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. IPR2025-01286
U.S. Patent No. 9,482,632

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

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LIST OF EXHIBITS

Exhibit	Description
Ex. 2001	U.S. Pat. App. Pub. No. 2009/0323277
Ex. 2002	U.S. Pat. App. Pub. No. 2002/0135496
Ex. 2003	Dkt. 94 (Second Amended Scheduling Order)
Ex. 2004	Docket Navigator Statistics
Ex. 2005	U.S. Court’s median time-to-trial statistics for the Eastern District of Texas
Ex. 2006	Dkt. 119 (Order Setting Markman Hearing)
Ex. 2007	Hira Invalidity Claim Chart for the ’632 Patent (B2)
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Ex. 2009	Declaration of Dr. Kevin Almeroth
Ex. 2010	*Curriculum Vitae* 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. 9,482,632 (the "'632 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. 2010 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. 2010).

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. 2010).

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. 2010).

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. 2010.

C. Preparation for this Declaration

32. In forming my opinions, I have considered the ’632 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 ’632 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 '632 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 '632 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 ’632 patent

45. The ’632 patent is titled “Abnormality detection device.”

46. The ’632 patent lists as its sole named inventor Jun Yokoyama.

A. Priority Date

47. The ’632 patent was filed as U.S. Patent Application No. 14/018,152 on September 4, 2013, and issued on November 1, 2016. It claims priority to a Japanese application No. 2012-194793, dated September 5, 2012.

48. I offer no opinion in this declaration as to whether the ’632 patent is entitled to its foreign priority date. My opinions herein apply regardless of whether September 4, 2013 or September 5, 2012 are used as the priority date.

B. Specification

49. The ’632 Patent relates to “an abnormality detection device that detects an abnormality of a cooling function of ICT (Information and Communication Technology) equipment such as a server.” Ex. 1001, 1:12-15. The specification provides examples where a dust filter is clogged and “the quantity of intake air decreases” or a cooling fan is down, which lead to a scenario where “the inside of the case cannot be cooled down.” *Id.*, 1:28-31.

50. The claims of the ’632 Patent recite systems and methods that detect these abnormalities by “estimat[ing] an upper limit of possible temperatures in a predetermined position of ICT equipment when a quantity of intake air into the ICT

equipment is appropriate." Ex. 1001, Claim 1. The "upper limit" is based on the "operational status of the ICT equipment" and "an intake air temperature." *Id.* In the claims, an abnormality is determined when the "detected equipment temperature in the predetermined position" exceeds the "upper limit." *Id.* The "operational status" of the ICT equipment and the "intake air temperature" are also used to "determine[] a rotation speed of the cooling fan." *Id.*

51. In the embodiments described in the specification, the system stores information about a "range of intake-air temperatures" and a "range of CPU temperatures" associated with a "load on the CPU." Ex. 1001, 3:62-66. The system may also store information about the exhaust-air temperature. *Id.*, 3:66-4:21. Figure 3 (below) shows an example of the stored information. *Id.*, Fig. 3. In Figure 3, each row corresponds to a combination of different intake-air temperatures, CPU loads, fan rotation numbers, and corresponding exhauster-air temperature ranges and CPU temperature ranges. For example, when the intake air temperature Ta is within a predetermined the Ta1 and Ta2, and the CPU load L is within a predetermined range L1 and L2, then the allowable CPU temperature range is set to the range between Tc1 and Tc2. *Id.*, 3:62-4:16.

FIG. 3

165 FAN-ROTATION-NUMBER AND TEMPERATURE-RANGE STORING PART

INTAKE-AIR TEMPERATURE	CPU LOAD	FAN ROTATION NUMBER	EXHAUST-AIR TEMPERATURE RANGE	CPU TEMPERATURE RANGE
Ta1≦Ta<Ta2	L1≦L<L2	R1	Tb1≦Tb<Tb2	Tc1≦Tc<Tc2
Ta1≦Ta<Ta2	L2≦L<L3	R2	Tb2≦Tb<Tb3	Tc2≦Tc<Tc3
⋮	⋮	⋮	⋮	⋮
Ta1≦Ta<Ta2	L10≦L<L11	R10	Tb10≦Tb<Tb11	Tc10≦Tc<Tc11
Ta2≦Ta<Ta3	L1≦L<L2	R1'	Tb1'≦Tb<Tb2'	Tc1'≦Tc<Tc2'
Ta2≦Ta<Ta3	L2≦L<L3	R2'	Tb2'≦Tb<Tb3'	Tc2'≦Tc<Tc3'
⋮	⋮	⋮	⋮	⋮
Ta2≦Ta<Ta3	L10≦L<L11	R10'	Tb10'≦Tb<Tb11'	Tc10'≦Tc<Tc11'
⋮	⋮	⋮	⋮	⋮

52. Using this information, the system can associate upper and lower limits of acceptable CPU temperatures with different combinations of intake-air temperatures, CPU loads, and fan rotation numbers. Ex. 1001, 4:6-16. TO determine the CPU temperature ranges for each combination of intake-air temperature, CPU load, and fan rotation number, the CPU temperature ranges are "actually measured when the ICT equipment 1 is normally operating (when an abnormality like clogging of the filter is not occurring)." *Id.*, 4:17-21. These temperatures correspond to the ICT equipment in a predetermined position, when the quantity of air intake is appropriate (because the filter is not clogged).

53. After these measurements are made, abnormalities are detected by estimating an upper limit of the CPU temperature based on the detected intake-air temperature and the operational status (that is, the CPU load). Ex. 1001, 5:40-51, 7:38-45. For example, the upper limit of the temperature may be the maximum value of the stored CPU temperature range for the detected combination of intake-air temperature and CPU load. *Id.*, 5:7-13. An abnormality is detected when the detected CPU temperature "is beyond the upper limit of the CPU temperature range." *Id.*, 6:9-14; *see also id.*, 7:45-49.

C. Level of Ordinary Skill in the Art

54. 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.

55. 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 September 4, 2013, the filing date of the application that issued as the ’632 patent, or September 5, 2012, the date of the related Japanese patent application.

56. I understand that the Petitioner proposes to define a POSITA for the ’632 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 would have had 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 mechanical engineering, electrical engineering, computer engineering, computer science, or a comparable subject and would have had one year of post-graduate research or work experience in the design and architecture of thermal management systems of electronic devices.” Pet. 9.

57. 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 ’632 patent, *i.e.*, September 5, 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

58. I understand that the Petition has proposed different possible constructions for the claim terms "estimating unit," "operational status detecting unit," "determining unit," and "fan controlling unit," depending on whether or not the terms are construed as means-plus-function limitations. Pet. 12-15. The Petition also proposes a construction for dependent claim 2. Pet. 10-12. 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.

59. 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.

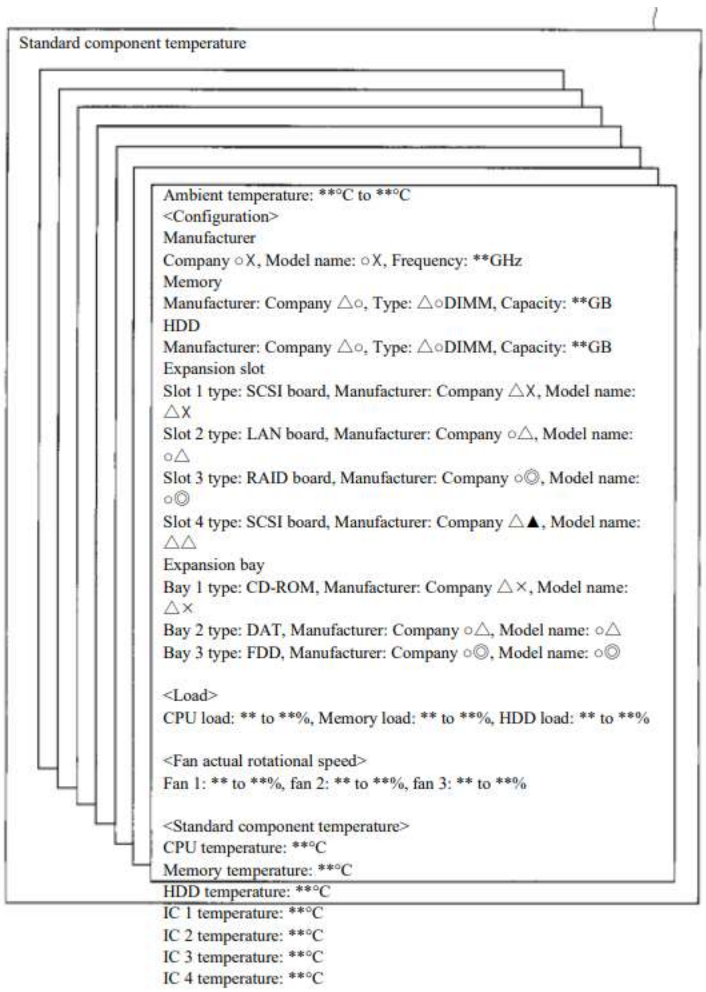
IV. Summary of the Prior Art

A. Hira (Ex. 1005)

60. Hira is a Japanese unexamined patent application publication (No. 2009-277053) filed on May 15, 2008.

61. Hira is directed to a "dust filter clogging status detection device." Ex. 1005, Abstract. To detect the dust filter clogging status, Hira stores "standard component temperatures" for different combinations of ambient temperature, hardware configuration, load, and fan speed. *Id.*, [0017]. Figure 3 of Hira (below)

shows how these combinations of parameters are stored in Hira's system. For example, for a particular range of ambient temperatures, ("**°C to **°C"), a particular hardware configuration (*i.e.*, CPU model and frequency, memory types and capacity, etc.), a particular range of operating parameters (*e.g.*, "CPU load: ** to **%"), and a particular range of fan rotation speeds (*e.g.*, "Fan 1: ** to **%"), Hira stores the standard component temperature for each component (*e.g.*, "CPU temperature: **°C). Ex. 1005, Fig. 3:



62. To determine the filter clogging status, Hira takes the standard component temperature associated with the applicable ambient temperature, hardware configuration, load, and fan speed, and sets that standard component temperature as a threshold value. Ex. 1005, [0025] ("The component temperature threshold value … is obtained by extracting component temperatures applicable to the current system status from standard component temperature 15, …. The standard component temperature information within the component temperature threshold value 19 becomes the component temperature threshold value used when detecting dust filter clogging status."), Fig. 4. The ratio of the actual component temperature to the component temperature threshold value (which is just the applicable standard component temperature for the current system status) is then calculated and used to determine the extent to which the dust filter is clogged. *Id.*, [0026]-[0027]; *see also id.*, Fig. 6.

B. Shiga (Ex. 1007)

63. Shiga is an international patent application (WO 2010/050080) published on May 6, 2010.

64. Shiga relates to "[c]ooling control for reducing the overall power consumption of a system." Ex. 1007, Abstract. In particular, the rotational speed of the fan is set based in part on "the estimated temperature of the processor" and "utilization rate of the processor." *Id.*

V. Ground I: Hira and Shiga Do Not Render Obvious the Challenged Claims

A. The Petition Does Not Show that Hira Discloses or Renders Obvious "in a Predetermined Position of the ICT Equipment" (All Claims)

65. In my opinion, the Petition does not show that Hira discloses or renders obvious "in a predetermined position of the ICT equipment."

66. The limitation "in a predetermined position of [the] ICT equipment" appears in independent claims 1, 8, and 9 of the '632 patent, each of which requires estimating an upper limit of possible temperatures in the "predetermined position" and detecting a temperature in the "predetermined position." The Petition only cites to Hira for this limitation.

67. Based on my review of the Petition, it does not identify what, in Hira, corresponds to the claimed "predetermined position of the ICT equipment." The Petition states that Hira's "component temperature threshold value 19," which is selected from among the multiple "standard component temperature[s] 15" stored by Hira's system, corresponds to the full claim limitation, *i.e.*, an "upper limit of possible temperatures in a predetermined position of ICT equipment when a quantity of intake air into the ICT equipment is appropriate." Pet. 34-35. But the "component temperature threshold value 19" does not store information about the "position" of ICT equipment, and the Petition does not explain how or why a POSITA would

understand any of the information included in "component temperature threshold value 19" to convey information about a "position."

68. Hira discloses that the "component temperature threshold value 19" is the "standard component temperature 15" that is "applicable to the current system status." Ex. 1005, [0025]. That information includes "ambient temperature, configuration, load, actual fan rotational speed, and standard component temperature." *Id.*; *see also id.*, Fig. 4 (which includes all of the above fields as part of the component temperature threshold value 19). But the Petition does not explain how or why any of these parameters is a position of the ICT equipment. In fact, the Petition maps each of these parameters items to different limitations that appear in the claims. *See* Pet. 34 (mapping the "standard component temperature" to "upper limit of possible temperatures"), 36 (mapping the "actual fan rotational speed," "hardware configuration," and "load" to "operational status of the ICT equipment"), 37 (mapping the "ambient temperature" to "intake air temperature"). Thus, I understand that the Petition does not contend that any of the parameters stored in the component temperature threshold value are a "predetermined position of the ICT equipment." And these parameters are all of the information stored in component temperature threshold value 19—there is no other information that the Petition could conceivably be relying on as claimed "predetermined position of the ICT equipment."

69. The Petition does argue that the component temperature threshold values are for "a particular system location (e.g. ambient air temperature)." Pet. 34. In my opinion, however, there is no disclosure in Hira that supports this statement, and the Petition does not point to any such statement. The Petition cites to paragraphs 25, 31, and 36 of Hira in connection with this argument, but each of these paragraphs discloses the same parameters that I discussed above, *i.e.*, ambient temperature, configuration, load, actual fan rotational speed, standard component temperature, and other temperature information. None of these reference a position, and the Petition does not explain how or why any of these would be considered a "predetermined position" or "location."

70. For example, Paragraph 25 of Hira states that "[t]he component temperature threshold value 19 … is composed of ambient temperature, configuration, load, actual fan rotational speed, and standard component temperature." Ex. 1005, [0025]. Paragraph 31 states that the "component threshold value generating unit" acquires "system information 8," "temperature sensor information 12," and "standard component temperature 15," which correspond to the same information. *Id.*, [0031]. The "system information" is just the "actual fan rotational speed 9, hardware configuration 10, load 11," and the "temperature sensor information 12" is just the "ambient temperature 13" and "component temperature 14," so these represent the same information as I discuss above. *Id.*, [0015] And

paragraph 36 describes calculating the component temperature threshold values from "ambient temperature 13, actual fan rotational speed 9, hardware configuration 10, and load 11." *Id.*, [0036].

71. It is not clear if Petitioners are claiming that the "ambient air temperature" is a "location," since they refer to "a particular system location (e.g. ambient air temperature)." Pet. 34. If that is the case, the Petition does not explain how or why an ambient temperature identifies a "location," and ambient air temperature does not necessarily indicate a specific location of ICT equipment. And as I note above, the Petition already maps the ambient air temperature to the claimed "intake air temperature," not the claimed "predetermined position." Pet. 37.

72. The Petition also states that "standard component temperature thresholds" are determined "under various different, normal operating conditions (*a predetermined position of ICT equipment when a quantity of intake air into the ICT equipment is appropriate*)." Pet. 34. The Petition makes a similar argument in a footnote, asserting that "the threshold values" correspond to "a given environment and configuration" (Pet. 35 n.9 (emphasis added)). The Petition does not cite to anything in Hira that makes these representations, and based on my review of Hira, I do not see any such statement. To the contrary, Hira teaches that the standard component temperature values are associated with predetermined "combinations of

ambient temperature, configuration, load, and fan rotational speed." Ex. 1005, [0024]. There is no mention of "position."

73. Dr. Pokharna repeats these arguments in the Petition without offering any additional analysis, reasoning, or supporting disclosures in Hira. *See* Ex. 1003, ¶¶119-129.

74. In my opinion, the Petition does not identify any disclosure of "predetermined position of ICT equipment" in Hira. The Petition does not rely on Shiga for this limitation. Thus, it is my opinion that the Petition has not shown that the prior art discloses or renders this limitation obvious.

B. The Petition Does Not Show that Hira Discloses or Renders Obvious "When a Quantity of Intake Air into the ICT Equipment Is Appropriate" (All Claims)

75. In my opinion, the Petition does not show that Hira discloses or renders obvious "when a quantity of intake air into the ICT equipment is appropriate."

76. The limitation "when a quantity of intake air into the ICT equipment is appropriate" appears in independent claims 1, 8, and 9 of the '632 patent, each of which requires estimating an upper limit of possible temperatures "when a quantity of intake air into the ICT equipment is appropriate." The Petition only cites to Hira for this limitation.

77. Based on my review of the Petition, it does not identify what, in Hira, corresponds to the claimed "when a quantity of intake air into the ICT equipment is

appropriate." The Petition cites to the same disclosures in Hira as it does for the "predetermined position" limitation, namely, Hira's "standard component temperature 15" and "component temperature threshold value 19," but does not explain how these elements in Hira correspond to a "quantity of intake air." Pet. 30-33.

78. In my opinion, Hira does not disclose any details regarding how the information included in the standard component temperature and component temperature threshold value is measured or obtained, or any other information that might suggest that the estimated temperature is determined for an "appropriate" "quantity of intake air into the ICT equipment" as required by the claim. Hira states that the standard component temperature information is determined for different "combinations of system information," Ex. 1005, [0013], and that it is "prepared during the design/development phase," *id.*, [0024]. But the "system information" is just "actual fan rotational speed 9, hardware configuration 10, load 11," and so these statements do not refer to a quantity of intake air. *Id.*, [0015]. Hira's component temperature threshold values 19 are determined from the standard component temperatures 15, so they would not include any additional information that could corresponding to a quantity of intake air. *Id.*, [0025].

79. The Petition also states that Hira's component temperature threshold values are determined under "normal operating conditions" and "with an operational

fan and a filter that is not clogged." Pet. 34-35 & n.9. The Petition claims that this refers to an "appropriate" "quantity of intake air." *Id.* But the Petition does not cite to Hira at all in connection with this statement, and Dr. Pokharna repeats these statements from the Petition without further reasoning or analysis, and without citing to any support in Hira itself. *Id.*; Ex. 1003, ¶¶127-128. Based on my review of Hira, there is no corresponding disclosure; Hira is silent on ***how*** the component temperatures are determined; it only states ***when*** they are determined, *i.e.*, "during the design/development phase," *id.*, [0024].

80. Dr. Pokharna repeats these arguments in the Petition without offering any additional analysis, reasoning, or supporting disclosures in Hira. *See* Ex. 1003, ¶¶119-129.

81. In my opinion, the Petition does not identify any disclosure of "when a quantity of intake air into the ICT equipment is appropriate" in Hira. The Petition does not rely on Shiga for this limitation. Thus, it is my opinion that the Petition has not shown that the prior art discloses or renders this limitation obvious.

C. The Petition Does Not Show that Hira Discloses or Renders Obvious an "Upper Limit of Possible Temperatures" (All Claims)

82. In my opinion, the Petition does not show that Hira discloses or renders obvious an "upper limit of possible temperatures."

83. The limitation an "upper limit of possible temperatures" appears in independent claims 1, 8, and 9 of the '632 patent, each of which requires estimating

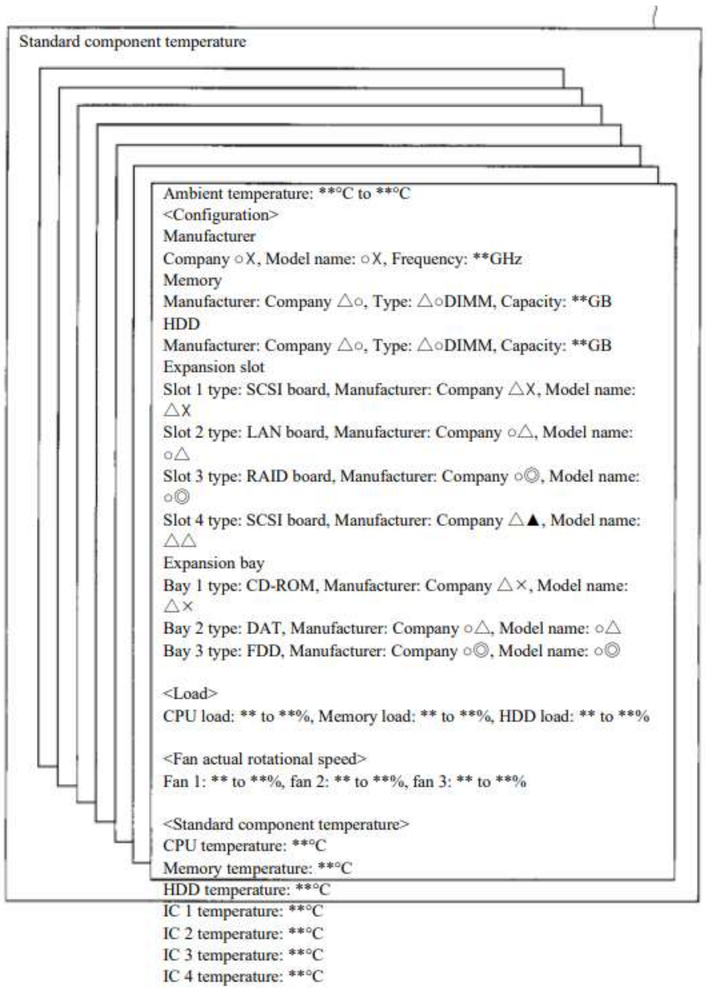
the "upper limit of possible temperatures." The Petition only cites to Hira for this limitation.

84. The Petition argues that Hira's component temperature threshold value 19—and, specifically, the standard component temperature information that is used as the component temperature threshold value—is the claimed "upper limit of possible temperatures." Pet. 34 ("[T]he standard component temperature values are the expected component temperature thresholds (*upper limit of possible temperatures*)….."), 36 ("Hira … generates component temperature threshold value 19 (*upper limit of possible temperatures*)….."). I disagree. In my opinion, a POSITA would understand that Hira's component temperature threshold value and standard component temperature information are not an ***upper limit*** of possible temperatures.

85. Hira's component temperature threshold value is "obtained by extracting component temperatures applicable to the current system status from standard component temperature 15," meaning that "[t]he standard component temperature information within the component temperature threshold value 19 becomes the component temperature threshold value used when detecting dust filter clogging status." Ex. 1005, [0025]. But according to Hira, both the standard component temperature and the component temperature threshold value (which is set to the applicable standard component temperature) are not any kind of limit—they just reflect the ***standard*** temperature of the component (hence the reference to

standard component temperature information). And specifically, in the context of Hira's disclosure, because the component temperature is described as "standard," and it is only defined as a single value, a POSITA would understand that it does not represent an upper limit.

86. This is clear from Figure 3 of Hira. For example, while Hira reports a range of values for certain parameters, such as ambient temperature (reported as "**°C to **°C") and CPU, memory, or HDD load (reported as "** to **%"), there is only one value provided for the standard component temperature (*e.g.*, "CPU temperature: **°C). Ex. 1005, Fig. 3. And because this value is the ***standard*** temperature, and not a temperature ***limit*** (*e.g.*, an upper limit, a maximum, etc.), a POSITA would understand that it does not represent an upper limit of possible temperatures. Hira does not disclose any component temperature value that corresponds to a ***limit***, nor does it disclose a range of component temperatures from which an upper limit could be determined.



87. The same is true for Hira's component temperature threshold value. It is just set to the standard component temperature for the applicable ambient temperature and system information. *Id.*, [0025]. And as I discuss in subsection D below, it is not used as a limit—instead, the threshold is used to calculate a ratio, and that ratio is then compared to predetermined percentages to determine the extent to which a dust filter was closed. *Id.*, [0026]-[0027]. Thus, the component temperature threshold value does not represent an upper limit of possible temperatures.

88. The Petition argues that Hira's "standard component temperature values are the expected component temperature thresholds." Pet. 34. Dr. Pokharna repeats the same statement without any additional reasoning, analysis, or supporting cites to Hira. *See* Ex. 1003, ¶¶127-128. To the extent the Petition and Dr. Pokharna are claiming that a standard component temperature is an expected upper limit of possible temperatures, I disagree. No such statement appears in Hira; the word "expected" does not even appear in Hira.

89. A POSITA would not understand Hira's "standard component temperature value" to be an upper limit. To a POSITA, the term "standard" would convey a typical or normal temperature, not a limit. The Petition and Dr. Pokharna do not offer any reason why a POSITA would understand this term differently in the context of Hira. Even if a POSITA understood Hira's "standard" component temperature to refer to an "expected" component temperature, this would still not communicate an "upper limit." Like the term "standard," "expected," without more, would suggest the typical or normal temperature, not a limit.

90. Dr. Pokharna repeats these arguments in the Petition without offering any additional analysis, reasoning, or supporting disclosures in Hira. *See* Ex. 1003, ¶¶119-129.

91. In my opinion, Hira does not disclose an "upper limit of possible temperatures." The Petition does not rely on Shiga for this limitation. Thus, it is

my opinion that the Petition has not shown that the prior art discloses or renders this limitation obvious.

D. The Petition Does Not Show that Hira Discloses or Renders Obvious an "Beyond the Upper Limit" (All Claims)

92. In my opinion, the Petition does not show that Hira discloses or renders obvious an "beyond the upper limit."

93. The limitation "beyond the upper limit" appears in independent claims 1, 8, and 9 of the '632 patent, each of which requires determining an abnormality when a detected temperature is "beyond the upper limit." The Petition only cites to Hira for this limitation.

94. As I explain above for the limitation "upper limit of possible temperatures," Hira does not disclose or render obvious an upper limit of possible temperatures, so for the same reasons it cannot disclose or render obvious determining an abnormality based on a temperature that is "beyond the upper limit."

95. However, even if Hira's component temperature threshold value were treated as the claimed "upper limit of possible temperatures," as the Petition proposes (and with which I disagree), in my opinion, Hira still would not disclose or render obvious that an abnormality is determined when a detected component temperature is beyond the component temperature threshold value.

96. In Hira, the component temperature threshold value is not itself used as the test for abnormal operation—Hira does not just check if the threshold value is

exceeded in order to determine whether there is an abnormality. Instead, Hira calculates a ratio of "actual component temperature to component temperature threshold value," and the ratio (not the threshold value) is used to determine the clogging status of a dust filter. Ex. 1005, [0026]. Hira then references a "clogging status table," which associates a "clogging status" for different ratios, as illustrated in Hira's Figure 6 (below). *Id.*, [0027], Fig. 6:

FIG. 6

Clogging status table

Actual temperature/temperature threshold value average value	Clogging status	Message
～%	～30%	No problems.
～%	30～70%	Please prepare to replace the filter.
～%	70～100%	Please replace the filter immediately.

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97. Hira does not explain how it determines which ratios are associated with a particular clogging status; it only states that the clogging status table is "prepared in advance during the design/development phase." *Id.*, [0027]. Hira also does not provide any examples of specific ratios and associated corresponding clogging statuses: Figure 6 only includes placeholder values, *i.e.*, "** ~ **%," without specifying any numbers, or any limitations on what numbers could be used. As a result, a POSITA would not understand Hira to suggest that an abnormality is detected when the detected temperature exceeds (*i.e.*, is "beyond") the component

temperature threshold value. That would only be the case if Hira is specifically configured to associate a clogged filter with a ratio above 100%, which Hira never discloses.

98. The Petition and Dr. Pokharna assert that a POSITA "would know … that actual temperatures in excess of component temperature threshold values indicate a clogged dust filter." Pet. 47, 50 ("Hira's clogging status detection unit 3 detects a clogged dust filter … if the actual temperature exceeds the threshold temperature…."); Ex. 1003, ¶¶159, 167 (repeating the same statements). But paragraph 27 of Hira—the only disclosure the Petitioner or Dr. Pokharna cite to for this proposition—says no such thing. Instead, paragraph 27 only states that "clogging status and messages" for each ratio are "prepared in advance." Ex. 1005, [0027]. If, in fact, Hira intended an actual temperature in excess of the component temperature threshold value to indicate a clogged dust filter, then the association between clogging statuses and ratios would be simple: if the ratio is above 100%, the filter is clogged; otherwise, it is not. But that is not what Hira teaches.

99. The Petition and Dr. Pokharna also claims that the use of the word "threshold" suggests that clogging is detected "when the actual component temperature … exceeds the threshold temperature." Pet. 47. I disagree—that is not consistent with Hira's disclosure. First, as I discuss for the "upper limit" limitation, Hira's threshold is set to the ***standard*** component temperature, not any type of limit.

See Ex. 1005, [0025]. As a result, it does not follow that any actual temperature that exceeds the threshold temperature would indicate a clogged filter. Second, as I explain above, the threshold temperature is not what is used to detect a clogged filter: the ratio of actual temperature to the threshold temperature is used instead. *Id.*, [0026]-[0027]. If Hira intended for any temperature that exceeds the threshold value to indicate a clogged dust filter, then the clogging status table would only need two entries: a ratio above 100% (corresponding to an actual temperature higher than the threshold) would indicate a clogged filter, and a ratio at or below 100% (corresponding to an actual temperature equal to or less than the threshold) would not indicate a clogged filter. But that is not what Hira teaches. Instead, Hira teaches that different ranges of ratios "prepared in advance during the design/development phase" can correspond to different clogging statuses. Ex. 1005, [0027].

100. Thus, unlike the '632 patent—which performs the simple test of whether or not the component temperature exceeds an upper limit, *see* Ex. 1001, 6:9-14—Hira compares the ratio of actual temperature to threshold value to some other, unspecified value—a value that Hira suggests can vary depending on the particular system design, but in any event, is never disclosed as 100%.

101. In my opinion, Hira does not disclose an "beyond the upper limit." The Petition does not rely on Shiga for this limitation. Thus, it is my opinion that the Petition has not shown that the prior art discloses or renders this limitation obvious.

VI. Conclusion

102. 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

Date: October 21, 2025

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