

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

HEADWATER RESEARCH LLC,
Patent Owner.

Case IPR2023-01360
Patent 9,609,544 B2

**DECLARATION OF DR. ZYGMUNT J. HAAS IN SUPPORT OF PATENT
OWNER'S RESPONSE TO THE PETITION**

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I, Zygmunt J. Haas, hereby declare as follows:

I. Introduction

1. I am over the age of eighteen (18) years and otherwise competent to make this declaration.

2. I have been retained as an expert witness on behalf of Patent Owner for the above-captioned *inter partes* review (“IPR”). I understand that the petition for *inter partes* review involves U.S. Patent No. 9,609,544 (“the ’544 Patent”).

3. I make this declaration based on my personal knowledge, educational background and training, consideration of the materials that I discuss herein, and my expert opinions.

4. I am being compensated at a rate of \$550 per hour for my time in this matter, in addition to reimbursement for expenses. My compensation does not depend on the outcome of this proceeding, and I have no financial interest in its outcome.

5. In preparing this Declaration, I have reviewed and considered the ’544 Patent, the ’544 Patent’s prosecution history, the Petition, the declaration submitted by Dr. Butler in this proceeding, the deposition transcript of Dr. Butler in this proceeding, and each document cited in this declaration.

II. Background and Qualifications

6. My qualifications for forming the opinions given in this declaration are briefly summarized here and are addressed more fully in my curriculum vitae, which I understand is submitted as Exhibit 2003.

7. I am a Professor and Distinguished Chair in Computer Science at the Computer Science department of the University of Texas at Dallas. I also hold the title of Professor Emeritus at the School of Electrical and Computer Engineering at Cornell University. Over the years, I provided technical consulting services on intellectual property matters, which have included writing expert reports and providing deposition and trial testimony in the areas of my expertise, including wireless communication technologies.

8. I received my Doctor of Philosophy (Ph.D.) degree in the field of Electrical Engineering from Stanford University in 1988. As part of my Ph.D. program, I authored the thesis titled "Packet Switching in Fiber-Optic Networks." I received my Masters of Science (M.Sc.) degree in Electrical Engineering, *summa cum laude*, from Tel-Aviv University in 1985 and my Bachelor of Science (B.Sc.) degree in Electrical Engineering *summa cum laude*, from Technion.

9. After receiving my Ph.D. degree from Stanford University, I worked in industry as a member of the technical staff at AT&T Bell Laboratories from 1988 to 1995, initially in the Network Research Department in Holmdel, New

Jersey. There, I performed research in the fields of wireless communications, mobility management, fast protocols, optical networks, and optical switching. During my tenure at AT&T, I also worked for the AT&T Wireless Center of Excellence, in Whippany, NJ. There, I studied various aspects of wireless and mobile networks.

10. After my work at AT&T Bell Laboratories, I joined the faculty of Electrical & Computer Engineering at Cornell University in 1995, and over time I was promoted to Tenured Full Professor. While at Cornell, I headed my research group – the Wireless Networks Lab – which has had extensive contributions in the area of wireless communication systems and networks. In 2013, I retired from Cornell University with the title of Emeritus Professor, and subsequently I joined the Computer Science Department at the University of Texas at Dallas with the title of Professor and Distinguished Chair in Computer Science. Both, at Cornell University as well at the University of Texas at Dallas, I have taught numerous courses related to computer network (at the undergraduate and graduate levels) and wireless communications. As part of my academic career, I have also served on numerous and various committees for the benefit of the scientific community.

11. In 2007, I was elevated to an IEEE Fellow, and in 2022, I was elevated to an ACM Fellow, both well-known distinctions. For example, the total number of IEEE Fellows which are selected in any given year does not

exceed 0.1% of the total number of voting members of IEEE. Alike, with respect to the ACM Fellow grade, ACM states that “ACM's most prestigious member grade recognizes the top 1% of ACM members for their outstanding accomplishments in computing and information technology and/or outstanding service to ACM and the larger computing community.” See <https://awards.acm.org/fellows>.

12. In 2016, I received the IEEE ComSoc AHSN Recognition Award for “outstanding contributions to securing ad hoc and sensor networks”. In 2012, I have received the IEEE ComSoc WTC¹ Recognition Award, which recognizes individuals for outstanding technical contributions in the field for their service to the scientific and engineering communities. As another example, I received the “Best Paper Award” for the paper “Optimal Resource Allocation for UWB Wireless Ad Hoc Networks” from the IEEE International Symposium on Personal Indoor and Mobile Radio Communications (PIMRC) conference in 2005. Finally, in 2003, I received the “Highly Commended Paper Award” for co-authoring “Performance Evaluation of the Modified IEEE 802.11 MAC for Multi-Channel Multi-Hop Ad Hoc Network,” directed at advanced information networking and applications. Furthermore, many of my papers have been extensively cited by other authors, as indicated by various citation indices. For example, my paper on

¹ Wireless Communications Technical Committee

“Securing Ad Hoc Networks,” co-authored with a Ph.D. student at the time, has been cited over 4000 times by other publications according to the *Google Scholar* index. I have also been invited to many international conferences to make keynote speeches.

13. I am a named author on many book chapters, including “A Decision-Theoretical Approach to Resource Allocation in Wireless Multimedia Networks,” in *Resource Allocation in Next Generation Wireless Networks*, Volume 5, W. Li and Y. Pan, Editors, Nova Science Publishers, 2006, chapter 1, pp.1-23; “Providing Ad-Hoc Connectivity with the Reconfigurable Wireless Networks,” in *Ad-Hoc Networks*, edited by Charlie Perkins, Addison Wesley, 1998; and “Mobile-TCP: An Asymmetric Transport Protocol Design for Mobile Systems,” in *Mobile Multimedia Communications*, edited by D. J. Goodman and D. Raychadhuri, Plenum Publishing, 1997.

14. I am an inventor or co-inventor on over twenty issued patents, which are primarily in the fields of high-speed networking, wireless networks, and optical switching.

15. I have served on the editorial boards of a number of professional journals including Wireless Communications and Mobile Computing, Wireless Networks Journal, and the Journal of High Speed Networks. I have served as guest

editor for the IEEE Journal on Selected Areas in Communications on several occasions.

III. Legal Principles

16. I am not an attorney, and I do not opine on matters of law. In preparation of this Declaration, I have been informed by counsel about certain aspects of the law that are relevant to my analysis and opinions, as set forth below.

Claim Construction

17. I have been informed by counsel that the first step in performing a validity analysis of patent claims is to interpret the meaning and scope of the claims by construing the terms and phrases found in those claims. I have been informed by counsel that the appropriate construction of a claim term is its ordinary and accustomed meaning as would have been understood by one of ordinary skill in the art at the time of the invention in the context of the entire patent and the prosecution history.

18. I have been informed by counsel that standard for claim construction in an *inter partes* review is the same standard as is applied in district court proceedings.

19. I have been informed by counsel that a determination of the meaning and scope of the claims is a matter of law. I have been informed by counsel that to

determine the meaning of the claims, one should consider the intrinsic evidence, which includes the patent's claims, written description, and prosecution history.

Burden of Proof

20. I have been informed by counsel that in an *inter partes* review, the petitioner has the burden of proving unpatentability by a preponderance of the evidence.

Anticipation

21. I have been instructed by counsel and understand that a reference is anticipated if a single prior art reference discloses each and every claim element, either explicitly or inherently, as arranged in the same way as in the claim. I have been informed by counsel that where even one claim element is not disclosed in a reference, a contention of anticipation fails.

22. I further have been informed by counsel that when a reference fails to explicitly disclose a claim element, that reference inherently discloses that element only if the reference must *necessarily* include the undisclosed claim element.

Obviousness

23. I have been instructed by counsel and understand that a combination of prior art references may render a claim obvious if, at the time of the invention, a person of ordinary skill in the art would have selected and combined those prior-art

elements in the normal course of research and development to yield the claimed invention.

24. I have been informed by counsel that in an obviousness analysis, one should consider the *Graham* factors, including: the scope and content of the prior art; the differences between the claimed inventions and the prior art; and the level of ordinary skill in the art. I further been informed by counsel that the obviousness analysis is to be performed on a claim-by-claim basis. I have been informed by counsel that a person of ordinary skill in the art is a person of ordinary creativity, not an automaton.

25. I have been instructed by counsel and understand that obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. I have been informed by counsel that obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have been motivated to combine those references in a manner that would include all limitations of the challenged claim, and, in making that combination, a person of ordinary skill in the art would have had a reasonable expectation of success (i.e., would have reasonably expected to arrive at the proposed modification without undue experimentation).

26. I also have been informed by counsel that an obviousness analysis must be conducted with awareness of the distortion caused by hindsight bias and with caution of arguments reliant upon *ex post* reasoning. For instance, I understand that when considering obviousness, I should put myself in the position of a person of ordinary skill in the field at the time of the invention, rather than considering new information that is known today, but was not known at the priority date of the challenged patent.

27. I have been informed and understand from counsel that the Supreme Court has recognized that inventions are nearly always “combinations of what, in some sense, is already known.” As a safeguard against hindsight bias, I thus understand that an obviousness determination should take into account whether any proposed modification to the prior art is more than the predictable use of prior art elements according to their established functions. I have been informed by counsel that if the proposed modification *is* more than the predictable use of prior art elements according to their established functions, that is an indication that the proposed modification is inventive, not obvious.

IV. Person of Ordinary Skill in the Art

28. Dr. Butler alleges that a person of ordinary skill in the art, as of the priority date of the '544 Patent, “would have had (1) at least a bachelor’s degree in computer science, electrical engineering, or a related field, and (2) three to five

years of experience with networking, power consumption of networked computing devices, and/or wireless digital communications systems. More education, e.g., a doctorate in an academic area emphasizing electrical engineering, computer engineering, computer science, or a related technical field, would compensate for fewer years of work experience.” Ex. 1003 (Butler Decl.) ¶ 17. It is my opinion that a POSITA at the time of the invention of the ’544 Patent would have had (1) at least a bachelor’s degree in computer science, electrical engineering, or related field, (2) at least three years of additional experience (which could include graduate experience) with networking, power consumption of networked computing devices, and/or wireless digital communications systems.

29. I have at least the qualifications of such a person of ordinary skill in the art, and had such qualifications prior to January 28, 2009 (the date that Dr. Butler applies as the priority date of the ’701 Patent—*see* Ex. 1003 ¶16).

V. Background of the ’544 Patent

30. At a high level, the ’544 Patent is directed to using a network usage policy to control network activity based on whether an application is classified as interacting with the user in the foreground and a power control state.

31. The only independent claim (Claim 1) of the ’544 Patent recites in full:

[1pre] A wireless end-user device, comprising:

[1a] a wireless modem to communicate data for network service usage activities between the device and a wireless network;

[1b] a processor that executes instructions to associate network service usage activity, on behalf of a first device application, and that occurs when the first device application is not in the foreground of user interaction, with a network service usage control policy,

[1d] set an application state indicating whether the first device application, associated with a particular network service usage activity, is in the foreground of user interaction, and

[1f] dynamically determine whether to apply the network service usage control policy to the particular network service usage activity, based on the application state and based on a power control state; and

[1g] a memory coupled to the processor to provide the processor with the instructions.

Ex. 1001 at claim 1.

32. For instance, the '544 Patent describes “dynamically” determining whether to apply a “network service usage control policy” to a “network service usage activity” based on “a power state of device” and “an application behavior.”

Ex. 1001, 89:12-23.

VI. Claim Construction

33. I am informed by counsel that the Board construes the claim terms and that claim construction is an exercise of interpreting disputed terms, to the extent needed to resolve any controversy between the parties; unless there are particular disputes that need resolution to resolve a controversy between parties, terms are to be given their plain meaning in view of the specification. As explained below, it is my opinion that the theories raised by Dr. Butler fail because the proposed modifications to the prior art would not have been obvious to a POSITA, and thus I do not provide any explicit constructions of any claim terms because such an analysis is not necessary to evaluate Petitioner's and Dr. Butler's failure to show the invalidity of any challenged claim.

VII. Dr. Butler does not show that his proposed combination of Rao with Araujo renders obvious claim 1.

34. Limitation [1.5] requires that the claimed "wireless end-user device" includes a processor executing instructions to "dynamically determine whether to apply the network service usage control policy to the particular network service usage activity, based on the application state and based on a power control state." Dr. Butler relies on a combination of Rau with Araujo (the "Rau-Araujo Device," or "RAD") to satisfy this limitation. *See* Ex. 1003 ¶¶98-101. However, in my opinion Dr. Butler neither explains what precisely his proposal is for how the combined system would operate to arrive at limitation [1.5], nor provides a

motivation why a POSITA would have combined Rao with Araujo in any particular way that would allegedly satisfy limitation [1.5].

35. Dr. Butler provides only two concrete statements about how his proposed combination of Rao with Araujo would operate in his analysis of limitation [1.5]. First, he states:

As one example, when a request to transmit network packets arrives, a POSITA would have recognized that RAD enforces a particular policy (i) when an application is in the foreground (per Rao) giving it “VIP” status (per Araujo and based on the foreground application state of Rao), and (ii) when the power state of the device indicates the battery is above a threshold charging level. SAMSUNG-1006, [0022]. In such cases, RAD would permit the transmission (since the battery is sufficiently charged) and place the packets in a high-priority queue (for the VIP application).

Ex. 1003 ¶101.

36. Second, Dr. Butler states:

In another example, [a] POSITA would have recognized that RAD enforces a different policy (i) when an application is in the background (per Rao) not giving it “VIP” status (per Araujo and based on the background application state of Rao), and (ii) when the power state of the device indicates the battery is above a threshold charging level. SAMSUNG-1006, [0022]. In such cases, RAD would permit the

transmission (since the battery is sufficiently charged) and place the packets in a lower-priority queue (for the non-VIP application).

Ex. 1001 ¶101.

37. However, Dr. Butler does not provide any motivation of why a POSITA would have pursued this combination with Rao and Araujo, other than a generic assertion that “[t]his technique would yield the expected behavior of prioritizing VIP packets over non-VIP packets.” Ex. 1003 ¶101. But a POSITA would have recognized that Rao *already* prioritizes high-priority packets over lower-priority packets, and Dr. Butler thus does not explain why his proposed combination of Rao with Araujo in the alleged would have been seen as beneficial by a POSITA.

38. Dr. Butler goes on to assert other ways in which his proposed combination of Rao with Araujo “might” be made:

Beyond these particular examples, a POSITA would have recognized and appreciated “the multitude of ways to define client-side application priorities.” SAMSUNG-1005, [0182]. For example, if the power level was somewhat lower, a policy *might* state that VIP packets can flow, but non-VIP packets are held. If the power level was still lower, no transmissions *might* occur, except *perhaps* for system-critical packets, such as updating anti-virus in response to an imminent threat.

Ex. 1003 ¶101.² This generic reference to a “multitude of ways” his combination “might” operate is insufficient for me to determine what his proposed combination actually *is*. Furthermore, he does not provide any reason why a POSITA would have been motivated to arrive at any of these potential ways the combined Rao-Araujo system “might” operate. *See generally id.* (no alleged motivation regarding why a POSITA to implement what he specifies “might” be done). Accordingly, it is my opinion that Dr. Butler has not shown that limitation [1.5] would have been obvious in view of Rao in combination with Araujo.

VIII. Dr. Butler additionally does not show that his proposed combination of Rao with Araujo renders obvious the requirements of claim 4.

39. Claim 4 recites: “The wireless end-user device of claim 1, wherein when the network service usage control policy is applied it disallows the particular network service usage activity, and wherein the processor executes the instruction further to, when it is determined that the particular network access request is disallowed, queue that particular network service usage activity until a power state change occurs.”

40. Dr. Butler asserts that it would have “been obvious to a POSITA that RAD adds to queues (as taught by Rao) requests to were [sic] disallowed until a

² All emphases in cited materials herein are added in this document, unless otherwise noted.

power state change occurred (as taught by Araujo) since queuing requests until they can be serviced was common in the field as of the Critical Date.” Ex. 1003 ¶110.

41. Notably, Rao’s queues (to which Dr. Butler refers) are *packet* queues, whereas Araujo’s requests are “requests to use a device that is turned off.” See Ex. 1003 ¶110 (referring to placing “network packets for an application” in a queue in Rao, but referring to queuing a “request[] to use a device that is turned off” in Araujo). For example, Araujo’s request to use a device that is turned off may refer to a request to open a network connection, but a POSITA would not understand that these requests would be in the form of network packets (because network packets are typically only formed for transmission when a network device is actually turned on).

42. However, because Dr. Butler’s proposal clearly asserts that requests would be added to Rao’s *packet* queues (see Ex. 1003 ¶110), he is apparently asserting that network packets would be generated and placed within a queue even though the network device is turned off. Dr. Butler, however, provides no motivation to generate packets for transmission at some indefinite future period of time even though the network device is turned off; such a solution is taught neither by Rao nor by Araujo, and Dr. Butler does not allege that such a solution would have been common as of the priority date of the ’544 Patent.

43. It is my opinion that such an approach (i.e., generating and queuing network packets even through the network device is turned off) would lead to uncertainty in application behavior, because the application would not know when its packets may eventually be transmitted (if ever). Furthermore, many packets are time-sensitive, and if they are not transmitted relatively quickly after being generated, there would be no benefit to transmitting them at all (and there may even be a detriment to transmitting them, because network resources would be consumed in order to transmit outdated or incorrect information and thus wasted). Furthermore, such an implementation would be wasteful of device resources, because it would require resources to manage and store the packets for later transmission, even though the packets may become stale before they are ultimately transmitted at some indefinite future period of time. Dr. Butler provides no alleged motivation to pursue such an implementation, and in my opinion such an implementation would not have been obvious.

IX. CONCLUSION

44. In signing this declaration, I understand that the declaration will be filed as evidence in contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this 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.

45. I declare that all statements made herein of my own knowledge are true and that all statements made on 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 under Section 1001 of Title 18 of the United States Code.

July 8, 2024



Dr. Zygmunt Haas