

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 IPR2023-01157
Patent 11,405,224 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. 11,405,224 (“the ’224 Patent”).

3. I make this declaration based on my personal knowledge, educational background and training, consideration of the materials 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 ’224 Patent, the ’224 Patent’s prosecution history, the Petition, the declaration submitted by Dr. Traynor in this proceeding, the deposition transcript of Dr. Traynor 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 summarized here and are addressed more fully in my curriculum vitae, which I understand is submitted as Exhibit 2007.

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 in 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 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 as 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 contribution to securing ad hoc and sensor networks” from the IEEE Communication Society in 2016. 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

¹ Wireless Communications Technical Committee

citation indices. For example, my paper on “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 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 board for 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

A. Claim Construction

16. 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.

17. 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.

18. 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.

B. Burden of Proof

19. 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.

C. Anticipation

20. 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.

21. 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.

D. Obviousness

22. 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.

23. 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 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.

24. 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).

25. 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.

26. 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

27. The Petition alleges that a person of ordinary skill in the art, as of the priority date of the '224 Patent, “would have had (1) at least a bachelor’s degree in computer science, electrical engineering, or related field, and (2) three to five years of experience with networking, power consumption of networked computing devices, and/or wireless digital communications systems. Additional graduate education could substitute for professional experience, and *vice versa*.” Ex. 1003

(Traynor Decl.) ¶ 22. I agree with Dr. Traynor that a POSITA would have had (1) at least a bachelor's degree in computer science, electrical engineering, or related field, and (2) at least three years of additional experience (including graduate experience) with networking, power consumption of networked computing devices, and/or wireless digital communication systems.

28. I have at least the qualifications of a person of ordinary skill in the art, and had such qualifications prior to January 28, 2009 (the date that Dr. Traynor applies as the priority date of the '224 Patent—*see* Ex. 1003 ¶19).

V. Background of the '224 Patent

29. The '224 Patent is directed to a method including, for a “plurality of applications,” “monitor[ing] a network service usage activity... associated with the given application,” classifying those network service activities based on the associated application, associating each of the network service usage activities with a service usage control policy that is dynamically selected based on a device state, and using the dynamically selected control policy to defer network service usage activities and manage network data access. More specifically, the only independent claim of the '224 Patent recites:

1. A wireless end-user communications device, comprising:
 - [1.1] at least one wireless modem;
 - [1.2] a processor configured to:

[1.3] for each given application of a plurality of applications on the wireless end-user device, monitor a network service usage activity of the wireless end-user communications device associated with the given application;

[1.4] classify, as a first classification for each given one of the network service usage activities, a classification based on the application associated with the given network service usage activity and that allows for a differential network access control, wherein the differential network access control comprises a set of service usage control policies applicable when a network service is available via the at least one wireless modem, including at least a first policy that allows the given network service usage activity to currently communicate data with a network destination via the at least one wireless modem, and a second policy that defers data communication associated with the given network service usage activity until a device state change occurs;

[1.5] associate each given one of the network service usage activities with a service usage control policy dynamically selected from the set of service usage control policies, based on the first classification of the given network service usage activity and at least one device state; and

[1.6] manage network data access via the at least one wireless modem for each of the plurality of applications according to the dynamically selected service usage control policy for each given network service activity of that application; and

[1.7] a memory coupled to the processor and configured to provide the processor with instructions.

Ex. 1001 at claim 1 (numbering added, consistent with that of the Petition
(*see* Pet. at vi-vii)).

30. This solution provides the advantage of deferring individual network service usage activities of a particular application based on active monitoring of those network service usage activities. For example, the invention does not require blocking ***all*** activities associated with any given application in response to a particular device state, because the individual network service usage activities associated with an application are monitored and managed.

VI. Claim Construction

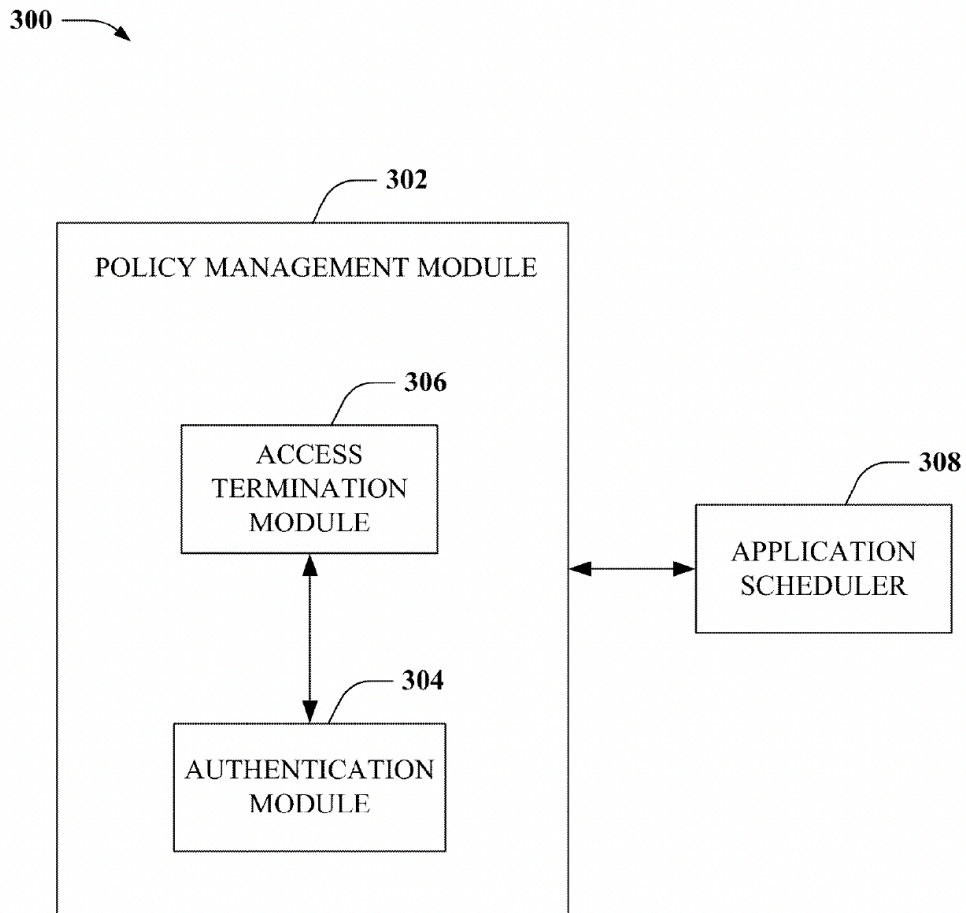
31. I am informed by counsel that claim construction is an exercise of interpreting disputed terms, to the extent needed to resolve any controversy between the parties; unless there are particular disputes that need resolution to resolve a controversy between parties, terms are to be given their plain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

VII. Cole in view of D'Amore and Rao does not render obvious independent claim 1.

32. Dr. Traynor and Petitioner rely on the combination of Cole with D'Amore and Rao to render obvious all challenged claims of the '224 Patent.

33. As an initial matter, the combination of Cole with D’Amore, although it certainly adds complexity to the Cole system, does not use elements of D’Amore for other than their intended purpose. Specifically, Cole generally relates to scheduling application activity. *See* Ex. 1003 (Traynor Decl.) ¶ 31 (alleging that “Cole describes that applications can be ‘aborted,’ ‘postpone[d],’ cancelled and rescheduled, and ‘block[ed]’”) (citing Ex. 1005, ¶¶80, 85-90, 125). I note that in the context of Cole’s disclosure, when Cole is referring to taking actions with respect to an application, it is actually disclosing taking such an action with respect to an application *activity*. *See* Ex. 1005 (Cole) at ¶80 (“For example, the user may request that a background *application* (e.g., synchronizing files or emails) *be aborted*. The connection manager 260 reschedules the *aborted activity at* a later time....”).

34. Likewise, D’Amore also relates to scheduling application activity. For example, the “policy management module” that Petitioner and Dr. Traynor rely on is shown below as interacting with an “application scheduler”:



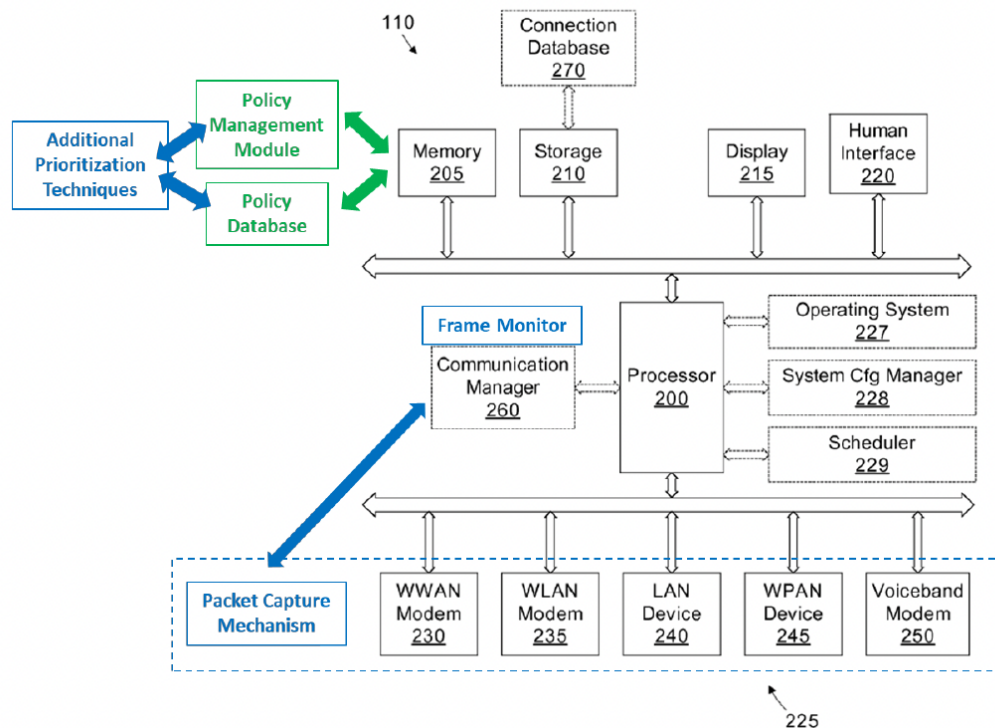
35. Ex. 1006 (D’Amore) at FIG. 3. Dr. Traynor likewise acknowledges that D’Amore is about controlling applications’ requests for access to mobile resources and accomplishes this by “approv[ing] or deny[ing] access to a mobile device resource and/or mobile network resource *for a mobile application*” “based at least in part on a priority level of a privilege code associated with the mobile application.” Ex. 1003 (Traynor Decl.) 35 (citing Ex. 1006 ¶50). I have reviewed both Cole and D’Amore, and neither of these references include any disclosure of making decisions about network access on a packet-by-packet level of granularity.

36. However, the Petition’s combination of Cole and D’Amore with Rao does significantly deviate from the principles under which Rao’s system components operate. Specifically, Rao relates to inspection and control of individual network packets and enforces its policies by “intercepting packets of network traffic associated with applications” (i.e., before those packets are transmitted over the network), “determining the priority of packets based on the application that is associated with each packet, and selectively communicating the packets to the network based on the determined priority. SAMSUNG-1007 [0184]-[0190], FIG. 5B. As an example, Rao’s system can ‘use the policies 520 to determine which network packets to queue and/or discard. SAMSUNG-1007 ¶[0207].” Ex. 1003 (Traynor Decl.) ¶ 45. I have reviewed the Rao reference, and the reference is entirely about using its disclosure of monitoring packets to influence how packets are controlled at the granularity of individual packets (e.g., by discarding individual packets or by placing certain types of packets ahead of other packets in a queue), and does not have any teachings related to application-level scheduling when various application activities are able to run or transmit data over a network. This approach, of using *packet* monitoring to control transmission at the granularity of individual packets makes sense, because a POSITA would have recognized that packet prioritization (such as in quality of service systems which would, for example, ensure that packets that use particular protocols for

communication need to be transmitted more quickly than other queued packets) is significantly different than prioritization or scheduling of application activities (e.g., such as scheduling an application update for a particular time of day).

37. At a high level, application scheduling is about *when* particular applications can run certain activities that impact the network and would typically be scheduled seconds, minutes, hours, or even days in advance. In contrast, packet control is about *how* packets that have already been generated from an application's activity that is running are transmitted across the network in real time, and the decisions on this basis typically happen on the order of milliseconds. For example, in 2009 the transmission speeds of mobile networks were on the order of 10 Mbps (or 10,000 Kbps), and the typical packet size sent over TCP is on the order of 1500 bytes (i.e., 12,000 bits or 12 K bits). Thus, on average, approximately 800 TCP packets could be sent over a network within a second, for a packet being sent every 1.25 milliseconds. Thus, a POSITA would readily understand that packet scheduling (which determines which individual packets go before other individual packets) involves significantly different design considerations than scheduling an application-level activity, such as which application will be able to initiate a download or update before another application is allowed to run an activity that consumes network resources.

38. Despite Rao's system being about prioritization and control of individual packets, Petitioner and Dr. Traynor propose that elements of Rao's system (specifically, Rao's packet capture mechanism and frame monitor) would be obvious to incorporate into the combined Cole/D'Amore system in order to influence scheduling of activities at the application level. A visual illustration of the fact that the combination involves this very specific modification to Rao's packet capture mechanism and frame monitor, for incorporation into a modified Cole/D'Amore system, is shown by Dr. Traynor's annotated version of Cole's Figure 2:



Ex. 1003 (Traynor Decl.) ¶ 51.

39. As can be seen from the above annotated diagram, the packet capture mechanism and frame monitor interface with Cole’s *communication manager* (or “connection manager”—*see* Ex. 1003 ¶29 n.3), which influences application-level scheduling of activities. In the proposed combination, there is no discussion of the packet capture mechanism and frame monitor being used in accordance with the principle that Rao discloses they would be used for, which is to prioritize traffic at the packet-level to provide for optimized quality of service.

40. I have had significant experience with Quality of Service protocols, and I am not aware of any systems that, on January 28, 2009 (the date that Dr. Traynor applies as the priority date of the ’224 Patent—*see* Ex. 1003 ¶19), made use of analysis of packet monitoring (i.e., monitoring of packets either before or as they are transmitted across a network) to influence application-level scheduling of activities. At most, packet monitoring would have been done to identify potential security violations, and would have entirely blocked certain network activity on that basis, but that is far different from what Dr. Traynor’s proposal entails where the packet capture mechanism and frame monitor at the level of individual packets would have been utilized to actually defer and schedule various activities. I also understand that, at his deposition, Dr. Traynor was unable to identify any systems or references that incorporated such a design or proposed such a design, and I am also not aware of such systems or references (including systems or references after

the priority date of the '224 Patent). In my view, the fact that there is no evidence that anyone ever even proposed such a design, especially not at the time of the '224 Patent, is additional evidence that such a design would not have been obvious to a POSITA driven by engineering (as opposed to litigation) motivations.

41. Setting aside the specific point that the proposed combination wouldn't have been obvious because it uses Rao's packet capture mechanism and frame monitor in a way that is significantly different than the purpose that Rao itself uses them for (and as further supported by the lack of evidence of anyone having *ever* proposed such a design choice), I have also evaluated Dr. Traynor's proposed motivations for making the combination, as discussed below.

42. First, I disagree that a POSITA would have viewed "inter-application classification of activities based on protocol" as beneficial for application scheduling, as opposed to packet scheduling. *See* Ex. 1003 ¶ 47. Indeed, D'Amore already has "application level 'priority policies'" (Ex. 1003 ¶ 37), and Cole recognizes that applications include particular application activities, such that the combined Cole-D'Amore system would *already* allow for inter-application prioritization of activities. Dr. Traynor provides no explanation whatsoever as to how the real-time observed packet protocol used by a particular activity would be beneficial in this analysis; in my view, relying on a packet capture mechanism and frame monitor to implement inter-application activity prioritization would not have

been recognized as advantageous, and would have been seen as introducing a tremendous amount of needless complexity into the combined system.

43. A POSITA likewise would have recognized that Rao does not “describ[e] prioritization techniques... that would enhance the priority policies of the Cole-D’Amore device” (Ex. 1003 ¶48), because Rao’s prioritization techniques are about prioritization of individual packets, whereas the Cole-D’Amore priority policies are policies applicable to application-level activities. A POSITA would have understood that a technique for prioritizing a particular packet over another packet would not be applicable to a policy for scheduling which application activity should be allowed network access before another application activity, and Dr. Traynor presents no evidence to the contrary. To the extent Dr. Traynor contends that consideration of “whether an application is running in the foreground or the background” (Ex. 1003 ¶48) would motivate the proposed combination, I disagree with that contention. As Dr. Traynor recognizes, Cole *already* considers whether an application is running in the background or foreground (i.e., not background), such that the addition of Rao’s packet capture mechanism and frame monitor would not provide any advantage over the Cole-D’Amore system. *See* Ex. 1003 ¶ 71 (“[I]n differentiating ‘background’ activities from non-background activities, [Cole’s] connection manager ‘*classifies*’ all (‘*each*’) of the activities in the communication load as those applications not classified as ‘background’ would

be assigned some other designation (e.g., ‘not background’).”) (citing Cole, Ex. 1005 ¶73), emphases present in Ex. 1003.

44. I also disagree that “combining Cole-D’Amore and Rao would have involved (1) combining prior art elements according to known methods to yield predictable results; and (2) using known technique[s] to improve similar devices in the same way.” Ex. 1003 ¶49. First, there were no “known methods” to make the modification that Dr. Traynor is proposing, because it had never been done before. There is no evidence that any POSITA knew of a technique to use a packet capture mechanism and frame monitor, such as that described in Rao, to influence scheduling of application-level activity. Likewise, the combination does not involve using known techniques to improve devices in the same way, because (1) the technique of influencing application activity scheduling with a packet capture mechanism and frame monitor was not a “known technique,” and (2) Rao’s packet capture mechanism and frame monitor would certainly not be used by Cole/D’Amore “in the same way” as it is used in Rao under Dr. Traynor’s proposed combination. To the contrary, it is my opinion that Dr. Traynor’s proposed combination fundamentally *changes* the way in which Rao’s packet capture mechanism and frame monitor operate. Specifically, Dr. Traynor’s proposed combination would utilize the packet capture mechanism and frame monitor not for the functions that were known in the art (i.e., control of individual

packets and malware control), but fundamentally changes their function to instead influence scheduling of application-level activity which is a function that was not known in the art for a packet capture mechanism and frame monitor at the time of the '224 Patent.

45. Furthermore, I disagree with Dr. Traynor's conclusions regarding reasonable expectation of success. I note that reasonable expectation of success is simply conjectural and theoretical, because Dr. Traynor presents no evidence that anyone has *ever* attempted to perform the type of modification that Dr. Traynor is alleging would have been obvious to a POSITA a decade and a half ago.

Moreover, I disagree with Dr. Traynor's stated rationales for why, theoretically, the proposed combination would have had a reasonable expectation of success. For example, Dr. Traynor states that Rao describes "optimizing communications" on mobile devices that run applications. Ex. 1003 (Traynor Decl.) ¶ 50. But as noted previously, Rao uses a very different technique of optimizing communications than do Cole and D'Amore—in my view, the fact that these references use vastly different techniques to achieve the broad result of "optimizing communications" is evidence that there are two very different ways to achieve optimization of network traffic, and that they stand apart from each other; it is not evidence that the combination of these very different techniques would have been obvious or predictable.

46. Likewise, Dr. Traynor states that “Rao describes that its techniques can be implemented in end-user devices.” *Id.* But Petitioner’s proposed combination is not an implementation of Rao’s techniques into Cole/D’Amore, because Rao does not provide **any** techniques for controlling or scheduling application-level activity. Rao’s techniques would have to be heavily modified before they could be implemented in Cole/D’Amore as Petitioner suggests, and Dr. Traynor presents no evidence that these modifications would be straightforward or predictable.

47. Dr. Traynor likewise states that “the use of computer program modules to monitor and identify application packet flow on mobile devices was known as of the Critical Date” (Ex. 1003 ¶ 50), but in support of that assertion he cites only to Kelz (Ex. 1010) which, like Rao, relates to a quality of service system that monitors packet flow for the specific purpose of modifying network traffic *at the packet level* of granularity. In my opinion, the fact that monitoring and identifying application packet flow was only used for quality of service decisions at the packet level is **not** evidence that a POSITA would have reasonably expected to succeed in monitoring and identifying packet flow to influence scheduling of application-level activities.

48. Finally, Dr. Traynor states that “the incorporation of Rao’s prioritization techniques would have been nothing more than the implementation

of software in a system already designed to execute similar program modules.” *Id.*

¶ 50. But again, Dr. Traynor’s proposed combination does not involve using prioritization techniques described by Rao, because Rao does not provide *any* prioritization techniques for scheduling application-level activity. Thus, a POSITA making Dr. Traynor’s proposed combination would need to derive entirely new prioritization techniques, which Dr. Traynor does not describe (much less establish a reasonable expectation of success in making). Alternatively, a POSITA could have simply used Rao’s packet capture mechanism and frame monitor for their originally intended purposes, but that is not the combination that Dr. Traynor proposes.

May 8, 2024

A handwritten signature in black ink, appearing to read "Zygmunt Haas", written over a horizontal line.

Dr. Zygmunt Haas