IN THE

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMAZON WEB SERVICES, INC.
AND AMAZON.COM SERVICES LLC,

Petitioners

- vs. -

ZENTIAN LIMITED

Patent Owner

Patent No. 10,971,140

Issued: April 6, 2021

Inventor: Mark Catchpole

Title: SPEECH RECOGNITION CIRCUIT USING PARALLEL PROCESSORS

Inter Partes Review No. IPR2023-01197

DECLARATION OF LES ATLAS, PH.D. IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,971,140

Mail Stop Patent Board
Patent Trial and Appeal Board
P.O. Box 1450
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I, Les Atlas, Ph.D., hereby declare as follows:

I. INTRODUCTION

1. My name is Les Atlas. I am at least eighteen years of age. I have personal knowledge of and am competent to testify as to the facts and opinions herein.

2. I have been retained by counsel for Petitioners Amazon.com Services LLC and Amazon Web Services, Inc. (collectively, "Petitioners" or "Amazon") to provide my opinion about the patentability of claims 1–8 (collectively, the "Challenged Claims") of U.S. Patent No. 10,971,140 (the "'140 Patent" (EX1001)), which I understand is assigned to Zentian Limited ("Patent Owner"). I further understand that Petitioners are seeking to join a prior proceeding brought by Apple, Inc. ("Apple"). I understand that Petitioners, like Apple, are requesting that the United States Patent and Trademark Office cancel claims 1–8. I submit this declaration in support of Petitioners' request for *inter partes* review.

3. I am being compensated for my time at my usual consulting rate of $950 per hour. Other than this consulting engagement, I have no financial interest in or professional relationship with Petitioners, nor is my compensation is dependent in any way upon the outcome of, or my testimony in, the present *inter partes* review or any related litigation proceeding. I have no financial interest in or professional

relationship with Patent Owner. I similarly have no financial interest in the challenged patent and have had no contact with any named inventor.

II. QUALIFICATIONS

4. My qualifications for forming the opinions set forth in this Declaration are summarized here and include my educational background, career history, publications, and other relevant qualifications. My full *curriculum vitae* is attached as Attachment A to this Declaration, and includes my detailed employment background, professional experience, and list of publications.

5. My academic credentials include a B.S. in Electrical Engineering from the University of Wisconsin in 1977 and an M.S. and a Ph.D. in Electrical Engineering from Stanford University in 1978 and 1983, respectively. I was also a part-time member of the technical staff at SRI International from February 1982 to November 1983, working on large vocabulary speech recognition systems. I am a Life Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and have been and remain active in the fields of electrical engineering, hearing, and speech science as a university faculty educator and researcher. My work and impact in hearing research go back 40 years when I designed the world's first portable speech processor for cochlear implants. I then also worked on the first real-time implementation of the Linear Predictive Coding (LPC-10) speech coding standard. This then-new technology pre-dated speech coding for portable processors, such as

telephones. Digital voice coding technology has evolved significantly since then and is now used in virtually all cellular phones worldwide. This speech coding technology and low bit rate music coding technologies share challenges such as sound shaping and range of amplification, wideband and extended bandwidth with portability. Both have external processors where sounds are conditioned, often with parameters carefully chosen to give listeners the impression of natural pitch and overall broadband transmission of the audio signal.

6. More recently, I have addressed the lack of rich music perception and challenges for speech understanding and recognition with noisy backgrounds. In 2012, I was awarded a Bloedel Scholar Award, given out by the Bloedel Speech and Hearing Research Institute, for my work in speech recognition and hearing loss. I also published a paper describing my decades of more theoretic work in the theory of time-frequency analysis. My work in speech recognition resulted in my election to the high level of Fellow of the IEEE "[f]or contributions to time-varying spectral analysis and acoustical signal processing." My work was also used to help modernize music coding for most listeners worldwide. For my coherent modulation approach, I received the 2003 Fulbright Senior Scholar Award. As part of the award, I spent six months at the Fraunhofer Institute in Germany and then three months in Cambridge, England. I also was invited to give a plenary tutorial at the annual top

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international conference on speech perception and automatic recognition—Interspeech 2012.

7. Since then, as speech recognition technology has advanced, my commitment to solving challenges facing natural sounding transmission of speech and perception of music has resulted in more publications and progress in that needed research direction. My Ph.D. research included design and tests of the first portable and real time speech encoder for cochlear implants. This device produced the first field tests of speech perception by profoundly deaf individuals who had electrodes implanted in their inner ear. This speech coding work was then expanded internationally and used in approximately one million cochlear implants performed worldwide. More recently, I have developed portable and low power approaches to encode music perception for cochlear implant subjects. My work is described in papers and was, for example, featured by National Public Radio, available at: http://www.npr.org/sections/health-shots/2015/05/18/406838781/deaf-jam-experiencing-music-through-a-cochlear-implant.

8. I have also contributed to the separation of speech from noise, which is important for high-quality automatic speech recognition, have provided new theory for low bit rate encoding of music, and have made contributions to the theory of digital signal processing for many audio and speech recognition applications. Many of the graduate students I supervised went on to academic positions and to top

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positions in industry. I have organized and attended international conferences which featured new results on high quality and practical speech recognition by and for the leading researchers in the field. For example, I have been General Chair of leading international conferences and symposia, such as the 1998 International Conference on Acoustics, Speech, and Signal Processing. My research in speech recognition technology has been funded by the U.S. Department of Defense and many industry companies. Most recently, Boeing Commercial Airplanes funded my project to use automatic speech recognition using deep neural networks to add redundancy to air traffic control conversations between the control tower and pilots. This research project lasted from 2019 to 2021 and was designed to work over the challenging, noisy, and distorted very high frequency (VHF) speech channels. I have also regularly taught classes which included these kinds of digital speech concepts, mostly at the graduate (Masters and Ph.D.) level. As a result, I have remained knowledgeable of the progression of speech and low bit rate speech and music coding technology from 1985 to present.

III. RELEVANT LEGAL PRINCIPLES

9. I am not an attorney, but counsel has explained to me the following legal principles, which I applied in conducting the analyses expressed in this declaration.

10. I understand that patent claims may be invalid as "anticipated" in view of a single prior art reference, or "obvious" in view of one or more prior art references.

11. I understand that a claimed invention is unpatentable if the differences between the invention and the prior art are such that the subject matter of the claim as a whole would have been obvious, at the time the invention was made, to a person having ordinary skill in the art to which the subject matter pertains ("POSITA").

12. It is my understanding that obviousness is a question of law based on underlying factual issues including (1) the scope and content of the prior art, (2) the differences between the prior art and the asserted claims, (3) the level of ordinary skill in the pertinent art, and (4) the existence of secondary considerations such as commercial success, long-felt but unresolved needs, failure of others, etc.

13. I understand that for a single reference or a combination of references to render obvious the claimed invention, a POSITA must have been able to arrive at the claims by altering or combining the applied references.

14. I understand that an obviousness evaluation can be based on a combination of multiple prior art references. I understand that the prior art references themselves may provide a suggestion, motivation, or reason to combine, but other times, the nexus linking two or more prior art references is simple common sense. I understand that one skilled in the art is also a person of ordinary creativity, and that

in many cases one skilled in the art would be motivated by a need or problem known in the field to combine the teachings of multiple patents or other prior art references together, along with the knowledge of a POSITA, to address that need or problem. I also understand that obviousness analysis recognizes that market demand, rather than scientific literature, may drive innovation, and that a motivation to combine references may be supplied by the direction of the marketplace.

15. I understand that I should be aware of and consider the distortion caused by hindsight bias, i.e., of relying on a hindsight view of the field and of prior art. Instead, I should cast my mind back to the time of the invention and consider whether the invention as a whole would have been obvious to one skilled in the art at that time, considering the background knowledge possessed by a person having ordinary skill in the art at that time, the needs and problems in the marketplace at that time, and the teachings of the prior art at that time.

16. I understand that if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

17. I also understand that practical and common-sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I also understand that a person of

ordinary skill in the art looking to overcome a problem will often be able to fit together the teaching of multiple publications. I understand that obviousness analysis therefore considers the inferences and creative steps that a person of ordinary skill in the art would employ under the circumstances.

18. I understand that a particular combination may be proven obvious by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common-sense.

19. I also understand that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. When a work is available in one field of endeavor, design incentives and other market forces can prompt variation of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, the patent claims is likely obvious.

20. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. I thus understand that any need or problem known in the field of

endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

21. I understand that a claim can be obvious in light of a single reference, without the need to combine references, if the elements of the claim that are not found explicitly or inherently in the reference can be supplied by the common-sense of one of skill in the art.

22. I understand that secondary indicia of non-obviousness may include (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) commercial success of processes covered by the patent; (3) unexpected results achieved by the invention; (4) praise of the invention by others skilled in the art; (5) taking of licenses under the patent by others; (6) deliberate copying of the invention; (7) failure of others to find a solution to the long felt need; and (8) skepticism by experts.

23. I also understand that there must be a relationship between any such secondary considerations and the invention. I also understand that contemporaneous and independent invention by others is a secondary consideration supporting an obviousness determination.

24. In sum, my understanding is that prior art teachings are properly combined where a person of ordinary skill in the art having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the

inventor, would have been led to make the combination of elements recited in the claims. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the invention, can provide a reason for combining the elements of multiple prior art references in the claimed manner.

IV. MATERIALS CONSIDERED

25. In forming my opinions, I relied on my experience, education, and training, as well as my detailed review of the Declaration of Christopher Schmandt in Support of Apple's Petition for *Inter Partes* Review of U.S. Patent No. 10,971,140 (the "Schmandt Declaration," EX1003), including all materials referenced therein.

V. OPINIONS REGARDING THE '140 PATENT

26. I have reviewed the Schmandt Declaration submitted in connection with Apple's petition for *inter partes* review of the '140 Patent (IPR2023-00037), including materials and exhibits cited therein. I fully agree with, and hereby adopt, the opinions set forth in the Schmandt Declaration.

VI. CONCLUSION

27. I hereby 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 by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: July 11, 2023

Les Atlas

Les Atlas, Ph.D.