

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DELL TECHNOLOGIES INC. AND DELL INC.,

Petitioners,

v.

CLOUD BYTE LLC

Patent Owner.

Case No. IPR2025-01288
U.S. Patent No. 9,651,320

DECLARATION OF KEVIN ALMEROOTH, PH.D., IN SUPPORT OF
PATENT OWNER'S PRELIMINARY RESPONSE

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LIST OF EXHIBITS

Exhibit	Description
Ex. 2001	U.S. Pat. 6,987,370
Ex. 2002	Dkt. 94 (Second Amended Scheduling Order)
Ex. 2003	Docket Navigator Statistics
Ex. 2004	U.S. Court's median time-to-trial statistics for the Eastern District of Texas
Ex. 2005	Dkt. 119 (Order Setting Markman Hearing)
Ex. 2006	Nakamura Invalidity Claim Chart for the '320 Patent (E8)
Ex. 2007	Declaration of Dr. Kevin Almeroth
Ex. 2008	CV of Dr. Kevin Almeroth

I, Dr. Kevin Almeroth, declare as follows:

I. Introduction

1. I have been retained by Quinn Emanuel Urquhart & Sullivan, LLP on behalf of the Patent Owner Cloud Byte LLC (“Patent Owner” or “Cloud Byte”) as an independent expert in this *inter partes* review (this “Proceeding”) before the Patent Trial and Appeal Board of the United States Patent and Trademark Office (the “Board”). I have been asked to review the Petition filed by Petitioners Dell Technologies Inc. and Dell Inc. (“Petitioners”) and the expert declaration of Dr. Himanshu Pokharna, challenging the patentability of U.S. Patent No. 9,651,320 (the “’320 patent”), and provide my opinions on the invalidity arguments presented in the Petition.

2. I am being compensated for my time spent on this matter at a rate of \$900 per hour, and my compensation is in no way contingent upon the outcome of this matter or on the opinions I offer. All of the opinions expressed in this declaration are my own.

A. Qualifications

3. Ex. 2008 is a true and correct copy of my current CV, which describes my education, patents and publications, employment and research history, and professional activities and awards.

1. Educational Background

4. I hold three degrees from the Georgia Institute of Technology: (1) a Bachelor of Science degree in Information and Computer Science (with minors in Economics, Technical Communication, and American Literature) earned in June 1992; (2) a Master of Science degree in Computer Science (with specialization in Networking and Systems) earned in June 1994; and (3) a Doctor of Philosophy (Ph.D.) degree in Computer Science (Dissertation Title: Networking and System Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia System, minor in Telecommunications Public Policy) earned in June 1997. I have taken a wide variety of courses as demonstrated by my minor. My undergraduate degree also included a number of courses more typical of a degree in electrical engineering, including digital logic, signal processing, and telecommunications theory.

2. Career

5. I am a Professor Emeritus in the Department of Computer Science at the University of California, Santa Barbara (UCSB). While active at UCSB, I held faculty appointments and was a founding member of the Computer Engineering (CE) Program, Media Arts and Technology (MAT) Program, and the Technology Management Program (TMP). I was the Associate Director of the Center for

Information Technology and Society (CITS) from 1999 to 2012. I have been a faculty member at UCSB since July 1997.

6. One of the major concentrations of my research has been the delivery of multimedia content and data between computing devices, including various network architectures. In my research, I have studied large-scale content delivery systems, and the use of servers located in a variety of geographic locations to provide scalable delivery to hundreds or thousands of users simultaneously. I have also studied smaller-scale content delivery systems in which content is exchanged between individual computers and portable devices. My work has emphasized the exchange of content more efficiently across computer networks, including the scalable delivery of content to many users, mobile computing, satellite networking, delivering content to mobile devices, and network support for data delivery in wireless networks.

7. In 1992, the initial focus of my research was on the provision of interactive functions (*e.g.*, VCR-style functions like pause, rewind, and fast-forward) for near video-on-demand systems in cable systems; in particular, how to aggregate requests for movies at a cable head-end and then how to satisfy a multitude of requests using one audio/video stream broadcast to multiple receivers simultaneously. This research has continually evolved and resulted in the development of techniques to scalably deliver on-demand content, including audio,

video, web documents, and other types of data, through the Internet and over other types of networks, including over cable systems, broadband telephone lines, and satellite links.

8. An important component of my research has been investigating the challenges of communicating multimedia content, including video, between computers and across networks including the Internet. I have worked on a variety of research problems and used a number of systems that were developed to deliver multimedia content to users. One content-delivery method I have researched is the one-to-many communication facility called “multicast,” first deployed as the Multicast Backbone, a virtual overlay network supporting one-to-many communication. Multicast is one technique that can be used on the Internet to provide streaming media support for complex applications like video-on-demand, distance learning, distributed collaboration, distributed games, and large-scale wireless communication. The delivery of media through multicast often involves using Internet infrastructure, devices and protocols, including protocols for routing and TCP/IP.

9. Starting in 1997, I worked on a project to integrate the streaming media capabilities of the Internet together with the interactivity of the web. I developed a project called the Interactive Multimedia Jukebox (IMJ). Users would visit a web page and select content to view. The content would then be scheduled on one of a

number of channels, including delivery to students in Georgia Tech dorms delivered via the campus cable plant. The content of each channel was delivered using multicast communication.

10. In the IMJ, the number of channels varied depending on the capabilities of the server including the available bandwidth of its connection to the Internet. If one of the channels was idle, the requesting user would be able to watch their selection immediately. If all channels were streaming previously selected content, the user's selection would be queued on the channel with the shortest wait time. In the meantime, the user would see what content was currently playing on other channels, and because of the use of multicast, would be able to join one of the existing channels and watch the content at the point it was currently being transmitted.

11. The IMJ service combined the interactivity of the web with the streaming capabilities of the Internet to create a jukebox-like service. It supported true Video-on-Demand when capacity allowed, but scaled to any number of users based on queuing requested programs. As part of the project, we obtained permission from Turner Broadcasting to transmit cartoons and other short-subject content. We also connected the IMJ into the Georgia Tech campus cable television network so that students in their dorms could use the web to request content and then view that content on one of the campus's public access channels.

12. More recently, I have also studied issues concerning how users choose content, especially when considering the price of that content. My research has examined how dynamic content pricing can be used to control system load. By raising prices when systems start to become overloaded (*i.e.*, when all available resources are fully utilized) and reducing prices when system capacity is readily available, users' capacity to pay as well as their willingness can be used as factors in stabilizing the response time of a system. This capability is particularly useful in systems where content is downloaded or streamed on-demand to users.

13. As a parallel research theme, starting in 1997, I began researching issues related to wireless devices and sensors. In particular, I was interested in showing how to provide greater communication capability to "lightweight devices," *i.e.*, small form-factor, resource-constrained (*e.g.*, CPU, memory, networking, and power) devices. Starting in 1998, I published several papers on my work to develop a flexible, lightweight, battery-aware network protocol stack. The lightweight protocols we envisioned were similar in nature to protocols like Bluetooth, Universal Plug and Play (UPnP) and Digital Living Network Alliance (DLNA).

14. From this initial work, I have made wireless networking—including ad hoc, mesh networks and wireless devices—one of the major themes of my research. My work in wireless networks spans the protocol stack from applications through to the encoding and exchange of data at the data link and physical layers.

15. At the application layer, even before the large-scale “app stores” were available, my research looked at building, installing, and using apps for a variety of purposes, from network monitoring to support for traditional computer-based applications (*e.g.*, content retrieval) to new applications enabled by ubiquitous, mobile devices. For example, my research has looked at developing applications for virtually exchanging and tracking “coupons” through “opportunistic contact” among mobile wireless devices (*i.e.*, communication among devices moving into communication range with each other). In many of the courses I have taught there is a project component. Through these projects I have supervised numerous efforts to develop new “apps” for download and use across a variety of mobile platforms.

16. Toward the middle of the protocol stack, my research has also looked to build wireless infrastructure support to enable communication among a set of mobile devices unaided by any other kind of network infrastructure. These kinds of networks are useful either in challenged network environments (*e.g.*, when a natural disaster has destroyed existing infrastructure) or when suitable support for network communication never existed. The deployment of such networks (or even the use of traditional network support) are critical to support services like disaster relief, catastrophic event coordination, and emergency services deployment.

17. Yet another theme is monitoring wireless networks, in particular different variants of IEEE 802.11 compliant networks, to (1) understand the

operation of the various protocols used in real-world deployments, (2) use these measurements to characterize use of the networks and identify protocol limitations and weaknesses, and (3) propose and evaluate solutions to these problems. I have successfully used monitoring techniques to study wireless data link layer protocol operation and to improve performance by enhancing the operation of such protocols. For wireless protocols, this research includes functions like network acquisition and channel bonding.

18. One theme in my wireless network research has been cross-layer solutions and innovations. As mentioned above, with greater wireless device use and network support, we envisioned new application paradigms and services, for example, when mobile devices come into contact with each other. Instead of relying on existing infrastructure to relay communication, the devices are able to discover each other and communicate directly. Other examples include discovering and using location information to enhance users' experiences. Network support and novel applications use a variety of network architectures supporting users on foot, in vehicles, and across varying terrains and environments. Finally, we studied how communication efficiency can be supported through intelligent handoffs as well as location and movement prediction.

19. Protecting networks, including their operation and content, has been an underlying theme of my research almost since the beginning of my research career.

Starting in 2000, I have been involved in several projects that specifically address security, network protection, and firewalls. After significant background work, a team on which I was a member successfully submitted a \$4.3M grant proposal to the Army Research Office (ARO) at the Department of Defense to propose and develop a high-speed intrusion detection system. Key aspects of the system included associating streams of packets and analyzing them for viruses and other malware. Once the grant was awarded, we spent several years developing and meeting the milestones of the project. A number of my students worked on related projects and published papers on topics ranging from intrusion detection to developing advanced techniques to be incorporated into firewalls. I have also used firewalls, including their associated malware detection features, in developing techniques for the classroom to ensure that students are not distracted by online content.

20. Recent work ties some of the various threads of my past research together. I have investigated content delivery in online social networks and proposed reputation management systems in large-scale social networks and marketplaces. On the content delivery side, I have looked at issues of caching and cache placement, especially when content being shared and the cache has geographical relevance. We were able to show that effective caching strategies can greatly improve performance and reduce deployment costs. Our work on reputation systems showed that reputations have economic value, and as such, creates a motivation to manipulate

reputations. In response, we developed a variety of solutions to protect the integrity of reputations in online social networks. The techniques we developed for content delivery and reputation management were particularly relevant in peer-to-peer communication.

21. My involvement in the research community extends to leadership positions for several academic journals and conferences. I am the co-chair of the Steering Committee for the ACM Network and System Support for Digital Audio and Video (NOSSDAV) workshop and on the Steering Committees for the International Conference on Network Protocols (ICNP), ACM Sigcomm Workshop on Challenged Networks (CHANTS), and IEEE Global Internet (GI) Symposium. I have served or am serving on the Editorial Boards of IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, IEEE Network, ACM Computers in Entertainment, AACE Journal of Interactive Learning Research (JILR), and ACM Computer Communications Review. I have co-chaired a number of conferences and workshops including the IEEE International Conference on Network Protocols (ICNP), IEEE Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), International Conference on Communication Systems and Networks (COMSNETS), IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS), the International Workshop On Wireless Network Measurement (WiNMee), ACM

Sigcomm Workshop on Challenged Networks (CHANTS), the Network Group Communication (NGC) workshop, and the Global Internet Symposium, and I have served on the program committees for numerous conferences.

22. Furthermore, in the courses I taught at UCSB, a significant portion of my curriculum covered aspects of the Internet and network communication including the physical and data link layers of the Open System Interconnect (OSI) protocol stack, and standardized protocols for communicating across a variety of physical media such as cable systems, telephone lines, wireless, and high-speed Local Area Networks (LANs). The courses I have taught also cover most major topics in Internet communication, including data communication, multimedia encoding, and mobile application design. My research and courses have covered a range of physical infrastructures for delivering content over networks, including cable, Integrated Services Digital Network (ISDN), Ethernet, Asynchronous Transfer Mode (ATM), fiber, and Digital Subscriber Line (DSL). For a complete list of courses I have taught, see my curriculum vitae (Ex. 2008).

23. I co-founded a technology company called Santa Barbara Labs that was working under a sub-contract from the U.S. Air Force to develop very accurate emulation systems for the military's next generation internetwork. Santa Barbara Labs' focus was in developing an emulation platform to test the performance characteristics of the network architecture in the variety of environments in which it

was expected to operate, and, in particular, for network services including IPv6, multicast, Quality of Service (QoS), satellite-based communication, and security. Applications for this emulation program included communication of a variety of multimedia-based services, including video conferencing and video-on-demand.

24. In addition to having co-founded a technology company myself, I have worked for, consulted with, and collaborated with companies for nearly 30 years. These companies range from well-established companies to start-ups and include IBM, Hitachi Telecom, Turner Broadcasting System (TBS), Bell South, Digital Fountain, RealNetworks, Intel Research, Cisco Systems, and Lockheed Martin.

25. Through my graduate education, leadership with CITS, involvement in TMP, role in the development of the Internet2 infrastructure, and consulting with ISPs, I have gained a strong understanding in the role of the Internet in our society and the challenges of deploying large-scale production networking infrastructure. CITS, since its inception, has looked at the role of the Internet in society, including how the evolution of technology has created communication opportunities and challenges, including, for example, through disruptive technologies like P2P. TMP looks to focus on non-purely technical issues, including, for example, state-of-the-art business methods, strategies for successful technology commercialization, new venture creation, and best practices for fostering innovation. Through my industry collaborations and Internet2 work, I have developed significant experience in the

challenges of deploying, monitoring, managing, and scaling communication infrastructure to support evolving Internet services like streaming media, conferencing, content exchange, social networking, and e-commerce.

26. Additional details about my employment history, fields of expertise, and publications are further included in my CV (Ex. 2008).

3. Other Relevant Qualifications

27. I am a Member of the Association of Computing Machinery (ACM) and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE).

28. As an important component of my research program, I have been involved in the development of academic research into available technology in the market place. One aspect of this work is my involvement in the Internet Engineering Task Force (IETF). The IETF is a large and open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. I have been involved in various IETF groups including many content delivery-related working groups like the Audio Video Transport (AVT) group, the MBone Deployment (MBONED) group, Source Specific Multicast (SSM) group, the Inter-Domain Multicast Routing (IDMR) group, the Reliable Multicast Transport (RMT) group, the Protocol Independent Multicast (PIM) group, etc. I have also served as a member of the Multicast Directorate (MADDOGS), which oversaw the standardization of all

things related to multicast in the IETF. Finally, I was the Chair of the Internet2 Multicast Working Group for seven years.

29. I am an author or co-author of approximately 200 technical papers, published software systems, IETF Internet Drafts and IETF Request for Comments (RFCs). A complete list of my publications is in my CV (Ex. 2008).

30. I have been awarded numerous teaching awards, including Computer Science Outstanding Faculty Member (1997-98, 1998-99, 1999-2000, 2004-06, UCSB Spotlight on Excellence Award (2000-01), and UCSB Academic Senate Distinguished Teaching Award (2006-07).

B. Previous Expert Witness Testimony

31. The list of recent matters in which I have testified can be found at the end of Ex. 2008.

C. Preparation for this Declaration

32. In forming my opinions, I have considered the '320 patent specification, including the Abstract, the figures, and the claim language itself, as would have been understood by a person of ordinary skill in the art as of the priority date of the '320 patent (a "POSITA"). My understanding of "POSITA" and "priority date" are set forth below. I have also reviewed the Petition, the expert declaration of Dr. Pokharna, the references cited and relied on by the Petition and Dr. Pokharna, and any other material cited in this declaration.

33. In forming my opinions, I have relied on my personal knowledge and professional experience, and on the documents and information referenced in this declaration.

34. This declaration explains, based on facts and information available to me to date, the subject matter and opinions related to this Proceeding. As such, I am prepared to provide expert testimony regarding opinions formed resulting from my analysis of the issues considered in this declaration if asked about those issues by the Board or by the private parties' attorneys. If the Board institutes an IPR proceeding relating to the '320 patent, I reserve the right to submit an additional declaration providing further opinions, including in connection with claim limitations and dependent claims that I do not discuss in this declaration.

35. Additionally, I may discuss my own work, teachings, and knowledge of the state of the art in the relevant time period. I may rely on handbooks, textbooks, technical literature, and the like to demonstrate the state of the art in the relevant period and the evolution of relevant technologies.

36. Throughout this declaration, I refer to specific pages of the '320 patent and other documents. The citations are intended to be exemplary and are not intended to convey that the citations are the only source of evidence to support the propositions for which they are cited.

II. Legal Understanding

37. In this section, I describe my understanding of certain legal standards that I have relied upon in forming my opinions set forth in this declaration. I have been informed of these legal standards by Patent Owner's attorneys. I am not an attorney and I have not thoroughly researched the law on patent invalidity. I am relying only on instructions from Patent Owner's attorneys for these legal standards.

A. Claim Construction

38. I have been instructed by counsel that claim construction is a matter of law. I understand that in an *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claim in a civil action, namely according to their plain and ordinary meaning to a POSITA.

39. I understand that a patent may include two types of claims, independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend on an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to the limitations recited in the claim from which it depends.

B. Anticipation

40. I understand that a patent claim is anticipated when a single piece of prior art describes every element of the claimed invention, either expressly or

inherently, arranged in the same way as in the claim. For inherent anticipation to be found, it is required that the missing descriptive material is necessarily present in the prior art. I understand that, for the purpose of an *inter partes* review, prior art that anticipates a claim can include both patents and printed publications from anywhere in the world.

C. Obviousness

41. I understand that a patent claim is unpatentable and invalid if the subject matter of the claim as a whole would have been obvious to a POSITA as of the time of the invention at issue. My understanding of a POSITA is set forth below. I understand that the following factors must be evaluated to determine whether the claimed subject matter is obvious: (1) the scope and content of the prior art; (2) the difference or differences, if any, between each claim of the patent and the prior art; and (3) the level of ordinary skill in the art at the time the patent was filed. Unlike anticipation, which allows consideration of only one item of prior art, I understand that obviousness may be shown by considering more than one item of prior art.

42. I understand that to prove that multiple prior art references together render a patent obvious, it is necessary to: (1) identify the specific references that together make the patent obvious; (2) identify which of the asserted references discloses each of the elements of the patent claim, and where the reference discloses

that element; and (3) explain how the references would have been combined by a person of ordinary skill in the art to arrive at the claimed invention.

43. In addition, I understand that for establishing obviousness, it is not sufficient to show that each element of the claim appears in one of multiple prior art references. It is also necessary to show that a person of ordinary skill in the art would have been motivated to combine the references in a manner that arrives at the claimed invention, and would have has a reasonable expectation of success in combining the references in that manner. I understand that a prior art reference may teach away from a combination if a person of ordinary skill in the art, based on the teachings of the reference, would have been discouraged from pursuing a particular approach or technique, or would have been led in a different direction that that of the claimed invention.

44. Moreover, I have been informed and I understand that the so-called objective indicia of non-obviousness, also known as “secondary considerations,” are also to be considered when assessing obviousness. These include: (1) commercial success; (2) long-felt but unresolved needs; (3) copying of the invention by others in the field; (4) initial expressions of disbelief by experts in the field; (5) failure of others to solve the problem that the inventor solved; and (6) unexpected results. I also understand that evidence of objective indicia of non-obviousness must be commensurate in scope with the claimed subject matter.

III. The '320 patent

45. The '320 patent is titled "ICT equipment."

46. The '320 patent lists as its sole named inventor Kumiko Suzuki.

A. Priority Date

47. The '320 patent was filed as U.S. Patent Application No. 13/782,490 on March 1, 2013, and issued on May 16, 2017. It claims priority to a Japanese application No. 2012-046673, dated March 2, 2012.

48. I offer no opinion in this declaration as to whether the '320 patent is entitled to its foreign priority date. My opinions herein apply regardless of whether March 1, 2013 or March 2, 2012 are used as the priority date.

B. Specification

49. The '320 patent relates to "ICT (Information and Communication Technology) equipment such as a server" with cooling equipment, such as "a cooling fan, a control device thereof, a temperature controlling method thereof, and a program." Ex. 1001, 1:12-15. The claims of the '320 patent relate to an improvement in cooling systems for ICT equipment installed in a room "where outside air is taken in, which is used to cool the inside of ICT equipment," instead of a room equipped with air conditioning. *Id.*, 1:19-25. Because the temperature of the room may "var[y] wildly", the ICT equipment includes functionality to regulate its own internal temperature. *Id.*, 1:26-30.

50. According to the specification, prior art ICT equipment risked “damage or malfunction of electronic components” if “the intake air temperature drops sharply.” *Id.*, 1:62-66. Because the electronic components are cooled using the intake air, if the temperature drops sharply, “there is a possibility that condensation occurs on the inner wall of the casing of the hard disk drive, which may induce rust so that damage or malfunction of the hard disk drive may be caused.” *Id.*, 1:66-24.

51. To solve this problem, the claimed invention of the ’320 patent computes a “declination index value” that indicates “the degree of declination of a component temperature,” which is a value indicative of the amount that the temperature of a particular component has changed over time. *Id.*, 5:9-29. If the declination index value for any component is above a certain threshold (in other words, the temperature has changed by a sufficiently large amount), the cooling fans are slowed or stopped to avoid a sharp drop in temperature. *Id.*, 8:3-34.

C. Level of Ordinary Skill in the Art

52. I understand that a person of ordinary skill in the art (“POSITA”) is a hypothetical person who is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity—not an automaton. In deciding the level of ordinary skill, I understand that the following factors may be considered:

- The levels of education and experience of persons working in the field;

- The types of problems encountered in the field; and
- The sophistication of the technology.

53. I understand that asserted claims must be evaluated from the perspective of a POSITA. I understand that the relevant point in time for determining the qualifications of a person of ordinary skill in the state-of-the-art is the time of the alleged invention. As noted above, my opinions below are the same whether or not that point in time is considered to be March 1, 2013, the filing date of the application that issued as the '320 patent, or March 2, 2012, the date of the related Japanese patent application.

54. I understand that the Petitioner proposes to define a POSITA for the '320 patent as one who “would have had (i) an undergraduate degree (or equivalent) in mechanical engineering, electrical engineering, computer engineering, computer science, or a comparable subject and two to three years of work experience in the design and architecture of thermal management systems of electronic devices, or (ii) an advanced degree (or equivalent) in the same or comparable subjects and one year of post-graduate research or work experience in the design and architecture of thermal management systems of electronic devices.” Pet. 8.

55. For purposes of this declaration, I have used Petitioner’s definition of a POSITA. Under that definition, I qualify as a POSITA, both now and as of the earliest priority date of the '320 patent, *i.e.*, March 2, 2012. My opinions in this

declaration would be the same even if a slightly higher or lower level of ordinary skill were applied.

D. Claim Construction

56. I understand that the Petition has proposed different possible constructions for the claim terms “declination index value calculation unit” and “control unit” depending on whether or not the terms are construed as means-plus-function limitations. Pet. 9-11. My opinions below do not rely on these terms or their construction, and would not change regardless of which construction is used. For the purposes of this declaration I have not formed an opinion as to the constructions of these terms.

57. For the terms on which I opine in this declaration, I have applied the plain and ordinary meaning as understood by a POSITA in view of the intrinsic evidence.

IV. Summary of the Prior Art

A. Sato (Ex. 1005)

58. Sato is a U.S. patent application publication (US 2011/0176275) published on July 21, 2011.

59. Sato is directed to a “cooling controlling apparatus” for a “server installation” or other electronic devices “which cool a plurality of heat generating parts by using a cooling device.” Ex. 1005, [0002], [0012].

60. Sato's cooling system measures the intake air temperature and the temperatures of individual electronic components and provides more precise control over a cooling fan by gradually increasing or decreasing the fan rotation speed when the temperatures of the components go above or below certain thresholds. First, depending on the intake air temperature relative to several predetermined thresholds, the fan speed is set to one of several possible baseline rotation speeds. *Id.*, [0051]. When the intake air temperature is higher, the fan rotates faster, increasing the air speed to more effectively cool the electronic components. *Id.*, [0052].

61. Second, Sato measures the temperatures of different electronic components in the system and compares them to specific thresholds set for each component. *Id.*, [0055]. When the temperatures of the components cross set thresholds, Sato periodically increases or decreases the fan speed by a certain percentage (depending on what the temperatures are relative to the thresholds). *Id.*, [0057]-[0059]. As a result, Sato gradually adjusts the fan rotation speed to by increasing or decreasing it in response to the measured component temperature. Sato does not disclose any adjustment or control of the fan rotation speed based on temperature change over time.

B. Nakamura (Ex. 1007)

62. Nakamura is a Japanese patent (JP 4511444) published on July 28, 2010.

63. Nakamura discloses methods “for controlling personal computer cooling fan rotation,” such as in “notebook computers.” Ex. 1007, [0004]-[0005]. Nakamura explains that when cooling personal computers, “noise reduction has become an important issue” because in computer systems with “limited interior space,” “cooling fans require higher cooling capacity, resulting in higher rotational speeds and consequently louder operating sound.” *Id.*, [0004].

64. Nakamura tries to solve a noise-related problem that occurs when the internal enclosure of a personal computer system “approaches thermal equilibrium.” *Id.*, [0007]. At the outset, in Nakamura’s cooling system, when the internal temperature is below a certain threshold, Nakamura turns off the cooling fan. *Id.*, [0006]. At thermal equilibrium, however, “the heat generated in the interior of the enclosure becomes nearly equal to the amount of heat evacuated to the exterior,” so “the rate of temperature decrease stagnates.” *Id.* According to Nakamura, if the system approaches thermal equilibrium while the internal temperature is still above the lowest temperature threshold, the “cooling fan continues to rotate without stopping,” even “after [the user’s] work is finished,” causing an “unpleasant” “operating sound that accompanies the rotation of the cooling fan.” *Id.*, [0008].

65. Nakamura describes a method for solving this problem by “prevent[ing] situations where the electronic device cooling fan continues to rotate when the interior temperature of the enclosure has been decreased.” *Id.* Specifically,

Nakamura addresses this problem by detecting when “the rate of temperature decrease has stagnated before the interior temperature of the enclosure reaches the set temperature for transitioning from low speed rotation to stop, and can stop the rotation of the cooling fan.” *Id.*, [0009]. In other words, Nakamura looks for a low temperature change over time, and then turns the fan off to reduce noise.

V. Ground I: Sato and Nakamura Do Not Render Obvious the Challenged Claims

66. In my opinion, the Petition does not demonstrate that a POSITA would have been motivated to combine Sato and Nakamura in a way that renders obvious the claims of the '320 patent. For that reason, in my opinion, Sato and Nakamura do not render any claim obvious.

67. Specifically, according to the Petition and Dr. Pokharna, combining Sato and Nakamura renders obvious the limitations “calculat[ing] an index value indicating a degree of declination of [a] component temperature of [an] electronic component” and “control[ling] the number of rotations of [a] cooling fan based on the index value ... and the temperature of the intake air.” However, in my opinion, a POSITA would not be motivated to combine the references for three reasons. First, Sato and Nakamura are directed to different types of problems in different types of systems (in particular, servers vs. personal computers), and the teachings of Nakamura would not be beneficial in Sato’s system. Second, Nakamura is inconsistent with Sato’s teachings because Nakamura is willing to turn off the

cooling fans entirely, even at higher temperatures, in order to minimize noise and power consumption, while Sato's highest priority is guaranteeing system functionality, even if that means some excessive cooling. Third, the problem Nakamura tries to solve—of stagnating temperature declines—is not what that will occur in Sato's system, because Sato's adjusts the fan rotation speed based on intake air temperature, which avoids this problem. None of the reasons provided in the Petition would provide a motivation to combine in view of the above.

A. Sato and Nakamura Are Directed to Different Types of Computer Systems that Different Types of Cooling Systems

68. In my opinion, a POSITA would not combine Sato and Nakamura because they describe different types of cooling systems designed for different types of computer systems.

69. Nakamura describes an improvement to cooling systems in personal computers that solves a problem specific to personal computers. For example, Nakamura identifies a problem that arises from computer systems being “widely used in human living environments and office environments,” and particularly applies to “notebook computers” where “the limited interior space of the enclosure” requires fans with “higher rotational speeds and consequently louder operating sound.” Ex. 1007, [0004]. In these systems, “noise reduction has become an important issue” because it “caus[es] discomfort to humans.” *Id.*, [0004]-[0005]. Nakamura's goal is to prevent the cooling fan from continuing to operate and create

noise “even after [a user’s] work is finished,” for example, when the computer is in “a temporary standby state,” because “users find the operating sound that accompanies the rotation of the cooling fan unpleasant.” *Id.*, [0008].

70. Sato describes an improvement to a “cooling controlling apparatus” for a “server installation,” or other “types of electronic apparatuses which cool a plurality of heat generating parts.” Ex. 1005, [0002], [0012]. Sato points out that there are normally differences between cooling systems for personal computers and for servers, at least because servers (unlike personal computers) have “a lot of heat generating parts.” *Id.*, [0004]-[0005] (describing conventional cooling system for personal computers), [0006] (“In contrast, a server installation [is] an information apparatus in which a lot of heat generating parts are mounted on a circuit board...”), [0008]-[0009] (describing conventional cooling systems for servers). Specifically, in a cooling system for server, the cooling system must ensure “that a temperature of each heat generating part will not exceed a limit value,” which becomes more complicated to ensure as the number of heat generating parts increases. *Id.*, [0010].

71. In my opinion, a POSITA would not have combined Nakamura’s cooling system for personal computers with Sato’s cooling system for servers and other systems with many heat generating parts, and the Petition does not show otherwise. According to the Petition and Dr. Pokharna, a POSITA would combine the references because both Sato and Nakamura are “directed to techniques for

controlling the speed of cooling fans used to cool components in an electronic device.” Pet. 27. I disagree. The statement in the Petition (which is repeated by Dr. Pokharna) does not appreciate the differences between cooling personal computers and cooling servers and other systems with lots of heat generating parts, which Sato itself recognizes.

72. The Petition and Dr. Pokharna also argue that the fact that both Sato and Nakamura use similar types of components (such as temperature sensors and fans) provides a motivation to combine. Pet. 27. I disagree. As I explain above, Sato recognizes that the way in which those components are configured and used is different in a personal computer as opposed to a server. *See* Ex. 1005, [0004]-[0010]. As I explain in the following sections, Sato and Nakamura also have different and inconsistent goals and priorities, which would discourage a POSITA from combining the references.

73. The Petition and Dr. Pokharna claim that “Nakamura’s reference to a notebook computer would not have dissuaded a POSITA from implementing Nakamura’s cooling program in Sato’s server” because Nakamura “does not limit the invention to notebook computers.” Pet. 28-29 n.7. I disagree. Nakamura states that its cooling system *can* be used in other types of electronic devices, but that does not mean a POSITA would be *motivated* to use Nakamura’s cooling techniques in a server system, specifically, because Sato clearly teaches that there are differences

between cooling for personal computers and cooling for servers. *See* Ex. 1005, [0004]-[0010].

74. Dr. Pokharna opines that Sato also encompasses personal computers because its teachings apply to “various types of electronic apparatuses which cool a plurality of heat generating parts by using a cooling device.” Ex. 1003, ¶140 (quoting Ex. 1005, [0012]). I disagree. As I explain above, Sato distinguishes between a personal computer and a server for precisely this reason: the server (and not the personal computer) has “a lot of heat generating parts [] mounted on a circuit board in high density.” Ex. 1005, [0006]. As a result, a POSITA would not interpret Sato’s reference to “various types of electronic apparatuses which cool a plurality of heat generating parts” (*id.*, [0012]) to mean that Sato’s teachings are intended for personal computers. Instead, a POSITA would understand that Sato’s system is *not* designed for personal computers.

B. Sato’s and Nakamura’s Inconsistent Priorities Render Their Systems Incompatible

75. In my opinion, a POSITA would be discouraged from combining Sato and Nakamura because they have inconsistent goals and priorities, and teach incompatible system configurations as a result.

76. As I explain above, Nakamura’s primary focus is minimizing noise that may be unpleasant to users of personal computers. Ex. 1007, [0004]-[0005], [0008]. Because noise reduction is the priority, Nakamura is willing to turn off the cooling

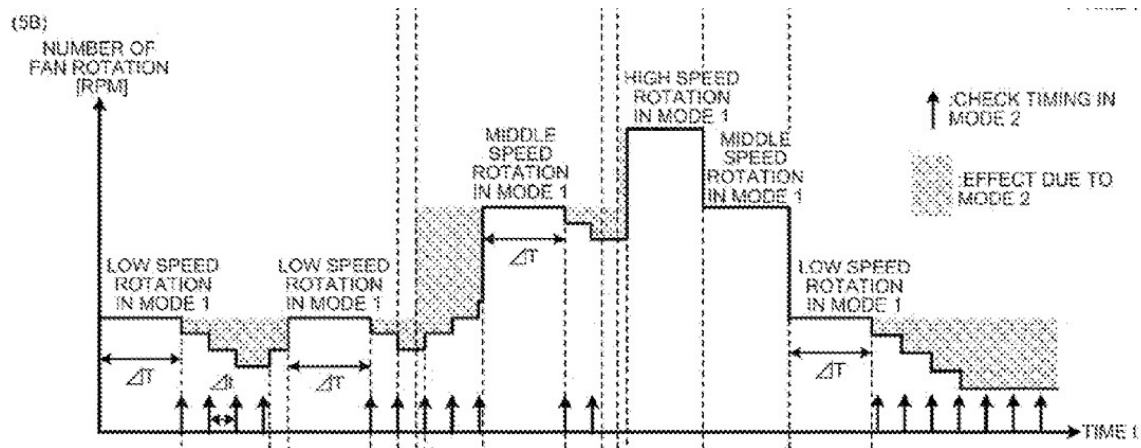
fan to avoid “user discomfort” even when the system temperature is above the lowest temperature threshold. *See id.*, [0008]-[0009], [0017] (“[T]he present invention makes it possible to provide a cooling system that can detect a state where the rate of temperature decrease has stagnated before the interior temperature of the enclosure reaches the set temperature value for transitioning from low speed rotation to stop, and can stop the rotation of the cooling fan....”).

77. Sato also seeks to reduce noise and power consumption, but not at the risk of system failure. As a result, Sato prioritizes cooling (even excessive cooling) over minimizing noise and power consumption. For example, when adjusting the fan rotation speed based on the measured temperatures of electronic components, Sato recommends that above the applicable threshold, the fan rotation speed is increased at a higher rate than the speed would be decreased below the threshold. Ex. 1005, [0058]-[0060] (disclosing “decreas[ing] the number of rotation of the cooling fans ... by α ” at low temperatures and “increase[ing] the number of rotation of the cooling fans ... by β ” at high temperatures, where “ $\alpha < \beta$ ”). This is because “an increase in temperature ... directly leads to a stop of the electronic apparatus,” so it is more important “that an electronic part can be cooled at high speed.” *Id.*, [0060]. By contrast, “[a]n excessive cooling of an electronic part, though having a problem in noise and excessive electric power consumption associated with the rotation of the cooling device, does not cause a stop of the electronic apparatus.” *Id.*

A POSITA would thus understand that Sato is willing to tolerate excessive cooling in certain circumstances “so that a continuity of the operation of the electronic apparatus [] can further be enhanced.” *Id.*

78. The different configurations of Sato’s and Nakamura’s cooling systems reflect these inconsistent design goals. For example, in Nakamura, the system is configured to stop the fan entirely when the internal temperature falls below a set threshold. Ex. 1007, [0031] (describing “set temperature value Tb3 for transitioning from low speed rotation to stop”). Nakamura then expands this functionality to stop the fan even when the lowest threshold is not reached, when the “rate of temperature decrease [] becomes more gradual” and the “interior temperature ... stagnates at a temperature value slightly above Tb3,” so that the fan noise is reduced whenever possible. *Id.*, [0032].

79. In Sato, there is no setting where the fan is stopped while the system is operational. Instead, depending on the measured intake air temperature, Sato’s fan operates at a predetermined speed, such as low speed, middle speed, or high speed. *See, e.g.*, Ex. 1005, [0051], Fig. 5A-5C. By measuring component temperatures, Sato can adjust the speed in small increments, as shown in Figure 5B (below), but the fan speed never reduces to 0 (a full stop). *Id.*, [0054], Fig. 5B. In fact, in one embodiment, Sato adds a minimum rotation speed “so as not to fall below minimum number of cooling fan rotation[s].” *Id.*, [0117].



80. The Petition and Dr. Pokharna argue that Nakamura's temperature control scheme "would have furthered Sato's goal of reducing excess fan operation." Pet. 29. The Petition and Dr. Pokharna also argue that a POSITA would be motivated to "[m]odify Sato to stop the fan when appropriate, as taught by Nakamura." *Id.* And specifically, in arguing that the claims are rendered obvious, the Petition and Dr. Pokharna rely not only on adding a "stop" setting to Sato's cooling system, but also on enabling the system to stop the fan "even though the internal component temperature is above the lowest threshold." Pet. 29-30. I disagree that a POSITA would be motivated to modify Sato in this way. Sato would have discouraged these modifications because it cautions *against* stopping the fan—both because it teaches setting a minimum fan speed that cannot be reduced further, *see* EX1005, [0117], and because it teaches that avoiding "a stop of the electronic apparatus" is the highest priority even if that results in "excessive cooling" that increases "noise and [] electric power consumption," *id.*, [0060]. In view of these

teachings, a POSITA would be discouraged from modifying Sato to not only stop its fan, but to do so when the temperature is not even at the lowest threshold, because these modifications run contrary to Sato's teachings.

81. Instead of stopping the fan entirely, Sato uses a different approach to reduce noise and power consumption without risking system failure. Specifically, when component temperatures are *above* the lowest threshold, but below the higher temperature thresholds, Sato's system periodically reduces the fan speed by a predetermined percentage, down to a non-zero value. *See* Ex. 1005, [0058], [0080], [0099], [0117], Fig. 4B (illustrating algorithm where the fan rotation speed is decreased when component temperatures are all "equal to or less than threshold value 2"), 6 (illustrating algorithm that sets a minimum fan speed below which the speed is not reduced), 5B-5C (illustrating fan speed over time and showing the fan speed reduced periodically when the component temperature is between the first and second thresholds). A POSITA would have understood that Sato's approach allows the fan speed to be "controlled carefully *without reducing the cooling efficiency*," while still "avoid[ing]" "a noise of a fan rotation of a cooling device and an excessive electric power consumption caused by an excessive cooling," which is important for servers. *Id.*, [0064]. A POSITA would have been discouraged from modifying Sato to stop the fan entirely, particularly when the temperature is not even below the

lowest threshold, because that would undermine Sato's goal of not reducing cooling efficiency.

C. Nakamura Is Directed To a Problem That Does Not Affect Sato's Cooling System

82. In my opinion, a POSITA would also be discouraged from combining Sato and Nakamura, and specifically discouraged from adding Nakamura's "stagnant" temperature detection to Sato's cooling system, because the problem Nakamura is trying to solve is not a problem that Sato's cooling system will encounter.

83. Nakamura's improvement is intended to solve a problem that arises when "the interior of the enclosure ... approaches thermal equilibrium" because "the amount of heat generated in the interior of the enclosure becomes nearly equal to the amount of heat evacuated to the exterior." Ex. 1007, [0007]. In Nakamura's system, this problem arises because the system relies *only* on temperature measurements of the interior of the enclosure to control the fan speed. *Id.*, [0006], [0031]. As Nakamura recognizes, the temperature where thermal equilibrium will be reached will "var[y] depending on individual differences among computers related to heat generation and cooling, differences in usage environment, and the like." *Id.*, [0007]. Nakamura has no way to detect and account for these differences (for example, by modifying the fan speed depending on the intake air temperature). As a result, the system may approach thermal equilibrium at a temperature that is above the

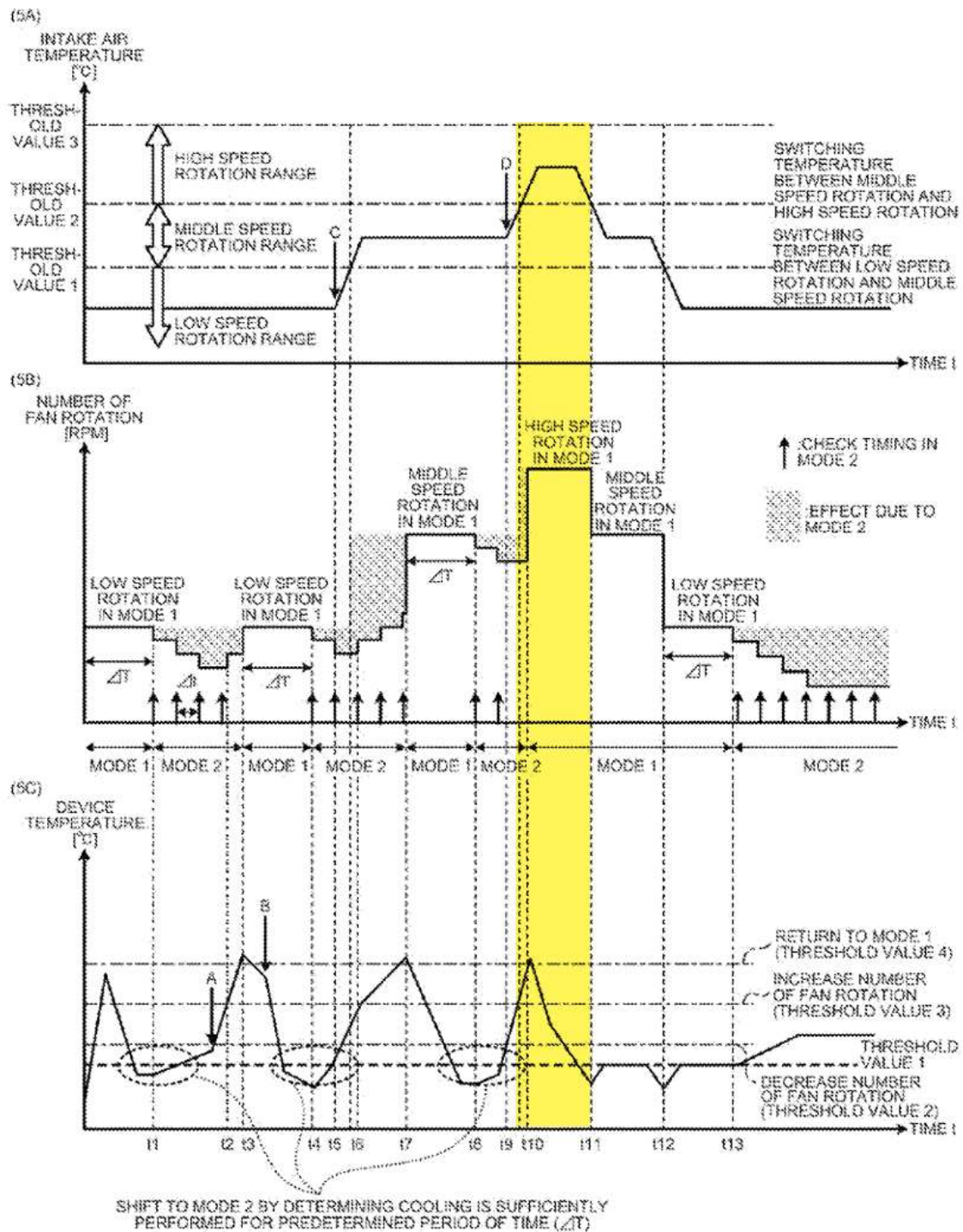
threshold where the fan would stop, and stagnate at that temperature so that the temperature never falls below the lowest threshold (and the fan is never stopped).

Id.

84. In Sato's cooling system, however, the system does not only measure the temperature of individual components; it also measures the intake air temperature. Ex. 1005, [0013]. As a result, Sato *can* adjust the fan speed in response to environmental factors, and Sato does in fact disclose controlling the fan speed based on the intake air temperature. *Id.*, [0050]-[0051]. Because the intake air temperature is used to set an initial speed for the fan (low, middle or high speed), Sato can effectively cool the electronic components even at higher intake air temperatures. *Id.*, [0052] (“[A] higher intake air temperature of the cooling air reduces a cooling efficiency of electronic parts However, the reduction of the cooling efficiency of the electronic parts can be suppressed by ... increasing the speed of the cooling air when the intake air temperature of the cooling air is high.”).

85. A POSITA would have understood that this allows Sato's system to avoid the “stagnant” temperature problem that Nakamura's system encounters, where the temperature never falls below the lowest set threshold, even when the system is idle and not generating heat. Specifically, the intake air temperature measurement would ensure that at higher intake air temperatures, the fan speed is set to a higher starting speed, which allows it to still effectively cool the system.

This can be seen in Figures 5A-5C of Sato (annotated below). In these figures, when the intake air temperature approaches “threshold value 3,” the system switches to “high speed rotation mode” and cools the component temperatures to below the lowest threshold value. Ex. 1005, Fig 5A-5C.



86. Because Sato's system will not "stagnate" at temperatures above the lowest threshold, there is no benefit to adding to Sato's cooling system Nakamura's

measurement of the rate of temperature decrease for detecting and avoiding temperature stagnation.

D. General Knowledge of Electronic Component Failures Would Not Motivate a POSITA to Combine Sato and Nakamura

87. The Petition and Dr. Pokharna also argue that a POSITA would be motivated to combine Sato and Nakamura because “a POSITA would have recognized other benefits from determining the rate of temperature decline ... such as detecting and mitigating condensation in the device enclosure.” Pet. 30 n.8. I disagree.

88. In support of this argument, the Petition and Dr. Pokharna cite to a textbook that generally discusses “environmental stresses causing electronic component and system failures,” and lists any number of “failure mechanisms,” including “Corrosion,” “Distortion,” “Fatigue and fracture,” and “Wear.” Ex. 1011, 21. Within this textbook, among a discussion of numerous factors that may negatively impact electronic devices generally (and not servers or computers specifically), and specifically as part of a discussion of humidity and moisture, the textbook notes in passing that “[r]apid cooling of equipment can cause condensation.” *Id.* In my opinion, that general statement about electronics generally would not be sufficient to lead a POSITA to the claimed invention of the ’320 patent except through hindsight application of the teachings of the patent itself. This is in part because neither Sato nor Nakamura even suggests solving a problem associated with

rapid cooling, or looking for high changes in temperature over time. Nakamura is concerned with the opposite problem: detecting *stagnating* temperature change by detecting very small changes in temperature over time.

VI. Conclusion

89. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

* * *

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on the information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Respectfully submitted,



Kevin C. Almeroth, Ph.D.

Date: October 21, 2025