 1-2 ("There are certain times in the evolution of technology that serve as inflection points that forever change the course of events. For the computing sector and communications, the adoption of PCI Express, a groundbreaking new general input/output architecture, will serve as one of these inflection points.").

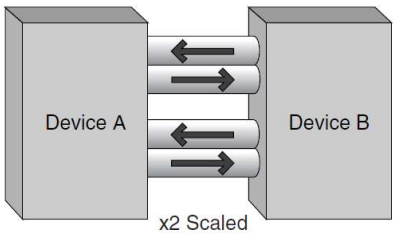
38. PCI Express connections transmit data packets known as transaction layer packets (TLP) that include data bits, address bits, and byte enable (BE) information bits.



Id. at 93-114.

39. In sum, PCI Express connections are LVDS channels that convey data bits, address bits, and byte enable information bits of a PCI bus transaction in a serial bit stream using pairs of unidirectional, differential signal lanes to convey the information in opposite directions allowing the connection to be scalable and dramatically reducing the pin-count required for connectors, as well as other benefits. "Currently PCI Express defines the following configuration of serial links:

x1, x2, x4, x8, x12, x16, and x32. … An x2 configuration indicates two serial paths to and from a device[.]"



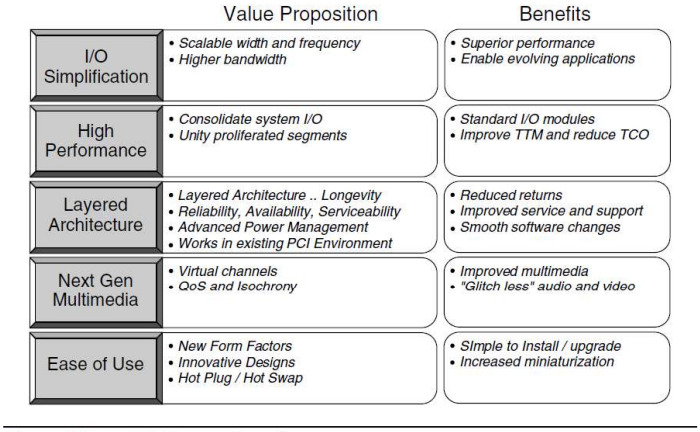


Figure 4.1 PCI Express Benefits

Id. at 3, 50.

40. Another example of a computer-to-peripheral interconnection that embodies Dr. Chu's patented invention is the USB 3.x connection. The "Super Speed" USB 3.0 architecture uses at least two pairs of unidirectional, point-to-point differential signal paths. Each pair includes a transmit path and a receiving path, thus transmitting the USB data packet information in opposite directions.

3.1.4 USB 3.0 Architecture Summary

USB 3.0 is a dual-bus architecture that incorporates USB 2.0 and a SuperSpeed bus. Table 3-1 summarizes the key architectural differences between SuperSpeed USB and USB 2.0.

Table 3-1. Comparing SuperSpeed to USB 2.0

Characteristic	SuperSpeed USB	USB 2.0
Data Rate	SuperSpeed (5.0 Gbps)	low-speed (1.5 Mbps), full-speed (12 Mbps), and high-speed (480 Mbps)
Data Interface	Dual-simplex, four-wire differential signaling separate from USB 2.0 signaling Simultaneous bi-directional data flows	Half-duplex two-wire differential signaling Unidirectional data flow with negotiated directional bus transitions
Cable signal count	Six: Four for SuperSpeed data path Two for non-SuperSpeed data path	Two: Two for low-speed/full-speed/high-speed data path
Bus transaction protocol	Host directed, asynchronous traffic flow Packet traffic is explicitly routed	Host directed, polled traffic flow Packet traffic is broadcast to all devices.

Universal Serial Bus 3.0 Specification, Rev. 1.0 (Nov. 12, 2008), at 3-1 to 3.5. In sum, USB 3.x connections are LVDS channels using two unidirectional, differential signal pairs that transmit USB protocol data packets in opposite directions.

41. The DMI is similar to PCIe and implements at least four serial lanes that all use differential signaling constituting 2 transmit lanes and 2 receive lanes and, therefore, transmitting data in opposite directions. *See* https://www.intel.com/content/dam/www/public/us/en/documents/white-papers/ia-introduction-basics-paper.pdf . *See also* https://en.wikipedia.org/wiki/Direct_Media_Interface ("DMI shares many characteristics with PCI Express, using multiple lanes and differential signaling to form a point-to-point link.").

42. Each claim of the ACQIS Patents is a patentable, valid and enforceable invention that is novel and non-obvious over the prior art.

43. ACQIS has not authorized or licensed Lenovo to practice any of the inventions claimed in the ACQIS Patents.

Lenovo's Infringing Products

44. Lenovo is a global leader in the personal and business computer market. Lenovo makes and sells a variety of laptop computers, desktop computers, and computer servers. Lenovo imports infringing laptop computers, desktop computers, and computer servers, and laptop computers, desktop computers, and computer servers made using infringing processes, into the United States through established distribution channels with the expectation that those products would be sold in the United States, State of Texas and this District.

45. Infringing Lenovo-brand laptop computers, desktop computers, and computer servers have been sold in the Western District of Texas through one or more Lenovo U.S. subsidiaries and their distributors, through the Lenovo website, and/or through retailers. Indeed, the infringing Lenovo-brand products can be purchased for delivery into this District through one or more websites available to the general public. By way of illustration, on October 6, 2020,

Plaintiff purchased a Lenovo-brand ThinkPad P1 Gen 3 Mobile Workstation and a Lenovo-brand ThinkStation P330 SFF from the Lenovo website (Lenovo.com), as well as a Lenovo ThinkSystem SR650 from the CDW website (www.cdw.com), for delivery to the offices of Scott, Douglass, and McConnico, 303 Colorado Street, Suite 2400, Austin, Texas 78701-4654, and those products were in fact delivered into this District at the designated address. Each of these products and their packaging confirm that the products were manufactured abroad (for example in China or Mexico), then imported, offered for sale, and sold into the United States and this District.

46. On information and belief, Lenovo's sale of laptops, desktops and servers generates billions of dollars in revenue every year.

47. In 2019, Lenovo achieved its highest ever annual revenue at $51 billion, constituting a 12.5% increase from the prior year. This included record revenues from Lenovo's PC and Smart Devices group of over $38 billion and form its Data Center Group of over $6 billion.

48. Lenovo has directly infringed, and continues to infringe, one or more claims of each of the ACQIS Patents under at least 35 U.S.C. §§ 271(a) and (g), by making, using, offering to sell, and/or selling within the United States, and/or importing into the United States, computer products that embody the claimed inventions of Dr. Chu, and/or by importing into the United States computer products that were made abroad using patented processes claimed in the ACQIS Patents.

49. Lenovo makes, uses, imports and sells a variety of laptop computer products in the United States that infringe one or more of the claims in the ACQIS Patents, and/or imports into the United States laptop computer products that were made abroad using patented processes claimed in the ACQIS Patents including, without limitation, laptops sold under the

brand names ThinkPad®, ThinkBook®, YOGA®, Legion®, ideapad®, and Lenovo®. These products are collectively referred to as the "Accused Laptops."

50. Lenovo makes, uses, imports and sells a variety of desktop computer products in the United States that infringe one or more of the claims in the ACQIS Patents, and/or imports into the United States desktop computer products that were made abroad using patented processes claimed in the ACQIS Patents including, without limitation, desktop computers sold under the brand names ThinkStation®, ideacentre®, ThinkCentre®, and Legion®. These products are collectively referred to as the "Accused Desktops."

51. Lenovo makes, uses, imports and sells a variety of computer server products in the United States that infringe one or more of the claims in the ACQIS Patents, and/or imports into the United States computer server products that were made abroad using patented processes claimed in the ACQIS Patents including, without limitation, edge, rack, tower and node servers sold under the brand names ThinkSystem® and ThinkServer®. These products are collectively referred to as the "Accused Servers."

52. The Accused Laptops, Accused Desktops, and Accused Servers are collectively referred to herein as the "Accused Lenovo Products."

53. On information and belief, Lenovo manufactures and tests at least certain of the Accused Lenovo Products abroad and directly or indirectly uses, offers to sell, and/or sells such products in the United States, and/or imports such products into the United States.

54. On information and belief, at least certain of the Accused Lenovo Products that Lenovo imports into the United States are manufactured outside the United States using one or more processes claimed in the ACQIS Patents.

55. The Accused Lenovo Products include products made, used, offered for sale, sold within the United States, and/or imported into the United States, at least since ACQIS provided Lenovo actual notice of its infringement on or around May 15, 2018.

56. The Accused Lenovo Products also include products made using the processes claimed in the ACQIS Patents and imported into the United States within the six years preceding the date of the original Complaint filed on October 15, 2020.

57. The Accused Lenovo Products also include products that are used to perform one or more methods claimed in the ACQIS Patents within the six years preceding the date of the original Complaint filed on October 15, 2020.

The Accused Laptops

58. On information and belief, all of the Accused Laptops are configured and operate in substantially the same way as explained below using the ThinkPad® P1 Mobile Workstation as an example for illustrative purposes.

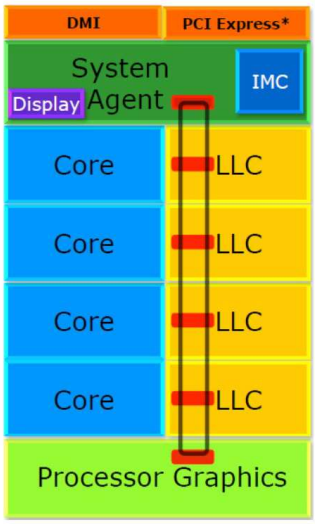
59. The ThinkPad® P1 is a computer system that runs the Windows operation system.

https://www.lenovo.com/us/en/laptops/thinkpad/thinkpad-p/ThinkPad-P1-Gen-3/p/22WS2P1P1N3

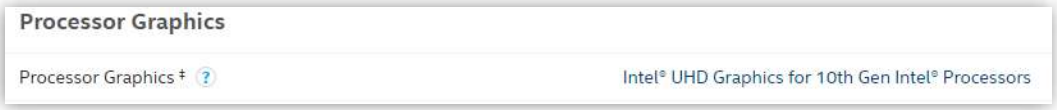
60. The ThinkPad® P1 uses an Intel® Core processor, such as the 10th Gen Intel® Core i7-10750H.

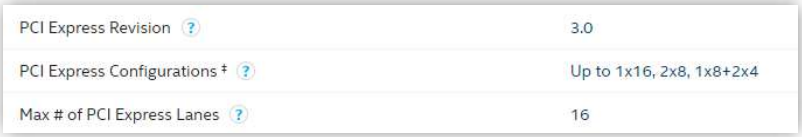
https://www.lenovo.com/us/en/laptops/thinkpad/thinkpad-p/ThinkPad-P1-Gen-3/p/22WS2P1P1N3

61. Intel's standard core architecture (including the 10th Gen Intel® Core i7-10750H architecture) integrates the central processing unit (CPU) with a graphics subsystem and an interface controller. On information and belief, the Intel Core processors integrate one or more interface controllers within Intel's "System Agent" to control PCIe and other data transmissions from the CPU.



https://www.intel.com/content/dam/www/public/us/en/documents/white-papers/ia-introduction-basics-paper.pdf





PCI Express Revision	3.0
PCI Express Configurations ‡	Up to 1x16, 2x8, 1x8+2x4
Max # of PCI Express Lanes	16

https://ark.intel.com/content/www/us/en/ark/products/201837/intel-core-i7-10750h-processor-12m-cache-up-to-5-00-ghz.html?wapkw=Core%20i7-10750H

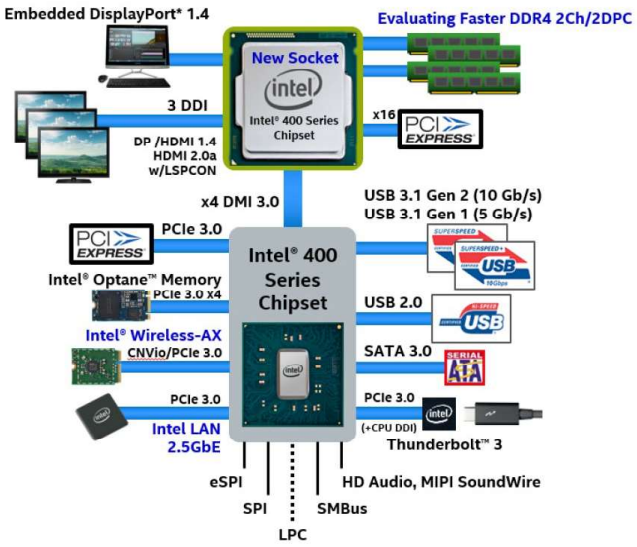
Graphics	• NVIDIA® Quadro T1000 4GB Max-Q • NVIDIA® Quadro T2000 4GB Max-Q • Integrated Intel® UHD Graphics

https://www.lenovo.com/us/en/laptops/thinkpad/thinkpad-p/ThinkPad-P1-Gen-3/p/22WS2P1P1N3

62. The ThinkPad® P1 laptops include a variety of connectors that can couple the CPU to a console, including through Intel's Embedded DisplayPort® connector and through USB 3.0, HDMI[2], and Thunderbolt[3] ports.

[2] High-Definition Multimedia Interface (HDMI) uses transition minimized differential signaling (TMDS) to carry digital video signals. *See* 10th Generation Intel® CoreTM Processors Datasheet, vol. 1 of 2, at p. 41 (July 2020, Rev. 005) (Doc. No. 615211-005).

[3] Thunderbolt 3 connectors can transmit USB 3.x, PCIe and DisplayPort data signals. *See* https://thunderbolttechnology.net/thunderbolt-3-infographic; https://www.engadget.com/2011-02-24-intel-thunderbolt-a-closer-look.html.

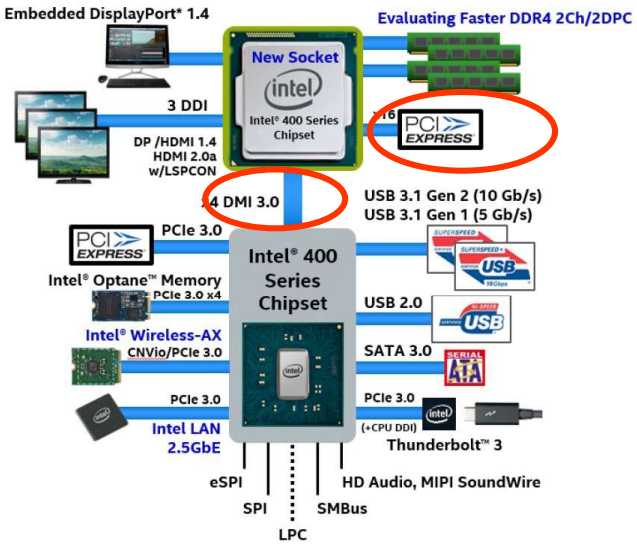


10th Generation Intel® Core™ Processors Datasheet, vol. 1 of 2, at p. 9-11 (July 2020, Rev. 005) (Doc. No. 615211-005).

- 1. Optional: SIM tray
- 2. SD card reader
- 3. USB-A 3.2 Gen 1
- 4. USB-A 3.2 Gen 1 (always on)
- 5. Kensington lock slot
- 6. Power in
- 7. 2 x USB-C Thunderbolt 3
- 8. HDMI
- 9. Headphone / mic combo

https://www.lenovo.com/us/en/laptops/thinkpad/thinkpad-p/ThinkPad-P1-Gen-3/p/22WS2P1P1N3

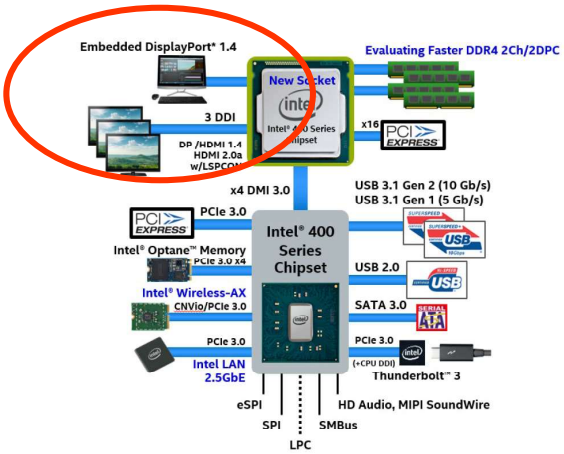
63. The Intel processors employed in the ThinkPad® P1 laptops connect directly to a variety of LVDS channels that convey data bits in a serial stream using unidirectional pairs of lanes transmitting data in opposite direction, including Intel's DMI and PCIe channels, and the directly-connected PCIe channels connect the CPU to a graphics card.



10th Generation Intel® Core™ Processors Datasheet, vol. 1 of 2, at p. 9-11, 26-30 (July 2020, Rev. 005) (Doc. No. 615211-005).

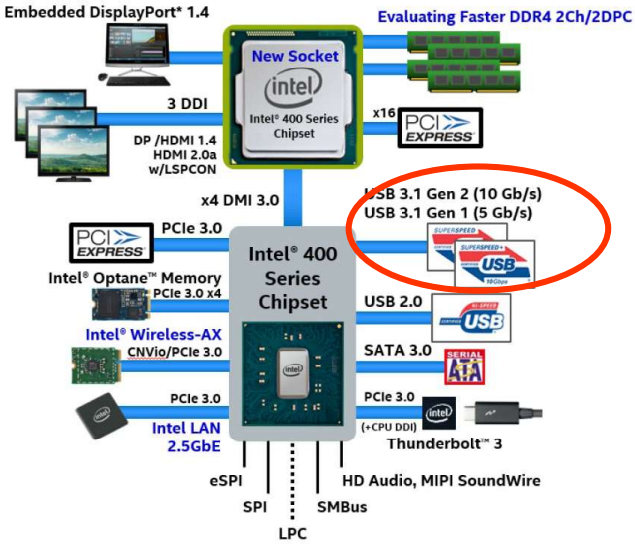
https://www.lenovo.com/us/en/laptops/thinkpad/thinkpad-p/ThinkPad-P1-Gen-3/p/22WS2P1P1N3

64. The Intel processors employed in the ThinkPad® P1 laptops also connect directly to a variety of differential signal channels that output digital video signals through a connector, including HDMI and DisplayPort.



10th Generation Intel® Core™ Processors Datasheet, vol. 1 of 2, at p. 9-11 (July 2020, Rev. 005) (Doc. No. 615211-005).

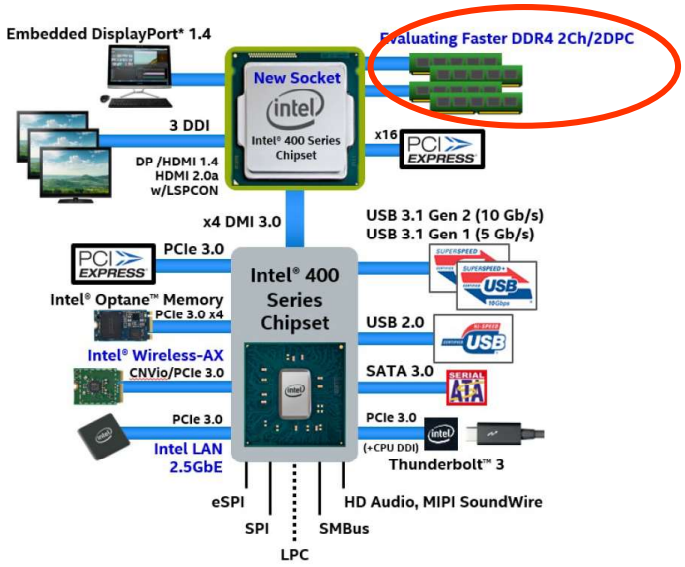
65. The Intel processors employed in the ThinkPad® P1 laptops also connect to LVDS channels that convey USB data packets through pairs of unidirectional differential signal paths in opposite directions—USB 3.x ports.



10th Generation Intel® Core™ Processors Datasheet, vol. 1 of 2, at p. 9-11 (July 2020, Rev. 005) (Doc. No. 615211-005).

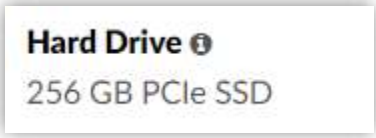
66. The ThinkPad® P1 laptops have DDR4 system memory connected directly to the CPU.

https://www.lenovo.com/us/en/laptops/thinkpad/thinkpad-p/ThinkPad-P1-Gen-3/p/22WS2P1P1N3



10th Generation Intel® Core™ Processors Datasheet, vol. 1 of 2, at p. 9-11 (July 2020, Rev. 005) (Doc. No. 615211-005).

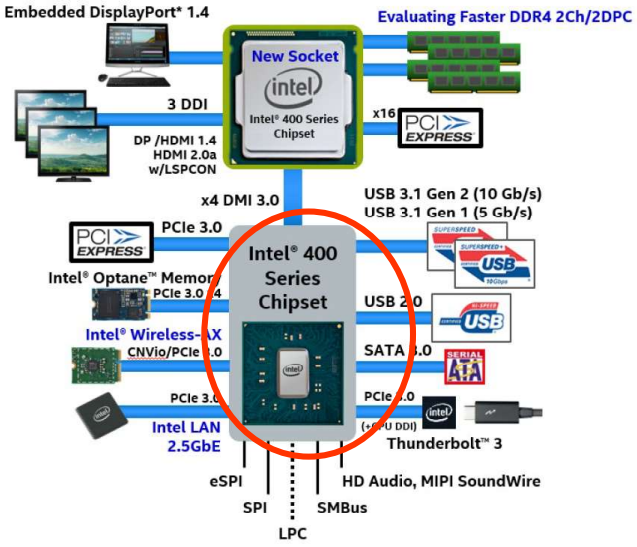
67. The ThinkPad® P1 laptops have a mass storage hard drive coupled to the CPU.



https://www.lenovo.com/us/en/laptops/thinkpad/thinkpad-p/ThinkPad-P1-Gen-3/p/22WS2P1P1N3

68. The Intel processors used in the ThinkPad® P1 laptops have a peripheral bridge called the Platform Controller Hub (PCH) connected to the CPU via the DMI. Because the PCH

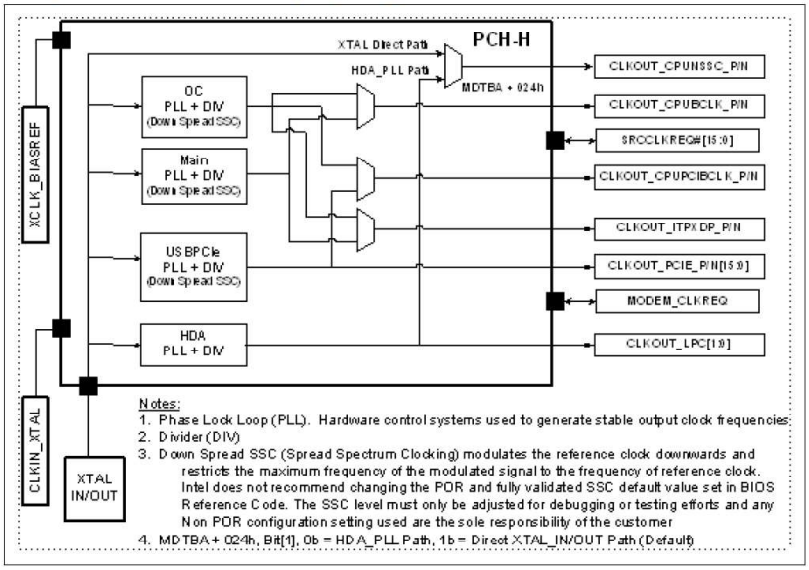
is coupled to PCIe, USB 3.x, and other interface connections, it necessarily has integrated interface controllers to control data transmission through those interfaces.



10th Generation Intel® Core™ Processors Datasheet, vol. 1 of 2, at p. 9-11 (July 2020, Rev. 005) (Doc. No. 615211-005).

69. The Intel PCH used in the ThinkPad® P1 laptops has an Integrated Clock Controller (ICC) that includes PLL circuitry, which uses Spread Spectrum Clocking (SSC) to generate different clock frequencies to convey the PCI bus transactions and USB transactions through the PCIe and USB channels based on the different clock frequencies.

Integrated Clock Controller (ICC) Diagram



Intel® 400 Series Chipset Family Platform Controller Hub Datasheet, Vol. 1, p. 169-171 (May 2020, Rev. 2; Doc. No. 620854-002).

70. In view of the foregoing facts concerning the technical features and functionalities of the Accused Laptops (*see* ¶¶ 58-69), when Lenovo manufactures the Accused Laptops, it improves the speed and performance of the peripheral data communication in its computer products by using a method of manufacturing that includes the following steps: (a) obtaining a CPU with a graphics controller in a single chip; (b) connecting one or more unidirectional differential signal channels to the CPU to output digital video data; (c) providing a connector with an LVDS channel to facilitate data communication with external peripherals, including digital video data communication; (d) providing multiple LVDS channels, connecting them to the CPU, which use one or more pairs of unidirectional lanes that convey USB protocol data and/or PCIe bus transaction data in serial bit streams in opposite directions; (e) connecting the CPU directly to a peripheral bridge on a circuit board; and (f) directly connecting to the peripheral bridge one or more LVDS channels with pairs of unidirectional lanes that convey data in serial bit streams in opposite directions.

71. On information and belief, Lenovo performs the foregoing manufacturing steps outside the United States to make at least certain of the Accused Laptops and then imports those Accused Laptops into the United States to be marketed and sold.

The Accused Desktops

72. On information and belief, all of the Accused Desktops are configured and operate in substantially the same way as explained below using the ThinkStation P340 Workstation as an example for illustrative purposes.

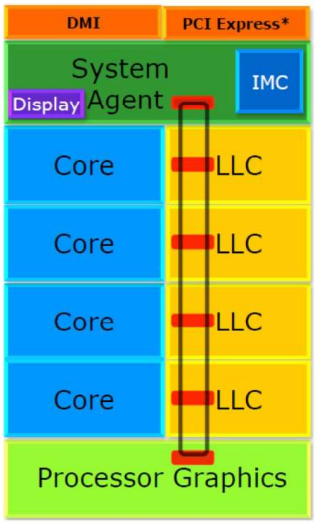
73. The ThinkStation P340 is a computer system that runs the Windows operation system.

https://www.lenovo.com/us/en/think-workstations/thinkstation-p-series-tiny-/ThinkStation-P340-Tiny/p/33TS3TP340T

74. The ThinkStation P340 uses an Intel® Core processor, such as a 10th Gen Intel® Core processor with vPro®.

https://www.lenovo.com/us/en/think-workstations/thinkstation-p-series-tiny-/ThinkStation-P340-Tiny/p/33TS3TP340T

75. On information and belief, Intel's standard core architecture (including the 10th Gen Intel® Core processors with vPro® architecture) integrates the central processing unit (CPU) with a graphics subsystem and an interface controller on a single chip. On information and belief, the Intel Core processors integrate one or more interface controllers within Intel's "System Agent" to control PCIe and other data transmissions from the CPU.



https://www.intel.com/content/dam/www/public/us/en/documents/white-papers/ia-introduction-basics-paper.pdf

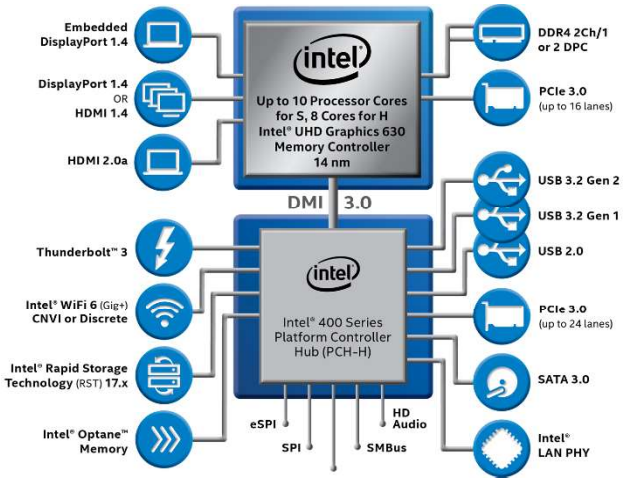
Processor Graphics	
Processor Graphics ‡	Intel® UHD Graphics 630

PCI Express Revision	3.0
PCI Express Configurations ‡	Up to 1x16, 2x8, 1x8+2x4
Max # of PCI Express Lanes	16

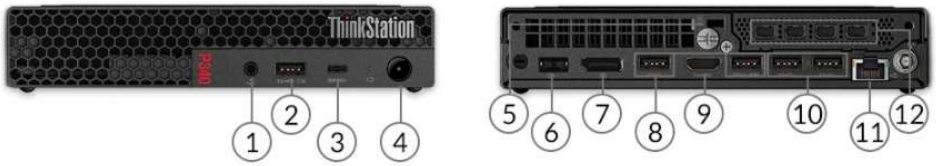
https://ark.intel.com/content/www/us/en/ark/products/199314/intel-core-i7-10700t-processor-

16m-cache-up-to-4-50-ghz.html

76. The ThinkStation P340 includes a variety of connectors that can couple the CPU to a variety of consoles through the HDMI, DisplayPort®, USB 3.x, USB-C[4] and other ports.



https://www.intel.com/content/www/us/en/products/docs/processors/core/10th-gen-vpro-processors-brief.html?wapkw=10th%20gen%20core%20vpro%20product%20brief

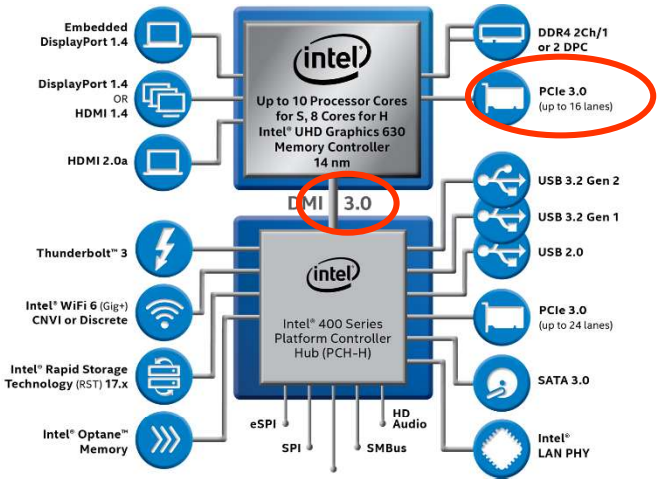


- 1. Headphone / mic jack
- 2. USB 3.2 Gen 2 Type-A
- 3. USB 3.2 Gen 1 Type-C
- 4. Power button
- 5. Kensington lock slot
- 6. Power in
- 7. DisplayPort
- 8. 2 x USB 3.2 Gen 1 Type-A
- 9. HDMI
- 10. 2 x USB 3.2 Gen 2 Type-A
- 11. RJ45
- 12. 4 x mini DisplayPort

[4] USB Type C connectors can convey both USB protocol data as well as DisplayPort digital video. *See* https://www.usb.org/sites/default/files/D2T1-4%20-%20VESA%20DP%20Alt%20Mode%20over%20USB%20Type-C.pdf; https://www.displayport.org/displayport-over-usb-c-7-reasons/; https://www.androidauthority.com/what-is-usb-type-c-594575/.

https://www.lenovo.com/us/en/think-workstations/thinkstation-p-series-tiny-/ThinkStation-P340-Tiny/p/33TS3TP340T

77. The Intel processors employed in the ThinkStation P340 connect directly to a variety of LVDS channels that convey data bits in a serial stream using unidirectional pairs of lanes transmitting data in opposite direction, including Intel's DMI and PCIe channels, and the directly-connected PCIe channels connect the CPU to a graphics card.

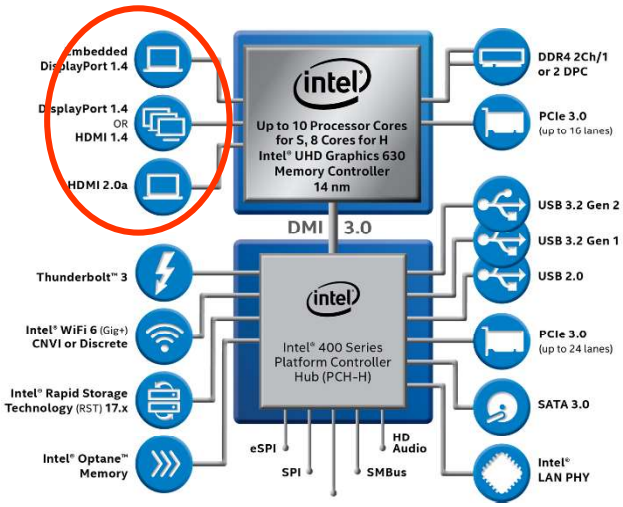


https://www.intel.com/content/www/us/en/products/docs/processors/core/10th-gen-vpro-processors-brief.html?wapkw=10th%20gen%20core%20vpro%20product%20brief; *see also* 10th Generation Intel® Core™ Processors Datasheet, vol. 1 of 2, at p. 9-11, 26-30 (July 2020, Rev. 005) (Doc. No. 615211-005).

Graphics	• NVIDIA® Quadro® P1000 4GB • NVIDIA® Quadro® P620 2GB

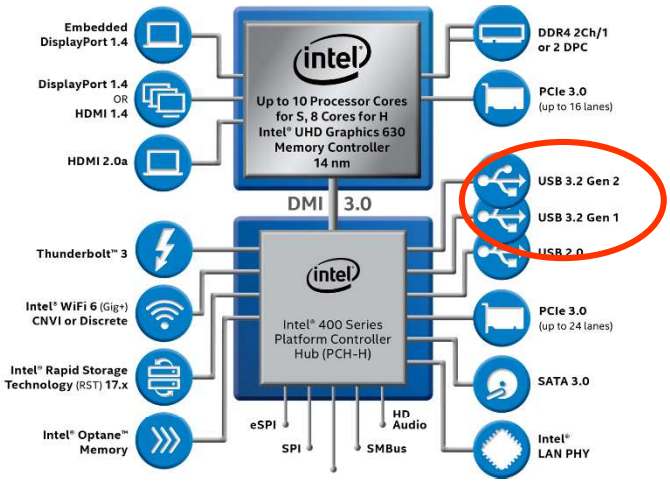
https://www.lenovo.com/us/en/think-workstations/thinkstation-p-series-tiny-/ThinkStation-P340-Tiny/p/33TS3TP340T

78. The Intel processors employed in the ThinkStation P340 also connect directly to a variety of differential signal channels that output digital video signals through a connector, including HDMI and DisplayPort connectors.



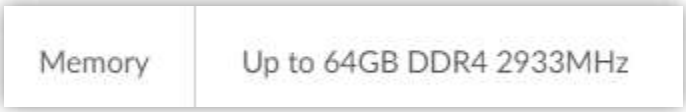
https://www.intel.com/content/www/us/en/products/docs/processors/core/10th-gen-vpro-processors-brief.html?wapkw=10th%20gen%20core%20vpro%20product%20brief; *see also see also* 10th Generation Intel® Core™ Processors Datasheet, vol. 1 of 2, at p. 40-42 (July 2020, Rev. 005) (Doc. No. 615211-005); https://www.lenovo.com/us/en/think-workstations/thinkstation-p-series-tiny-/ThinkStation-P340-Tiny/p/33TS3TP340T.

79. The Intel processors employed in the ThinkStation P340 also connect to LVDS channels that convey USB data packets through pairs of unidirectional differential signal paths in opposite directions—USB 3.x ports.

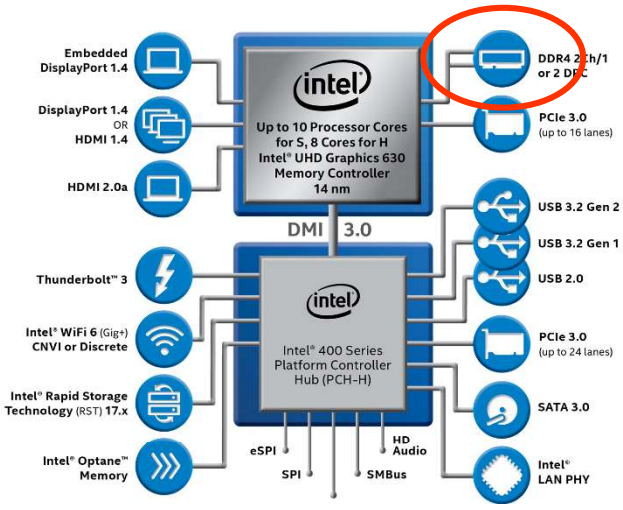


https://www.intel.com/content/www/us/en/products/docs/processors/core/10th-gen-vpro-processors-brief.html?wapkw=10th%20gen%20core%20vpro%20product%20brief

80. The ThinkStation P340 has DDR4 system memory connected directly to the CPU.



https://www.lenovo.com/us/en/think-workstations/thinkstation-p-series-tiny-/ThinkStation-P340-Tiny/p/33TS3TP340T



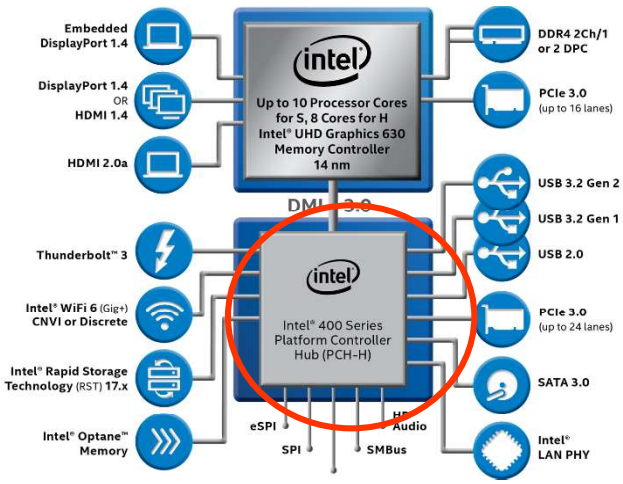
https://www.intel.com/content/www/us/en/products/docs/processors/core/10th-gen-vpro-processors-brief.html?wapkw=10th%20gen%20core%20vpro%20product%20brief

81. The ThinkStation P340 has a mass storage hard drive coupled to the CPU.

Storage	Up to 2 x 2TB M.2 PCIe NVMe SSD

https://www.lenovo.com/us/en/think-workstations/thinkstation-p-series-tiny-/ThinkStation-P340-Tiny/p/33TS3TP340T

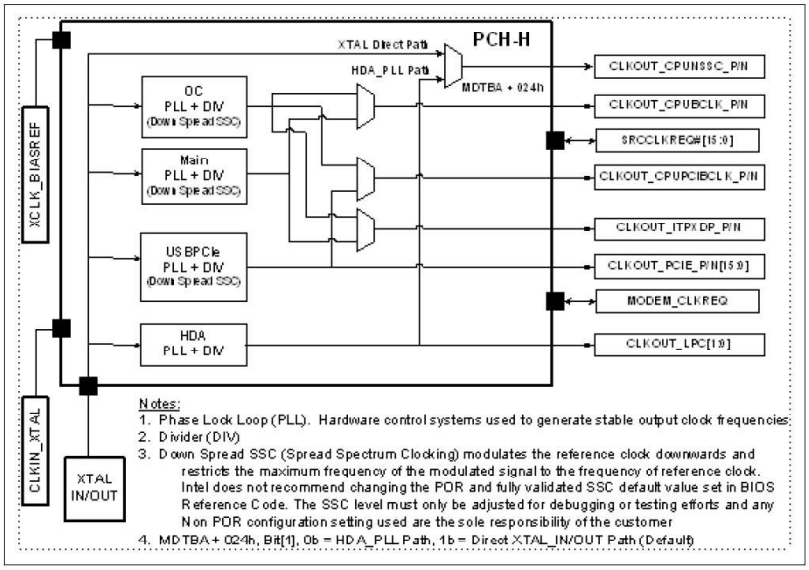
82. The Intel processors used in the ThinkStation P340 have a peripheral bridge called the PCH connected to the CPU via the DMI. Because the PCH is coupled to PCIe, USB 3.x, and other interface connections, it necessarily has integrated interface controllers to control data transmission through those interfaces.



https://www.intel.com/content/www/us/en/products/docs/processors/core/10th-gen-vpro-processors-brief.html?wapkw=10th%20gen%20core%20vpro%20product%20brief

83. The Intel PCH used in the ThinkStation P340 has an Integrated Clock Controller (ICC) that includes PLL circuitry, which uses Spread Spectrum Clocking (SSC) to generate different clock frequencies to convey the PCI bus transactions and USB transactions through the PCIe and USB channels based on the different clock frequencies.

Integrated Clock Controller (ICC) Diagram



Intel® 400 Series Chipset Family Platform Controller Hub Datasheet, Vol. 1, p. 169-171 (May 2020, Rev. 2; Doc. No. 620854-002).

84. In view of the foregoing facts concerning the technical features and functionalities of the Accused Desktops (*see* ¶¶ 72-83), when Lenovo manufactures the Accused Desktops, it improves the speed and performance of the peripheral data communication in its computer products by using a method of manufacturing that includes the following steps: (a) obtaining a CPU with a graphics controller in a single chip; (b) connecting one or more unidirectional differential signal channels to the CPU to output digital video data; (c) providing a connector with an LVDS channel to facilitate data communication with external peripherals, including digital video data communication; (d) providing multiple LVDS channels, connecting them to the CPU, which use one or more pairs of unidirectional lanes that convey USB protocol data and/or PCIe bus transaction data in serial bit streams in opposite directions; (e) connecting the CPU directly to a peripheral bridge on a circuit board; and (f) directly connecting to the peripheral bridge one or more LVDS channels with pairs of unidirectional lanes that convey data in serial bit streams in opposite directions.

85. On information and belief, Lenovo performs the foregoing manufacturing steps outside the United States to make at least certain of the Accused Desktops and then imports those Accused Desktops into the United States to be marketed and sold.

The Accused Servers

86. On information and belief, all of the Accused Servers are configured and operate in substantially the same way as explained below using the ThinkSystem® SR650 server as an example for illustrative purposes.

87. The ThinkSystem® SR650 is a computer system that can run on various server operating systems.

https://lenovopress.com/lp1050-thinksystem-sr650-server-xeon-sp-gen2

88. The ThinkSystem® SR650 uses up to two Intel® Xeon Scalable processors, which have integrated interface controllers on a single chip to drive the PCIe channels connected to the processor.

Scalability and performance

The SR650 server offers numerous features to boost performance, improve scalability, and reduce costs:

- Improves productivity by offering superior system performance with the second generation of the Intel Xeon Processor Scalable Family with up to 28-core processors, up to 38.5 MB of last level cache (LLC), up to 2933 MHz memory speeds, and up to 10.4 GT/s Ultra Path Interconnect (UPI) links.

- Reduces I/O latency and increases overall system performance with Intel Integrated I/O Technology that embeds the PCI Express 3.0 controller into the Intel Xeon Processor Scalable Family.

https://lenovopress.com/lp1050-thinksystem-sr650-server-xeon-sp-gen2

89. The ThinkSystem® SR650 includes a variety of connectors that can couple the CPU to a variety of consoles, including USB 3.x and VGA connectors.

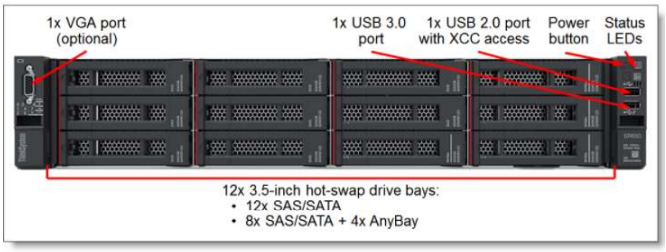


Figure 5. Front view of the SR650: 12x 3.5-inch drive bays

The front of the SR650 server includes the following components:

- Up to 16x 2.5-inch, or 24x 2.5-inch, or 8x 3.5-inch, or 12x 3.5-inch hot-swap drive bays.
- One VGA port (optional).
- One USB 3.0 port.
- One USB 2.0 port with XClarity Controller access.
- Power button.
- Status LEDs.

The following figure shows the rear of the SR650 server.

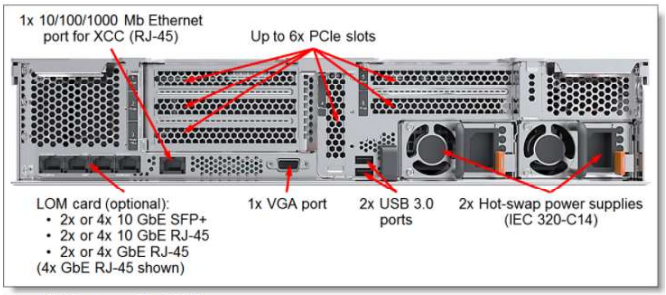


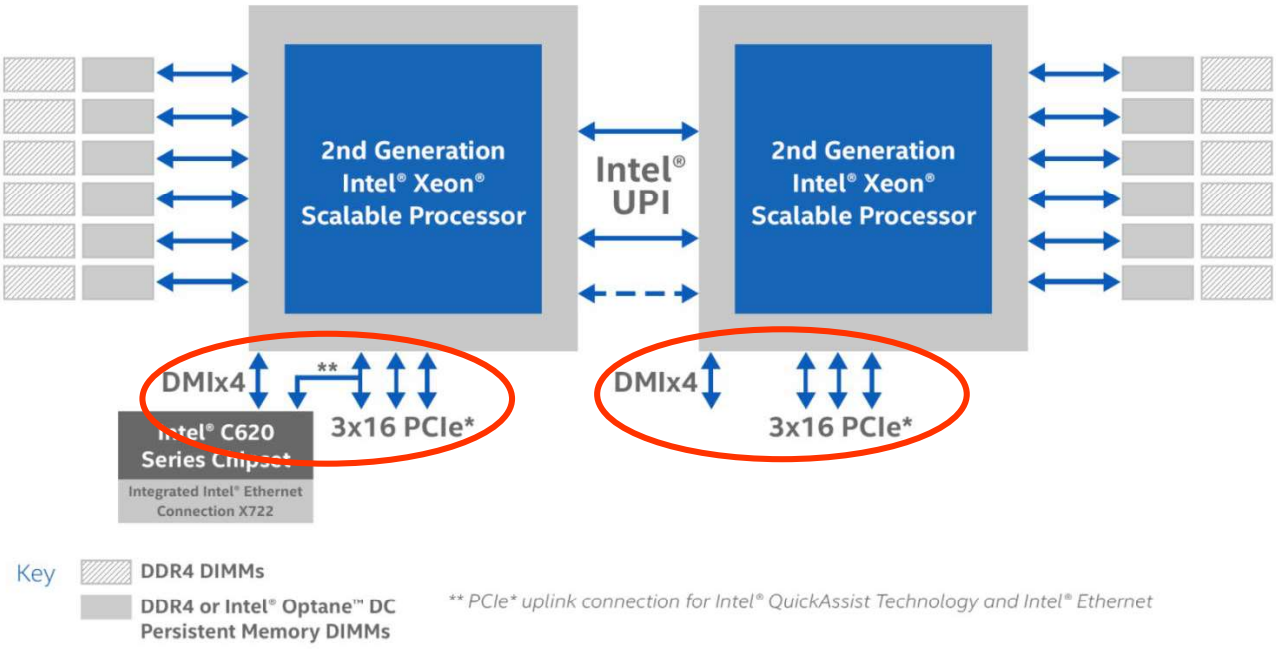
Figure 6. Rear view of the SR650

The rear of the SR650 server includes the following components:

- Up to six PCIe expansion slots (depending on the riser cards selected).
- One LOM card slot.
- One 1 GbE port for XClarity Controller.
- One VGA port.
- Two USB 3.0 ports.
- Up to two hot-swap power supplies.

https://lenovopress.com/lp1050-thinksystem-sr650-server-xeon-sp-gen2#processors

90. The Intel processors employed in the ThinkSystem® SR650 connect directly to a variety of LVDS channels that convey data bits in a serial stream using unidirectional pairs of lanes transmitting data in opposite direction, including Intel's DMI and PCIe channels, and the directly-connected PCIe channels connect the CPU to a graphics processor.



https://www.intel.com/content/www/us/en/design/products-and-solutions/processors-and-chipsets/cascade-lake/2nd-gen-intel-xeon-scalable-processors.html

Description
Low profile PCIe 3.0 x16 single-wide GPU adapters
ThinkSystem NVIDIA Quadro P620 2GB PCIe Active GPU
ThinkSystem NVIDIA Tesla T4 16GB PCIe Passive GPU
Full-height, full-length PCIe 3.0 x16 double-wide GPU adapters
ThinkSystem AMD Radeon Instinct MI25 16GB PCIe Passive GPU
ThinkSystem NVIDIA Quadro P6000 24GB GPU, PCIe (active)
ThinkSystem NVIDIA Quadro RTX 5000 16GB PCIe Active GPU
ThinkSystem NVIDIA Tesla M10 32GB PCIe Passive GPU
ThinkSystem NVIDIA Tesla P40 24GB PCIe Passive GPU
ThinkSystem NVIDIA Tesla V100 16GB PCIe Passive GPU
ThinkSystem NVIDIA Tesla V100 32GB PCIe Passive GPU
ThinkSystem NVIDIA Tesla V100S 32GB PCIe Passive GPU
Full-height, half-length PCIe 3.0 x16 single-wide GPU adapters
ThinkSystem NVIDIA Tesla V100 FHHL 16GB PCIe GPU
Full-height, full-length PCIe 3.0 x16 single-wide GPU adapters
ThinkSystem NVIDIA Quadro P4000 8GB PCIe Active GPU
ThinkSystem NVIDIA Quadro RTX 4000 8GB PCIe Active GPU

https://lenovopress.com/lp1050-thinksystem-sr650-server-xeon-sp-gen2#gpu-adapters

91. The Intel processors employed in the ThinkSystem® SR650 also connect to LVDS channels that convey USB data packets through pairs of unidirectional differential signal paths in opposite directions—USB 3.x ports. *See, supra,* https://lenovopress.com/lp1050-thinksystem-sr650-server-xeon-sp-gen2#processors

- Supports PCIe*, USB, SATA* and connects to Ethernet, SSD and FPGA peripherals

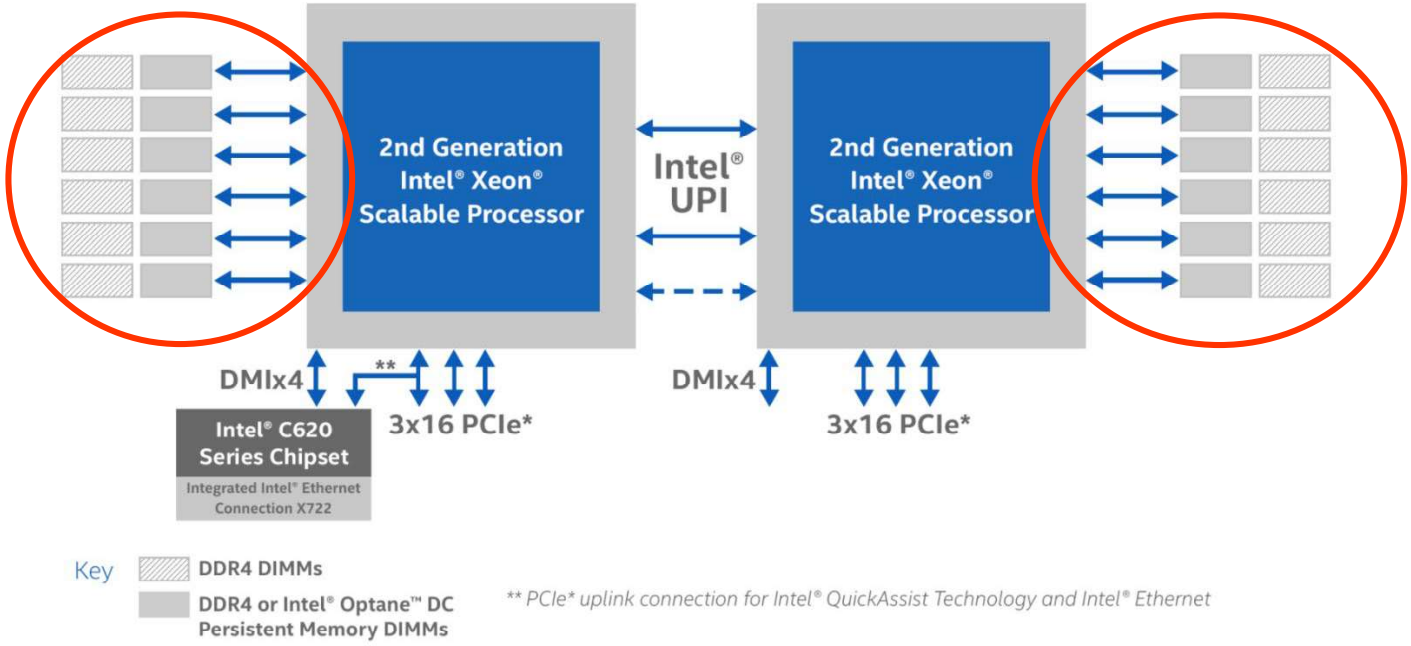
https://www.intel.com/content/www/us/en/design/products-and-solutions/processors-and-chipsets/cascade-lake/2nd-gen-intel-xeon-scalable-processors.html

92. The ThinkSystem® SR650 has DDR4 system memory connected directly to the CPU.

Memory

The SR650 server supports up to 12 TruDDR4 memory RDIMMs or 3DS RDIMMs when one processor is installed and up to 24 DIMMs when two processors are installed. Each processor has six memory channels (two integrated memory controllers with three memory channels per memory controller), and there are two DIMMs per channel.

https://lenovopress.com/lp1050-thinksystem-sr650-server-xeon-sp-gen2#memory



https://www.intel.com/content/www/us/en/design/products-and-solutions/processors-and-chipsets/cascade-lake/2nd-gen-intel-xeon-scalable-processors.html

93. The ThinkSystem® SR650 has a mass storage hard drive coupled to the CPU through the onboard NVMe PCIe interface that is directly connected to the CPU through PCIe channels.

Internal storage capacity	• 2.5-inch drives:
	  ◦ 368.64TB using 24x 15.36TB 2.5-inch SAS SSDs
	  ◦ 368.64TB using 24x 15.36TB 2.5-inch NVMe SSDs
	  ◦ 57.6TB using 24x 2.4TB 2.5-inch HDDs
	• 3.5-inch drives:
	  ◦ 252TB using 14x 18TB 3.5-inch HDDs
	  ◦ 107.52TB using 14x 7.68TB 3.5-inch SAS/SATA SSDs
	  ◦ 30.72TB using 4x 7.68TB 3.5-inch NVMe SSDs

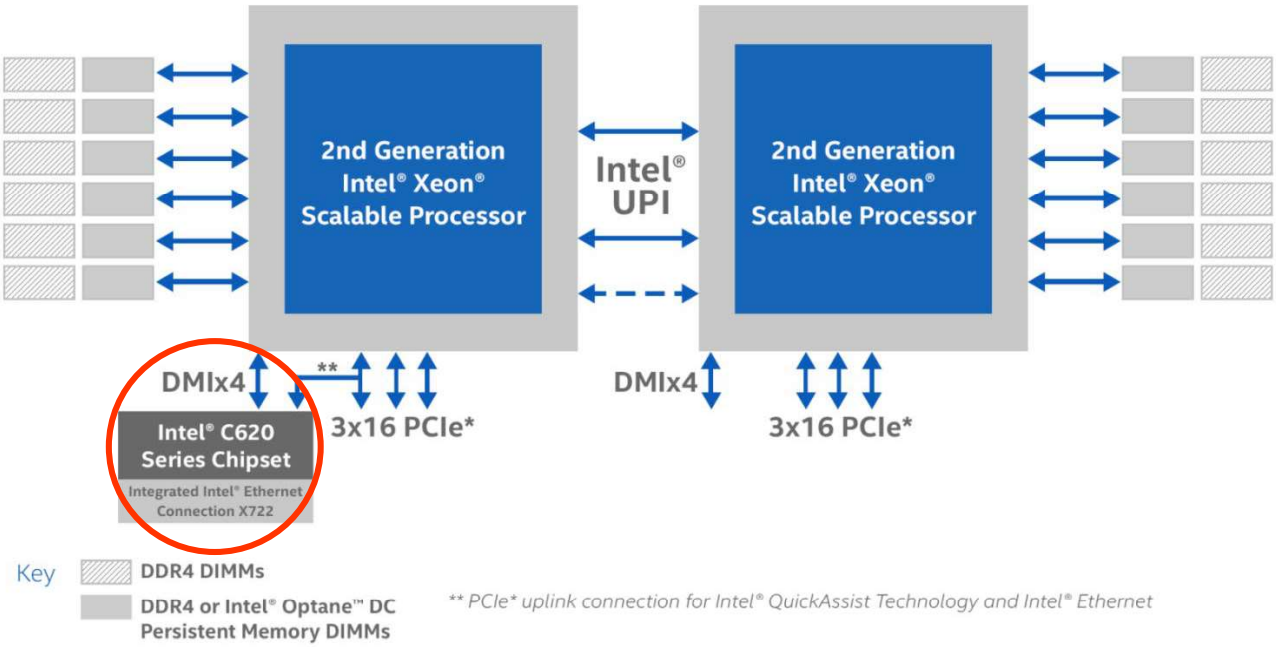
NVMe PCIe interfaces (non-RAID)				
Onboard NVMe interface (4-port)	None	None	1	-
ThinkSystem 810-4P NVMe Switch Adapter	None*	B22D	4	2, 4, 7, 6
ThinkSystem 1610-4P NVMe Switch Adapter	7Y37A01081	AUV2	3	1, 5, 6
ThinkSystem 1610-8P NVMe Switch Adapter	None^	B4PA	1	1

Configurations with 20x 2.5-inch U.2 NVMe PCIe drive bays use the following interfaces and adapters for JBOD (non-RAID) connectivity to up to 20x U.2 NVMe PCIe SSDs (up to eight SSDs per Processor 1, and up to 12 SSDs per Processor 2) without oversubscription:

- The onboard NVMe interface (Processor 2) that provides four PCIe 3.0 x4 ports for connections to four SSDs without oversubscription.
- Two 810-4P NVMe Switch adapters installed in the PCIe x8 Slots 4 and 7 (Processor 1) that provide two PCIe 3.0 x4 ports each for connections to four SSDs (two SSDs per 810-4P) without oversubscription.
- Three 1610-4P NVMe Switch adapters installed in the PCIe x16 Slot 1 (Processor 1) and PCIe x16 Slots 5 and 6 (Processor 2) that provide four PCIe 3.0 x4 ports each for connections to twelve SSDs (four SSDs per 1610-4P) without oversubscription.

https://lenovopress.com/lp1050-thinksystem-sr650-server-xeon-sp-gen2#system-specifications

94. The Intel processors used in the ThinkSystem® SR650 have a peripheral bridge called the C620 chipset PCH connected to the CPU via the DMI, which has an integrated controller.



https://www.intel.com/content/www/us/en/design/products-and-solutions/processors-and-chipsets/cascade-lake/2nd-gen-intel-xeon-scalable-processors.html

The Intel Xeon Processor Scalable Family is the next generation of 64-bit, multi-core server processor built on 14-nm process technology. The processor supports up to 46 bits of physical address space and 48 bits of virtual address space. The processor is designed for a platform consisting of at least one Intel Xeon Scalable Family processor and the Platform Controller Hub (PCH). Included in this family of processors are integrated memory controller (IMC) and an Integrated I/O (IIO) on a single silicon die.

Intel® Xeon® Processor Scalable Family Datasheet, Vol. 1, p. 7 (May 2018 Doc. No. 336062-003)

The Intel® C620 Series Chipset PCH provides extensive I/O support. Functions and capabilities include:

- ACPI Power Management Logic Support, Revision 4.0a
- *PCI Express* Base Specification*, Revision 3.0
- Integrated Serial ATA host controller, supports data transfer rates of up to 6 Gb/s on all ports.
- xHCI USB controller with SuperSpeed USB 3.0 ports
- Direct Media Interface
- Serial Peripheral Interface
- Enhanced Serial Peripheral Interface
- Flexible I/O—Allows some high speed I/O signals to be configured as PCIe* root ports, PCIe uplink for use with certain PCH SKUs, SATA (and sSATA), or USB 3.0.

Intel® C620 Series Chipset Platform Controller Hub Datasheet, p. 34, 38 (May 2019 Doc. No. 336067-007US)

95. The Intel C620 PCH used in the ThinkSystem® SR650 has an Integrated Clock Controller (ICC) that includes PLL circuitry, which generates different clock frequencies to convey the PCI bus transactions and USB transactions through the PCIe and USB channels based on the different clock frequencies.

Acronyms	Description
ICC	Integrated Clock Controller
LPC	Low Pin Count
PCH	Platform Controller Hub
PLL	Phase Locked Loop Circuit
SSC	Spread Spectrum Clocking

Overview

This document describes the signals and different clocking modes that the Intel® C620 Series Chipset PCH supports. How you route the signals is the province of the appropriate platform PDG, as each platform can have different rules and restrictions on how the clocks are routed, connectivity, and modes supported.

Controls USB3Gen2PCIe PLL and its output clocks behavior. This offset is lockable by setting LOCK_G2PLLC bit (ICCSEC offset 1020h bit 10).

Intel® C620 Series Chipset Platform Controller Hub Datasheet, p. 98-116 (May 2019 Doc. No. 336067-007US)

96. The Intel Xeon Scalable processor used in the ThinkSystem® SR650 also has integrated clock circuitry that includes PLL circuitry, which generates different clock frequencies to convey the PCI bus transactions through the PCIe channels based on the different clock frequencies.

Clock multiplying within the processor is provided by the internal phase locked loop (PLL), which requires a constant frequency BCLK{0/1/2}_DP, BCLK{0/1/2}_DN input, with exceptions for spread spectrum clocking. DC specifications for the BCLK{0/1/2}_DP, BCLK{0/1/2}_DN inputs are provided in Section 2.8.3.7.

System Reference Clock (BCLK{0/1/2}) Signals

Signal Name	Description
BCLK{0,1,2}_DN/DP	Reference Clock Differential input. These pins provide the required reference inputs to various PLLs inside the processor, such as Intel UPI and PCIe. BCLK0, BCLK1 and BCLK2 run at 100 MHz from the same clock source.

Intel® Xeon® Processor Scalable Family Datasheet, Vol. 1, p. 15, 56 (May 2018 Doc. No.

336062-003)

97. In view of the foregoing facts concerning the technical features and functionalities of the Accused Servers (*see* ¶¶ 86-96), when Lenovo manufactures the Accused Servers, it improves the speed and performance of the peripheral data communication in its computer products by using a method of manufacturing that includes the following steps: (a) connecting a CPU directly to a peripheral bridge on a printed circuit board; (b) directly connecting to the peripheral bridge one or more LVDS channels with pairs of unidirectional lanes that convey data in serial bit streams in opposite directions; and (c) providing a connector with an LVDS channel to facilitate data communication with external peripherals using two unidirectional serial lanes to transmit data in opposite directions, including USB protocol data.

98. On information and belief, Lenovo performs the foregoing manufacturing steps outside the United States to make at least certain of the Accused Servers and then imports those Accused Servers into the United States to be marketed and sold.

99. Through making, using, selling, offering for sale, and importing the Accused Lenovo Products with the features and functionalities alleged above, Lenovo has and continues to infringe one or more of the claims in each of the ACQIS Patents.

100. Lenovo's infringing conduct has caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause additional severe and irreparable injury and damages to ACQIS unless enjoined by this Court.

ACQIS Provided Lenovo Actual Notice of its Infringement

101. On or around May 15, 2018, ACQIS notified Lenovo, pursuant to 35 U.S.C. § 287(a), of all of the ACQIS Patents and Lenovo's infringement thereof based on the Accused Lenovo Products. Specifically, ACQIS' letter identified all of the ACQIS Patents asserted herein

and described the applicability of the ACQIS Patents to the PCI Express, USB 3.0, and other computer interface technologies. ACQIS's letter specifically identified Lenovo's various laptop, desktop and server brands, including the Accused Laptops, Accused Desktops, and Accused Servers addressed herein as using ACQIS' patented technologies. ACQIS also described the enforcement history of ACQIS's patent portfolio, and specifically noted a prior lawsuit enforcing ACQIS Patents related to the presently-asserted ACQIS Patents, which resulted in a significant jury verdict against IBM.

102. ACQIS invited Lenovo to discuss potential licensing arrangements to allow Lenovo to continue to utilize the patented technologies in the ACQIS patent portfolio, including the ACQIS Patents.

103. Lenovo did not respond to ACQIS's May 15, 2018 letter and continues to make, import, and sell the Accused Lenovo Products identified in ACQIS's letter in willful violation of ACQIS' patent rights, or at the very least in reckless disregard of ACQIS' patent rights.

104. Upon receiving actual notice of the ACQIS Patents and how they apply to Lenovo's computer products, Lenovo at the very least ignored the notice and chose to remain willfully blind to its own infringement and the infringement that it was inducing others to commit through the use of the Accused Lenovo Products.

105. Lenovo's choice to ignore ACQIS, the ACQIS Patents, and ACQIS' offer to engage in a licensing arrangement, and instead to continue making and selling the infringing Accused Lenovo Products, is egregious and exceptional.

106. Lenovo's conduct constitutes willful infringement of the ACQIS Patents, beginning at least as early as May 15, 2018.

Lenovo's Indirect Infringement

107. Lenovo indirectly infringes the ACQIS Patents under 35 U.S.C. § 271(b), (c) by inducing third parties, such as importers, resellers, customers, and end users, to directly infringe the ACQIS Patents by using, offering for sale, selling and/or importing the Accused Lenovo Products in this District and elsewhere in the United States and by importing and selling the Accused Lenovo Products despite knowledge that those products are material parts of a computer system, and are not staple articles of commerce with substantial non-infringing uses. For example, Lenovo Accused Products are offered for sale and sold in this District and elsewhere in the United States through retailers like CDW and Best Buy.

108. On information and belief, Lenovo took affirmative acts to induce third parties to commit those direct infringing acts. Lenovo did so by, at least, actively promoting the Accused Lenovo Products for the U.S. market. For example, on information and belief, for every one of the Accused Lenovo Products sold in the United States, Lenovo pursues and obtains approval from U.S. and state regulatory agencies to allow sales of such Accused Lenovo Products in the United States. Lenovo competes for business in the United States (including by advertising). Lenovo's website offers support for US consumers of the Accused Products by offering US-based support website at https://support.lenovo.com/us/en/.

109. Lenovo has taken these acts despite knowledge of the ACQIS Patents and the infringement by the Accused Lenovo Products, Lenovo knows and specifically intends that its customers will sell the infringing Accused Lenovo Products in the United States or cause the Accused Lenovo Products to be sold in the United States.

110. Lenovo's customers directly infringe the ACQIS Patents by importing the Accused Lenovo Products into the United States, offering to sell and selling the Accused Lenovo Products

in the United States, and using the Accused Lenovo Products in the United States.

111. Lenovo further induces direct infringement of the ACQIS Patents by providing instruction and direction to end users of the Accused Lenovo Products about how to use the Accused Lenovo Products in a manner that infringes one or more claims of the ACQIS Patents. Lenovo knows and specifically intends that end users will use the Accused Lenovo Products in an infringing manner as directed by Lenovo. On information and belief, Lenovo has configured the Accused Lenovo Products in such a manner that direct infringing use necessarily occurs upon operation of the Accused Lenovo Products in their normal, intended manner without any specific action of the end user other than turning on the product.

112. Lenovo has induced others' direct infringement as stated above despite actual notice that the Accused Lenovo Products infringe the ACQIS Patents, as set forth herein. Lenovo therefore has caused its purchasers and end users to directly infringe the ACQIS Patents with knowledge of the ACQIS Patents and with the specific intent, or at the very least willful blindness, that the purchasers and end users will directly infringe. Lenovo knew the acts it induced (like importation, US retail sales, and use by consumers) constituted infringement.

113. Lenovo's acts of indirect infringement as stated herein have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause additional severe and irreparable injury and damages to ACQIS in the future if not enjoined by this Court.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 9,529,768

114. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 113 of this First Amended Complaint in support of its first cause of action as though fully set forth herein.

115. Pursuant to 35 U.S.C. § 282, the claims of the '768 patent are presumed valid.

116. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-100 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '768 patent in violation of 35 U.S.C. § 271(a) by making, using, selling, offering to sell, and/or importing the Accused Lenovo Products.

117. Lenovo's direct infringement of the '768 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrates infringement of at least claim 33 of the '768 patent by showing:

(a) the ThinkPad® P1 laptop is a computer running the Windows® operating system;

(b) the ThinkPad® P1 laptop has a central processing unit (CPU) with an integrated interface controller that is directly connected to an LVDS channel using two sets of unidirectional, multiple, differential signal pairs to transmit encoded address and data bits of a PCI bus transaction in opposite directions through different numbers of differential signal pairs;

(c) the ThinkPad® P1 laptop has system memory directly coupled to the CPU;

(d) the ThinkPad® P1 laptop has a mass storage hard drive coupled to the CPU; and

(e) the ThinkPad® P1 laptop has other LVDS channels that use two sets of unidirectional, differential signal pairs to transmit data serially in opposite directions constituting point-to-point data communication links, including various USB 3.x channels, Thunderbolt connectors, and additional PCIe channels.

118. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 33 of the '768 patent, and additional infringed claims will be identified through infringement contentions and discovery.

119. Lenovo's direct infringement of the '768 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrates infringement of at least claim 33 of the '768 patent by showing:

(a) the ThinkStation P340 Workstation is a computer running the Windows® operating system;

(b) the ThinkStation P340 Workstation has a central processing unit (CPU) with an integrated interface controller that is directly connected to an LVDS channel using two sets of unidirectional, multiple, differential signal pairs to transmit encoded address and data bits of a PCI bus transaction in opposite directions through different numbers of differential signal pairs;

(c) the ThinkStation P340 Workstation has system memory directly coupled to the CPU;

(d) the ThinkStation P340 Workstation has a mass storage hard drive coupled to the CPU; and

(e) the ThinkStation P340 Workstation has other LVDS channels that use two sets of unidirectional, differential signal pairs to transmit data serially in opposite directions constituting point-to-point data communication links, including various USB 3.x channels and additional PCIe channels.

120. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 33 of the '768 patent, and additional infringed claims will be identified through infringement contentions and discovery.

121. Lenovo's direct infringement of the '768 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Servers is shown by way of the exemplary

ThinkSystem® SR650 server as set forth in paragraphs 44-57 and 86-96 above, which demonstrates infringement of at least claim 33 of the '768 patent by showing:

(a) the ThinkSystem® SR650 is a computer running the Windows® operating system;

(b) the ThinkSystem® SR650 has a central processing unit (CPU) with an integrated interface controller that is directly connected to an LVDS channel using two sets of unidirectional, multiple, differential signal pairs to transmit encoded address and data bits of a PCI bus transaction in opposite directions through different numbers of differential signal pairs;

(c) the ThinkSystem® SR650 has system memory directly coupled to the CPU;

(d) the ThinkSystem® SR650 has a mass storage hard drive coupled to the CPU; and

(e) the ThinkSystem® SR650 has other LVDS channels that use two sets of unidirectional, differential signal pairs to transmit data serially in opposite directions constituting point-to-point data communication links, including various USB 3.x channels, Thunderbolt connectors, and additional PCIe channels.

122. ACQIS' infringement allegations against the Accused Servers are not limited to claim 33 of the '768 patent, and additional infringed claims will be identified through infringement contentions and discovery.

123. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '768 patent and the infringement alleged herein.

124. Lenovo's actions as alleged herein, including those alleged in paragraphs 107-113, constitute indirect infringement of the '768 patent pursuant to 35 U.S.C. § 271(b) and (c).

125. The above-described acts of direct and indirect infringement committed by Lenovo

have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

126. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

127. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

COUNT II
INFRINGEMENT OF U.S. PATENT NO. 9,703,750

128. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 127 of this First Amended Complaint in support of its second cause of action as though fully set forth herein.

129. Pursuant to 35 U.S.C. § 282, the claims of the '750 patent are presumed valid.

130. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-100 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '750 patent in violation of 35 U.S.C. § 271(a) by making, using, selling, offering to sell, and/or importing the Accused Lenovo Products.

131. Lenovo's direct infringement of the '750 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrates infringement of at least claim 46 of the '750 patent by showing:

(a) the ThinkPad® P1 laptop is a computer;

(b) the ThinkPad® P1 laptop has a central processing unit (CPU) directly connected to an

LVDS channel using two sets of unidirectional, multiple, differential signal pairs to transmit encoded address and data bits of a PCI bus transaction in opposite directions;

(c) the ThinkPad® P1 laptop has system memory directly connected to the CPU;

(d) the ThinkPad® P1 laptop has a mass storage hard drive coupled to the CPU; and

(e) the ThinkPad® P1 laptop has other LVDS channels that use two sets of unidirectional, differential signal pairs to transmit data serially in opposite directions constituting point-to-point data communication links that convey USB protocol data packets, including various USB 3.x channels.

132. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 46 of the '750 patent, and additional infringed claims will be identified through infringement contentions and discovery.

133. Lenovo's direct infringement of the '750 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrates infringement of at least claim 46 of the '750 patent by showing:

(a) the ThinkStation P340 Workstation is a computer;

(b) the ThinkStation P340 Workstation has a CPU directly connected to an LVDS channel using two sets of unidirectional, multiple, differential signal pairs to transmit encoded address and data bits of a PCI bus transaction in opposite directions;

(c) the ThinkStation P340 Workstation has system memory directly connected to the CPU;

(d) the ThinkStation P340 Workstation has a mass storage hard drive coupled to the CPU; and

(e) the ThinkStation P340 Workstation has other LVDS channels that use two sets of unidirectional, differential signal pairs to transmit data serially in opposite directions constituting point-to-point data communication links conveying USB protocol data packets, including various USB 3.x channels.

134. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 46 of the '750 patent, and additional infringed claims will be identified through infringement contentions and discovery.

135. Lenovo's direct infringement of the '750 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Servers is shown by way of the exemplary ThinkSystem® SR650 server as set forth in paragraphs 44-57 and 86-100 above, which demonstrates infringement of at least claim 46 of the '750 patent by showing:

(a) the ThinkSystem® SR650 is a computer;

(b) the ThinkSystem® SR650 has a CPU directly connected to an LVDS channel using two sets of unidirectional, multiple, differential signal pairs to transmit encoded address and data bits of a PCI bus transaction in opposite directions;

(c) the ThinkSystem® SR650 has system memory directly connected to the CPU;

(d) the ThinkSystem® SR650 has a mass storage hard drive coupled to the CPU; and

(e) the ThinkSystem® SR650 has other LVDS channels that use two sets of unidirectional, differential signal pairs to transmit data serially in opposite directions constituting point-to-point data communication links conveying USB protocol data packets, including a USB 3.x channel.

136. ACQIS' infringement allegations against the Accused Servers are not limited to claim 46 of the '750 patent, and additional infringed claims will be identified through infringement contentions and discovery.

137. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '750 patent and the infringement alleged herein.

138. Lenovo's actions as alleged herein, including those alleged in paragraphs 107-113, constitute indirect infringement of the '750 patent pursuant to 35 U.S.C. § 271(b) and (c).

139. The above-described acts of direct and indirect infringement committed by Lenovo have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

140. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

141. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 8,756,359

142. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 141 of this First Amended Complaint in support of its third cause of action as though fully set forth herein.

143. Pursuant to 35 U.S.C. § 282, the claims of the '359 patent are presumed valid.

144. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-100 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '359 patent in violation of 35 U.S.C. § 271(a) by making, using, selling, offering to sell, and/or importing the Accused Lenovo Products.

145. Lenovo's direct infringement of the '359 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrates infringement of at least claim 6 of the '359 patent by showing:

(a) the ThinkPad® P1 laptop is a computer;

(b) the ThinkPad® P1 laptop has a variety of connectors configured to couple to a console, including USB 3.x connectors;

(c) the ThinkPad® P1 laptop has a central processing unit (CPU);

(d) the ThinkPad® P1 laptop has an LVDS channel directly extending from the CPU using two sets of unidirectional, differential signal line pairs to transmit data in opposite directions; and

(e) the ThinkPad® P1 laptop has other LVDS channels that can couple to a console through one or more USB 3.x connectors, which use two sets of unidirectional, differential signal pairs to convey USB protocol data packets in opposite directions.

146. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 6 of the '359 patent, and additional infringed claims will be identified through infringement contentions and discovery.

147. Lenovo's direct infringement of the '359 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary

ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrates infringement of at least claim 6 of the '359 patent by showing:

(a) the ThinkStation P340 Workstation is a computer;

(b) the ThinkStation P340 Workstation has a variety of connectors configured to couple to a console, including USB 3.x connectors;

(c) the ThinkStation P340 Workstation has a central processing unit (CPU);

(d) the ThinkStation P340 Workstation has an LVDS channel directly extending from the CPU using two sets of unidirectional, differential signal line pairs to transmit data in opposite directions; and

(e) the ThinkStation P340 Workstation has other LVDS channels that can couple to a console through one or more USB 3.x connectors, which use two sets of unidirectional, differential signal pairs to convey USB protocol data packets in opposite directions.

148. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 6 of the '359 patent, and additional infringed claims will be identified through infringement contentions and discovery.

149. Lenovo's direct infringement of the '359 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Servers is shown by way of the exemplary ThinkSystem® SR650 server as set forth in paragraphs 44-57 and 86-100 above, which demonstrates infringement of at least claim 6 of the '359 patent by showing:

(a) the ThinkSystem® SR650 is a computer;

(b) the ThinkSystem® SR650 has a variety of connectors configured to couple to a console, including a USB 3.x connector;

(c) the ThinkSystem® SR650 has a central processing unit (CPU);

(d) the ThinkSystem® SR650 has an LVDS channel directly extending from the CPU using two sets of unidirectional, differential signal line pairs to transmit data in opposite directions; and

(e) the ThinkSystem® SR650 has other LVDS channels that can couple to a console through one or more USB 3.x connectors, which use two sets of unidirectional, differential signal pairs to convey USB protocol data packets in opposite directions.

150. ACQIS' infringement allegations against the Accused Servers are not limited to claim 6 of the '359 patent, and additional infringed claims will be identified through infringement contentions and discovery.

151. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '359 patent and the infringement alleged herein.

152. Lenovo's actions as alleged herein, including those alleged in paragraphs 107-113, constitute indirect infringement of the '359 patent pursuant to 35 U.S.C. § 271(b) and (c).

153. The above-described acts of direct and indirect infringement committed by Lenovo have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

154. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

155. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 8,626,977

156. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 155 of this First Amended Complaint in support of its third cause of action as though fully set forth herein.

157. Pursuant to 35 U.S.C. § 282, the claims of the '977 patent are presumed valid.

158. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-85 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '977 patent in violation of 35 U.S.C. § 271(a) by making, using, selling, offering to sell, and/or importing the Lenovo Accused Laptops and Accused Desktops.

159. Lenovo's direct infringement of the '977 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrates infringement of at least claim 1 of the '977 patent by showing:

(a) the ThinkPad® P1 laptop is a computer;

(b) the ThinkPad® P1 laptop has a variety of connectors configured to couple to a console, including HDMI, DisplayPort and USB 3.x connectors;

(c) the ThinkPad® P1 laptop has a an integrated central processing unit (CPU) and graphics subsystem in a single chip;

(d) the ThinkPad® P1 laptop has an LVDS channel directly extending from the CPU using two sets of unidirectional, differential signal line pairs to transmit encoded address and data bits of a PCI bus transaction in a serial bit stream in opposite directions;

(e) the ThinkPad® P1 laptop has other serial bit channels coupled to the USB 3.x connectors that are adapted to convey USB protocol data packets in opposite directions;

and

(f) the CPU of the ThinkPad® P1 laptop outputs digital video display signals through HDMI or DisplayPort channels.

160. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 1 of the '977 patent, and additional infringed claims will be identified through infringement contentions and discovery.

161. Lenovo's direct infringement of the '977 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrates infringement of at least claim 1 of the '977 patent by showing:

(a) the ThinkStation P340 Workstation is a computer;

(b) the ThinkStation P340 Workstation has a variety of connectors configured to couple to a console, including HDMI, DisplayPort and USB 3.x connectors;

(c) the ThinkStation P340 Workstation has an integrated central processing unit (CPU) and graphics subsystem in a single chip;

(d) the ThinkStation P340 Workstation has an LVDS channel directly extending from the CPU using two sets of unidirectional, differential signal line pairs to transmit encoded address and data bits of a PCI bus transaction in a serial bit stream in opposite directions;

(e) the ThinkStation P340 Workstation has other serial bit channels coupled to the USB 3.x connectors that are adapted to convey USB protocol data packets in opposite directions; and

(f) the CPU of the ThinkStation P340 Workstation outputs digital video display signals

through HDMI or DisplayPort channels.

162. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 1 of the '977 patent, and additional infringed claims will be identified through infringement contentions and discovery.

163. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '977 patent and the infringement alleged herein.

164. Lenovo's actions as alleged herein, including those alleged in paragraphs 107-113, constitute indirect infringement of the '977 patent pursuant to 35 U.S.C. § 271(b) and (c).

165. The above-described acts of direct and indirect infringement committed by Lenovo have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

166. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

167. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. RE44,739

168. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 167 of this First Amended Complaint in support of its third cause of action as though fully set forth herein.

169. Pursuant to 35 U.S.C. § 282, the claims of the '739 patent are presumed valid.

170. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-85 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '739 patent in violation of 35 U.S.C. § 271(a) by making, using, selling, offering to sell, and/or importing the Lenovo Accused Laptops and Accused Desktops.

171. Lenovo's direct infringement of the '739 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrates infringement of at least claim 18 of the '739 patent by showing:

(a) the ThinkPad® P1 laptop is a computer;

(b) the ThinkPad® P1 laptop has an integrated central processing unit (CPU) and graphics controller in a single chip directly coupled to one or more differential signal channels to convey digital video display information, including HDMI and DisplayPort channels;

(c) the ThinkPad® P1 laptop has various LVDS channels with at least two pairs of unidirectional, differential signal lanes to transmit data in opposite directions, including USB 3.x channels; and

(d) the ThinkPad® P1 laptop has a variety of connectors configured to couple to a console, including USB 3.x connectors which transmit USB protocol data through the USB 3.x connectors to a console.

172. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 18 of the '739 patent, and additional infringed claims will be identified through infringement contentions and discovery.

173. Lenovo's direct infringement of the '739 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrates infringement of at least claim 18 of the '739 patent by showing:

(a) the ThinkStation P340 Workstation is a computer;

(b) the ThinkStation P340 Workstation has an integrated central processing unit (CPU) and graphics controller in a single chip directly coupled to one or more differential signal channels to convey digital video display information, including HDMI and DisplayPort channels;

(c) the ThinkStation P340 Workstation has various LVDS channels with at least two pairs of unidirectional, differential signal lanes to transmit data in opposite directions, including USB 3.x channels; and

(d) the ThinkStation P340 Workstation has a variety of connectors configured to couple to a console, including USB 3.x connectors which transmit USB protocol data through the USB 3.x connectors to a console.

174. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 18 of the '739 patent, and additional infringed claims will be identified through infringement contentions and discovery.

175. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '739 patent and the infringement alleged herein.

176. Lenovo's actions as alleged herein, including those alleged in paragraphs 107-113, constitute indirect infringement of the '739 patent pursuant to 35 U.S.C. § 271(b) and (c).

177. The above-described acts of direct and indirect infringement committed by Lenovo have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

178. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

179. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

COUNT VI
INFRINGEMENT OF U.S. PATENT NO. 8,977,797

180. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 179 of this First Amended Complaint in support of its third cause of action as though fully set forth herein.

181. Pursuant to 35 U.S.C. § 282, the claims of the '797 patent are presumed valid.

182. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-100 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '797 patent in violation of 35 U.S.C. § 271(g) by using one or more of the methods claimed in the '797 patent to manufacture the Accused Lenovo Products and then importing, selling, offering to sell and/or using the Accused Lenovo Products in the United States.

183. The Accused Lenovo Products made using the methods claimed in the '797 patent are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

184. Lenovo's direct infringement of the '797 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrate that to manufacture the ThinkPad® P1 laptop, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 36 of the '797 patent upon importation and/or sale of the ThinkPad® P1 laptop in the United States:

(a) Lenovo performs a method of improving data throughput on a motherboard when manufacturing the ThinkPad® P1 laptop, which contains a motherboard;

(b) when manufacturing the ThinkPad® P1 laptop, Lenovo mounts an integrated CPU and interface controller as a single chip on the motherboard, because the ThinkPad® P1 laptop uses an Intel CPU-controller;

(c) when manufacturing the ThinkPad® P1 laptop, Lenovo connects an LVDS channel directly to the integrated CPU-controller chip, which uses two unidirectional, serial channels to transmit data in opposite directions because the ThinkPad® P1 laptop has PCIe channels directly connected to the CPU-controller chip;

(d) when manufacturing the ThinkPad® P1 laptop, Lenovo increases data throughput in the serial channels by providing each channel with multiple differential signal line pairs, because the PCIe channels have multiple pairs of differential signal lanes;

(e) when manufacturing the ThinkPad® P1 laptop, Lenovo configures the interface controller to adapt to different numbers of differential signal line pairs to convey encoded address and data bits of a PCI bus transaction in serial form, because the CPU-controllers Lenovo uses are configured to convey PCIe data signals through PCIe channels having multiple differential signal line pairs; and

(f) when manufacturing the ThinkPad® P1 laptop, Lenovo couples the CPU-controller to a peripheral device, such as a graphics card, which is attached to the motherboard through the PCIe channel.

185. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 36 of the '797 patent, and additional infringed claims will be identified through infringement contentions and discovery.

186. Lenovo's direct infringement of the '797 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrate that to manufacture the ThinkStation P340 Workstation, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 36 of the '797 patent upon importation and/or sale of the ThinkStation P340 Workstation in the United States:

(a) Lenovo performs a method of improving data throughput on a motherboard when manufacturing the ThinkStation P340 Workstation, which contains a motherboard;

(b) when manufacturing the ThinkStation P340 Workstation, Lenovo mounts an integrated CPU and interface controller as a single chip on the motherboard, because the ThinkStation P340 Workstation uses an Intel CPU-controller;

(c) when manufacturing the ThinkStation P340 Workstation, Lenovo connects an LVDS channel directly to the integrated CPU-controller chip, which uses two unidirectional, serial channels to transmit data in opposite directions because the ThinkStation P340 Workstation has PCIe channels and a DMI interface directly connected to the CPU-controller chip;

(d) when manufacturing the ThinkStation P340 Workstation, Lenovo increases data

throughput in the serial channels by providing each channel with multiple differential signal line pairs, because the PCIe and DMI channels have multiple pairs of differential signal lanes;

(e) when manufacturing the ThinkStation P340 Workstation, Lenovo configures the interface controller to adapt to different numbers of differential signal line pairs to convey encoded address and data bits of a PCI bus transaction in serial form, because the CPU-controllers Lenovo uses are configured to convey PCIe data signals through PCIe channels having multiple differential signal line pairs; and

(f) when manufacturing the ThinkStation P340 Workstation, Lenovo couples the CPU-controller to a peripheral device such as a graphics card, which is attached to the motherboard through a PCIe channel.

187. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 36 of the '797 patent, and additional infringed claims will be identified through infringement contentions and discovery.

188. Lenovo's direct infringement of the '797 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Servers is shown by way of the exemplary ThinkSystem® SR650 server as set forth in paragraphs 44-57 and 86-100 above, which demonstrate that to manufacture the ThinkSystem® SR650, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 36 of the '797 patent upon importation and/or sale of the ThinkSystem® SR650 in the United States:

(a) Lenovo performs a method of improving data throughput on a motherboard when manufacturing the ThinkSystem® SR650, which contains a motherboard;

(b) when manufacturing the ThinkSystem® SR650, Lenovo mounts an integrated CPU

and interface controller as a single chip on the motherboard, because the ThinkSystem® SR650 uses an Intel CPU-controller;

(c) when manufacturing the ThinkSystem® SR650, Lenovo connects an LVDS channel directly to the integrated CPU-controller chip, which uses two unidirectional, serial channels to transmit data in opposite directions because the ThinkSystem® SR650 has PCIe channels and a DMI interface directly connected to the CPU-controller chip;

(d) when manufacturing the ThinkSystem® SR650, Lenovo increases data throughput in the serial channels by providing each channel with multiple differential signal line pairs, because the PCIe and DMI channels have multiple pairs of differential signal lanes;

(e) when manufacturing the ThinkSystem® SR650, Lenovo configures the interface controller to adapt to different numbers of differential signal line pairs to convey encoded address and data bits of a PCI bus transaction in serial form, because the CPU-controllers Lenovo uses are configured to convey PCIe data signals through PCIe channels having multiple differential signal line pairs; and

(f) when manufacturing the ThinkSystem® SR650, Lenovo couples the CPU-controller to a peripheral device such as a storage interface controller or a graphics processor, which is attached to the motherboard through a PCIe channel.

189. ACQIS' infringement allegations against the Accused Servers are not limited to claim 36 of the '797 patent, and additional infringed claims will be identified through infringement contentions and discovery.

190. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '797 patent and the infringement alleged herein.

191. The above-described acts of direct and indirect infringement committed by Lenovo have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

192. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

193. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

COUNT VII
INFRINGEMENT OF U.S. PATENT NO. 9,529,769

194. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 193 of this First Amended Complaint in support of its third cause of action as though fully set forth herein.

195. Pursuant to 35 U.S.C. § 282, the claims of the '769 patent are presumed valid.

196. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-100 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '769 patent in violation of 35 U.S.C. § 271(g) by using one or more of the methods claimed in the '769 patent to manufacture the Accused Laptops and Accused Desktops and then importing, selling, offering to sell and/or using the Accused Laptops and Accused Desktops in the United States.

197. Lenovo's Accused Laptops and Accused Desktops that are made using the methods claimed in the '769 patent are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

198. Lenovo's direct infringement of the '769 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrate that to manufacture the ThinkPad® P1 laptop, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 19 of the '769 patent upon importation and/or sale of the ThinkPad® P1 laptop in the United States:

(a) Lenovo performs a method of improving external peripheral data communication in a computer when manufacturing the ThinkPad® P1 laptop;

(b) when manufacturing the ThinkPad® P1 laptop, Lenovo obtains an integrated CPU and graphics controller as a single chip, because the ThinkPad® P1 laptop uses an Intel core CPU;

(c) when manufacturing the ThinkPad® P1 laptop, Lenovo connects a unidirectional signal channel directly to the integrated CPU-graphics chip to output digital video data, because the ThinkPad® P1 laptop has HDMI and DisplayPort channels connected to the CPU;

(d) when manufacturing the ThinkPad® P1 laptop, Lenovo provides a connector for external peripheral data communication, because the ThinkPad® P1 laptop has a variety of connectors for external peripherals, including HDMI, Thunderbolt, USB 3.x, and PCIe connectors;

(e) when manufacturing the ThinkPad® P1 laptop, Lenovo provides an LVDS channel to

convey USB protocol data through a connector that uses two unidirectional, serial bit channels that transmit data in opposite directions, because the ThinkPad® P1 laptop has Thunderbolt connectors that convey USB 3.x data; and

(f) when manufacturing the ThinkPad® P1 laptop, Lenovo provides a second LVDS channel to convey digital video data through a connector, because the ThinkPad® P1 laptop has Thunderbolt connectors that convey both USB 3.x and DisplayPort signals.

199. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 19 of the '769 patent, and additional infringed claims will be identified through infringement contentions and discovery.

200. Lenovo's direct infringement of the '769 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrate that to manufacture the ThinkStation P340 Workstation, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 19 of the '769 patent upon importation and/or sale of the ThinkStation P340 Workstation in the United States:

(a) Lenovo performs a method of improving external peripheral data communication in a computer when manufacturing the ThinkStation P340 Workstation;

(b) when manufacturing the ThinkStation P340 Workstation, Lenovo obtains an integrated CPU and graphics controller as a single chip, because the ThinkStation P340 Workstation uses an Intel core CPU;

(c) when manufacturing the ThinkStation P340 Workstation, Lenovo connects a unidirectional signal channel directly to the integrated CPU-graphics chip to output digital video data, because the ThinkStation P340 Workstation has HDMI and

DisplayPort channels connected to the CPU;

(d) when manufacturing the ThinkStation P340 Workstation, Lenovo provides a connector for external peripheral data communication, because the ThinkStation P340 Workstation has a variety of connectors for external peripherals, including HDMI, USB 3.1 Type C, and PCIe connectors;

(e) when manufacturing the ThinkStation P340 Workstation, Lenovo provides an LVDS channel to convey USB protocol data through a connector that uses two unidirectional, serial bit channels that transmit data in opposite directions, because the ThinkStation P340 Workstation has a USB 3.1 Type C connector that conveys USB 3.x data; and

(f) when manufacturing the ThinkStation P340 Workstation, Lenovo provides a second LVDS channel to convey digital video data through a connector, because the ThinkStation P340 Workstation has a USB 3.1 Type C port that can convey/output both USB 3.x and digital video data signals.

201. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 19 of the '769 patent, and additional infringed claims will be identified through infringement contentions and discovery.

202. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '769 patent and the infringement alleged herein.

203. The above-described acts of direct and indirect infringement committed by Lenovo have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

204. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

205. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

COUNT VIII
INFRINGEMENT OF U.S. PATENT NO. RE45,140

206. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 205 of this First Amended Complaint in support of its third cause of action as though fully set forth herein.

207. Pursuant to 35 U.S.C. § 282, the claims of the '140 patent are presumed valid.

208. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-100 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '140 patent in violation of 35 U.S.C. § 271(g) by using one or more of the methods claimed in the '140 patent to manufacture the Accused Laptops and Accused Desktops and then importing, selling, offering to sell and/or using the Accused Laptops and Accused Desktops in the United States.

209. Lenovo's Accused Laptops and Accused Desktops that are made using the methods claimed in the '140 patent are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

210. Lenovo's direct infringement of the '140 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrate that to

manufacture the ThinkPad® P1 laptop, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 35 of the '140 patent upon importation and/or sale of the ThinkPad® P1 laptop in the United States:

(a) Lenovo performs a method of improving performance of a computer when manufacturing the ThinkPad® P1 laptop;

(b) when manufacturing the ThinkPad® P1 laptop, Lenovo obtains an integrated CPU and graphics controller as a single chip, because the ThinkPad® P1 laptop uses an Intel core CPU;

(c) when manufacturing the ThinkPad® P1 laptop, Lenovo connects an LVDS channel directly to the CPU-graphics chip that uses two unidirectional, serial bit channels to transmit data in opposite directions, because the ThinkPad® P1 laptop has PCIe and DMI channels connected directly to the CPU;

(d) when manufacturing the ThinkPad® P1 laptop, Lenovo connects a differential signal channel directly to the integrated CPU-graphics chip to output digital video data, because the ThinkPad® P1 laptop has HDMI and DisplayPort channels connected to the CPU;

(e) when manufacturing the ThinkPad® P1 laptop, Lenovo provides a connector for external peripheral data communication, because the ThinkPad® P1 laptop has a variety of connectors for external peripherals, including HDMI, Thunderbolt, USB 3.x, and PCIe connectors; and

(f) when manufacturing the ThinkPad® P1 laptop, Lenovo provides a second LVDS channel using two unidirectional, serial bit channels to transmit data in opposite directions through the connector, because the ThinkPad® P1 laptop has Thunderbolt

connectors and USB 3.x connectors.

211. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 35 of the '140 patent, and additional infringed claims will be identified through infringement contentions and discovery.

212. Lenovo's direct infringement of the '140 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrate that to manufacture the ThinkStation P340 Workstation, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 35 of the '140 patent upon importation and/or sale of the ThinkStation P340 Workstation in the United States:

(a) Lenovo performs a method of improving performance of a computer when manufacturing the ThinkStation P340 Workstation;

(b) when manufacturing the ThinkStation P340 Workstation, Lenovo obtains an integrated CPU and graphics controller as a single chip, because the ThinkStation P340 Workstation uses an Intel core CPU;

(c) when manufacturing the ThinkStation P340 Workstation, Lenovo connects an LVDS channel directly to the CPU-graphics chip that uses two unidirectional, serial bit channels to transmit data in opposite directions, because the ThinkStation P340 Workstation has PCIe and DMI channels connected directly to the CPU;

(d) when manufacturing the ThinkStation P340 Workstation, Lenovo connects a differential signal channel directly to the integrated CPU-graphics chip to output digital video data, because the ThinkStation P340 Workstation has DisplayPort channels connected to the CPU;

(e) when manufacturing the ThinkStation P340 Workstation, Lenovo provides a connector for external peripheral data communication, because the ThinkStation P340 Workstation has a variety of connectors for external peripherals, including DisplayPort, USB 3.x, and PCIe connectors; and

(f) when manufacturing the ThinkStation P340 Workstation, Lenovo provides a second LVDS channel using two unidirectional, serial bit channels to transmit data in opposite directions through the connector, because the ThinkStation P340 Workstation has USB 3.x connectors.

213. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 35 of the '140 patent, and additional infringed claims will be identified through infringement contentions and discovery.

214. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '140 patent and the infringement alleged herein.

215. The above-described acts of direct and indirect infringement committed by Lenovo have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

216. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

217. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

COUNT IX
INFRINGEMENT OF U.S. PATENT NO. RE44,654

218. ACQIS incorporates by this reference the allegations set forth in paragraphs 1 through 217 of this First Amended Complaint in support of its third cause of action as though fully set forth herein.

219. Pursuant to 35 U.S.C. § 282, the claims of the '654 patent are presumed valid.

220. In view of the foregoing facts and allegations, including paragraphs 44-57 and 58-100 above, Lenovo has directly infringed and continues to directly infringe one or more claims of the '654 patent in violation of 35 U.S.C. § 271(g) by using one or more of the methods claimed in the '654 patent to manufacture the Accused Lenovo Products and then importing, selling, offering to sell and/or using the Accused Lenovo Products in the United States.

221. The Accused Lenovo Products made using the methods claimed in the '654 patent are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

222. Lenovo's direct infringement of the '654 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Laptops is shown by way of the exemplary ThinkPad® P1 laptop as set forth in paragraphs 44-57 and 58-71 above, which demonstrate that to manufacture the ThinkPad® P1 laptop, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 23 of the '654 patent upon importation and/or sale of the ThinkPad® P1 laptop in the United States:

(a) Lenovo performs a method of increasing data communication speed of a computer when manufacturing the ThinkPad® P1 laptop;

(b) when manufacturing the ThinkPad® P1 laptop, Lenovo connects a CPU directly to a peripheral bridge on a printed circuit board, because the ThinkPad® P1 laptop uses an

Intel core CPU directly connected to the Intel PCH via a DMI connection;

(c) when manufacturing the ThinkPad® P1 laptop, Lenovo connects an LVDS channel directly to the peripheral bridge (PCH), which uses two unidirectional, serial channels to transmit data in opposite directions, because the ThinkPad® P1 laptop has PCIe channels and USB 3.x channels directly connected to the Intel PCH;

(d) when manufacturing the ThinkPad® P1 laptop, Lenovo provides a connector to connect the computer to a console, because the ThinkPad® P1 laptop has a variety of connector ports such as DisplayPort and USB 3.x;

(e) when manufacturing the ThinkPad® P1 laptop, Lenovo provides a second LVDS channel using two unidirectional, serial channels to transmit data in opposite directions through the connector to the console, because the ThinkPad® P1 laptop has USB 3.x ports; and

(f) when manufacturing the ThinkPad® P1 laptop, Lenovo enables the transmission of USB protocol data through the second LVDS channel via a USB 3.x port and channel.

223. ACQIS' infringement allegations against the Accused Laptops are not limited to claim 23 of the '654 patent, and additional infringed claims will be identified through infringement contentions and discovery.

224. Lenovo's direct infringement of the '654 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Desktops is shown by way of the exemplary ThinkStation P340 Workstation as set forth in paragraphs 44-57 and 72-85 above, which demonstrate that to manufacture the ThinkStation P340 Workstation, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 23 of the '654 patent upon importation and/or sale of the ThinkStation P340 Workstation in the United States:

(a) Lenovo performs a method of increasing data communication speed of a computer when manufacturing the ThinkStation P340 Workstation;

(b) when manufacturing the ThinkStation P340 Workstation, Lenovo connects a CPU directly to a peripheral bridge on a printed circuit board, because the ThinkStation P340 Workstation uses an Intel core CPU directly connected to the Intel PCH via a DMI connection;

(c) when manufacturing the ThinkStation P340 Workstation, Lenovo connects an LVDS channel directly to the peripheral bridge (PCH), which uses two unidirectional, serial channels to transmit data in opposite directions, because the ThinkStation P340 Workstation has PCIe channels and USB 3.x channels directly connected to the Intel PCH;

(d) when manufacturing the ThinkStation P340 Workstation, Lenovo provides a connector to connect the computer to a console, because the ThinkStation P340 Workstation has a variety of connector ports such as DisplayPort and USB 3.x;

(e) when manufacturing the ThinkStation P340 Workstation, Lenovo provides a second LVDS channel using two unidirectional, serial channels to transmit data in opposite directions through the connector to the console, because the ThinkStation P340 Workstation has USB 3.x ports; and

(f) when manufacturing the ThinkStation P340 Workstation, Lenovo enables the transmission of USB protocol data through the second LVDS channel via a USB 3.x port and channel.

225. ACQIS' infringement allegations against the Accused Desktops are not limited to claim 23 of the '654 patent, and additional infringed claims will be identified through infringement contentions and discovery.

226. Lenovo's direct infringement of the '654 patent through its manufacture, use, offers to sell, sales, and importation of the Accused Servers is shown by way of the exemplary ThinkSystem® SR650 server as set forth in paragraphs 44-57 and 86-100 above, which demonstrate that to manufacture the ThinkSystem® SR650, Lenovo necessarily performs the following actions, which results in direct infringement of at least claim 23 of the '654 patent upon importation and/or sale of the ThinkSystem® SR650 in the United States:

(a) Lenovo performs a method of increasing data communication speed of a computer when manufacturing the ThinkSystem® SR650;

(b) when manufacturing the ThinkSystem® SR650, Lenovo connects a CPU directly to a peripheral bridge on a printed circuit board, because the ThinkSystem® SR650 uses an Intel core CPU directly connected to the Intel PCH via a DMI connection;

(c) when manufacturing the ThinkSystem® SR650, Lenovo connects an LVDS channel directly to the peripheral bridge (PCH), which uses two unidirectional, serial channels to transmit data in opposite directions, because the ThinkSystem® SR650 has PCIe channels and a DMI channel directly connected to the Intel PCH;

(d) when manufacturing the ThinkSystem® SR650, Lenovo provides a connector to connect the computer to a console, because the ThinkSystem® SR650 has a variety of connector ports such as USB 3.x;

(e) when manufacturing the ThinkSystem® SR650, Lenovo provides a second LVDS channel using two unidirectional, serial channels to transmit data in opposite directions

through the connector to the console, because the ThinkSystem® SR650 has USB 3.x ports; and

(f) when manufacturing the ThinkSystem® SR650, Lenovo enables the transmission of USB protocol data through the second LVDS channel via a USB 3.x port and channel.

227. ACQIS' infringement allegations against the Accused Servers are not limited to claim 23 of the '654 patent, and additional infringed claims will be identified through infringement contentions and discovery.

228. As early as around May 15, 2018, and at least as of the filing of the original Complaint on October 15, 2020, Lenovo had actual notice of the '654 patent and the infringement alleged herein.

229. The above-described acts of direct and indirect infringement committed by Lenovo have caused injury and damage to ACQIS and ACQIS' licensees, and will continue to cause damages and irreparable harm to ACQIS unless enjoined.

230. ACQIS is entitled to recover all damages sustained as a result of Lenovo's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

231. Lenovo's infringement as described herein has been and continues to be willful and exceptional. Accordingly, ACQIS is entitled to recover enhanced damages up to three times the amount found or assessed at trial pursuant to 35 U.S.C. § 284, as well as its attorneys' fees pursuant to 35 U.S.C. § 285.

JURY TRIAL DEMANDED

ACQIS LLC hereby demands a trial by jury on all claims and issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff ACQIS LLC respectfully requests that this Court grant the following relief to ACQIS LLC:

A. enter judgment that Lenovo has infringed, both directly and indirectly, one or more claims of each of the ACQIS Patents and continues to infringe those claims through: (1) the manufacture, use, offering to sell, and/or sale in the United States, and/or the importation into the United States, of infringing Lenovo-brand computer products; (2) the practice of claimed methods of the ACQIS Patents by manufacturing, using, and/or testing Lenovo-brand computer products in the United States; and (3) the importation into the United States of Lenovo-brand computer products made abroad using patented processes claimed in the ACQIS Patents; and/or (4) the inducement of third parties to engage in such infringing activity with knowledge of the ACQIS Patents and of the third parties' infringing actions;

B. enter judgement that such infringement is willful;

C. enter judgment awarding ACQIS monetary relief pursuant to 35 U.S.C. § 284 in an amount adequate to compensate for Lenovo's infringement of the ACQIS Patents to be determined at trial, but not less than a reasonable royalty, awarding ACQIS all pre- and post-judgment interest and costs, and awarding ACQIS enhanced damages for Lenovo's willful infringement of the ACQIS Patents;

D. enter an order that Lenovo pay to ACQIS ongoing royalties in an amount to be determined for any infringement occurring after the date that judgment is entered;

E. enter an order, pursuant to 35 U.S.C. § 285, declaring this an exceptional case and awarding to ACQIS its reasonable attorneys' fees; and

F. enter an order awarding to ACQIS such other and further relief, whether at law or in equity, that this Court seems just, equitable, and proper.

Dated: May 28, 2021.

Respectfully submitted,

By: */s/ Paige Arnette Amstutz*

Paige Arnette Amstutz
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CERTIFICATE OF SERVICE

Pursuant to the Federal Rules of Civil Procedure and Local Rule CV-5, I hereby certify that, on May 28, 2021, all counsel of record who have appeared in this case are being served with a copy of the foregoing via the Court's CM/ECF system.

/s/ Paige Arnette Amstutz
Paige Arnette Amstutz