

**UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

ROKU, INC.,
Petitioner,

v.

UNIVERSAL ELECTRONICS INC.,
Patent Owner.

Case IPR2022-01289
Patent No. 9,847,083

**DECLARATION OF DR. MICHAEL S. SCORDILIS IN SUPPORT OF
PATENT OWNER'S RESPONSE**

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I, Dr. Michael S. Scordilis, declare as follows:

I. INTRODUCTION

1. My name is Dr. Michael S. Scordilis. I have been retained by counsel for Patent Owner Universal Electronics Inc. (“Patent Owner” or “UEI”) to provide my independent analysis regarding the validity of claims 1-19 (“Challenged Claims”) of U.S. Patent No. 9,847,083 (“the ‘083 patent”).

A. My Background, Qualifications, Publications, and Testimony

2. My background, qualifications, and educational and employment history are set forth in my curriculum vitae, which is attached hereto as **Exhibit 1**.

3. I have over 40 years of experience in the areas of acoustics, electronics, and signal processing. I started building electronic radio circuits in 1977. That hands-on activity continued during my undergraduate studies at the Royal Melbourne Institute of Technology, where I built voice scrambling radio transmitters, as well as several other circuits, and during my summer work experience where I programmed and built control circuits for farming applications. My practical experience continued during my work as Technical Officer at LM Ericsson where I evaluated, repaired, and modified telephone exchange electronic systems for voice communications.

4. I have over 30 years of academic experience. First at the University of Melbourne (1990-1995) where, as tenured lecturer, I developed and taught

several courses in digital signal processing and digital speech processing, and supervised several masters theses and doctoral dissertations in the areas of communications and audio and speech processing. I have had visiting scientist positions at Bell Communication Research (Bellcore) (1994) working on speech analysis and synthesis, at Sun Microsystems (1994) working on microphone arrays for speech recognition, and at the University of Patras, Greece (1995-96) working on acoustics and audio processing research. My academic career continued at the University of Miami (1997-2021) where, as associate professor, I developed and taught several undergraduate and graduate courses in electrical circuits, electronics, linear systems, digital signal processing, electrical and computer design, digital speech and audio processing, and engineering acoustics. I also supervised many senior projects, masters theses, and doctoral dissertations in the areas of signals and systems, electronics, communications, acoustics, digital signal processing, audio and speech signal processing.

5. I am also the author of numerous academic research publications that focus on various aspects of electronic devices, machine learning, speech identification, speech recognition, affective speech processing, speech enhancement, audio watermarking, acoustic filtering for echo cancellation, and numerous other audio-related scientific studies. In addition, I am the named inventor on at least one United States patent focused on audio watermarking.

6. I have experience with several aspects of the technology related to voice-controlled universal remotes. That experience includes research and development of speech detection in automatic speech recognition systems and spoken keyword spotting in real-world acoustic noise conditions. My research experience includes noise suppression, loudness estimation and acoustic analysis of speech and audio signals, and speech recognition adaptation to varying acoustic environmental conditions. My consulting experience includes work on speech recognition, voice-activated smart devices, voice detection, and noise suppression.

7. Numerous projects I have worked on have included speech-based devices and services, which are integral parts in voice-controlled universal remotes. One project I completed while working on a Sabbatical leave at Sun Microsystems Laboratories involved the design and implementation of a microphone array for improving speech quality in noisy home environments that utilize remote voice detection. In another project for Visa, I developed and applied signal enhancement methods for the purpose of estimating and suppressing environmental noise and improving speech signal quality when, during a transaction, users entered credit card credentials using voice.

B. Compensation

8. My compensation in this case is \$390 per hour without regard to the outcome of this proceeding.

9. I am not, and never have been, an employee of UEI. I am not receiving compensation for this declaration beyond my normal hourly fees based on my time actually spent analyzing and documenting my opinions herein on the ‘083 patent. My compensation is not related to the outcome of this proceeding, and I will not receive any additional compensation based on the outcome of any IPR or other proceeding involving the ‘083 patent.

II. SUMMARY OF MY OPINIONS

10. In summary, it is my opinion that each of the Challenged Claims of the ‘083 patent is valid and patentable. Petitioner and its expert, Mr. McNair, have failed to show that the Challenged Claims of the ‘083 patent are rendered obvious by the prior art under 35 U.S.C. § 103.

III. LEGAL PRINCIPLES

11. I will not offer opinions of the law, as I am not an attorney. However, patent counsel has informed me of several patent law principles, upon which I have relied to arrive at my conclusions.

A. Legal Standard for Claim Construction

12. It is my understanding that the purpose of the claim construction process is to determine the meaning of the terms in the Challenged Claims of the ‘083 patent to a person of ordinary skill in the art (“POSITA”) as of the time that the claimed invention was filed. I also understand that the words of the claims, the

specification, and the prosecution history are to be primarily considered in order to construe the claims. These three sources are commonly referred to as “intrinsic evidence,” while everything else is referred to as “extrinsic evidence.”

13. It is my understanding that in an *Inter Partes* Review the words of a claim are generally given their ordinary and customary meaning to a POSITA as of the time that the patent application containing the claimed invention was filed.

14. It is my further understanding that the same words and phrases within a claim or claims are presumed to have the same meaning. It is also my understanding that different words and phrases within a claim or claims are presumed to have different meanings. Similarly, all words in a claim have meaning, and a word or phrase in a claim should not be interpreted so as to render other words or phrases in the claim superfluous.

15. It is also my understanding that a POSITA is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification and the prosecution history.

B. Legal Standard for Obviousness

16. I understand that a patent claim may be unpatentable if the invention recited in the claim would have been obvious to one of ordinary skill in the art at the time the invention was made. In considering whether the Challenged Claims of

the '083 patent are obvious, I have been asked to consider (a) the level of ordinary skill in the art at the time of the claimed invention, (b) the scope and content of the prior art, and (c) any differences between the prior art and the Challenged Claims of the '083 patent. I further understand that the patent owner may show “secondary factors” related to non-obviousness, including commercial success, long-felt but unresolved need, failure of others, copying, praise by others, and unexpected results.

17. I understand that a patent claim composed of several elements is not necessarily proved obvious merely by demonstrating that each of its elements was independently known in the prior art. I also understand that obviousness should not be analyzed using the benefit of hindsight. Instead, it must be analyzed from the standpoint of what was known and understood by a POSITA at the time of the claimed invention. I further understand that a party seeking to invalidate a patent claim as obvious must demonstrate that a skilled artisan would have had reason to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so. I also understand that the party must persuasively explain how the references would be combined to arrive at the claimed invention. I understand that a proposed modification or combination is inappropriate for an obviousness inquiry when the modification or combination would change a prior art reference's

basic principle of operation or would render the prior art reference inoperable for its intended purpose.

18. I understand that a reference qualifies as prior art for an obviousness determination only when it is analogous to the claimed invention. I understand that prior art is analogous if it is from the same field of endeavor or if it is reasonably pertinent to the particular problem the inventor is trying to solve.

IV. THE BASES FOR MY OPINIONS

19. I have reviewed the '083 patent, including the Challenged Claims and the prosecution history of the '083 patent. (EX1001 and EX1002).

20. I have also reviewed the Petition for *Inter Partes* Review filed by Petitioner Roku, Inc. ("Petitioner" or "Roku"), the attached Declaration of Bruce McNair (EX1003), the transcript of the deposition of Mr. McNair (EX2002), as well as the Exhibits attached to Roku's Petition.

21. I have also reviewed the Board's Institution Decision.

22. In forming my opinions, I have considered the materials listed above and any other documents cited in this declaration. I have also relied on my own education, knowledge, and experience in the relevant art.

23. I have also considered the understanding of a POSITA around the time of the invention of the Challenged Claims.

V. PERSON OF ORDINARY SKILL IN THE ART

24. I am informed that prior art and any opinions related to the prior art are to be analyzed from the perspective of a POSITA who would be involved in the same field as the '083 patent at the time of the invention of the Challenged Claims (*i.e.*, November 17, 2011).

25. All of the opinions that I express in this declaration have been made from the standpoint of a POSITA at the time of the invention of the Challenged Claims of the '083 patent.

26. I understand that Petitioner has proposed that a POSITA would have had a bachelor's degree in computer science, in electrical engineering, or a related field, and approximately three years of experience or equivalent study in voice-controlled devices in universal remote controlled systems. I further understand that Petitioner has proposed that additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.

27. For the purposes of this declaration only, I have adopted Petitioner's proposed definition of a POSITA.

28. I met Petitioner's proposed definition of a POSITA as of the time of the invention of the Challenged Claims of the '083 patent.

VI. THE BOARD'S INSTITUTION DECISION

29. I understand that the Board instituted review of the Challenged Claims of the '083 patent on four grounds: (1) alleged obviousness of claims 1-6, 8-10, and 12-18 over Aginsky in view of Stammli; (2) alleged obviousness of claims 7, 11, and 19 over Aginsky in view of Stammli and Dresti; (3) alleged obviousness of claims 1-6, 8-10, and 12-18 over Aginsky in view of Hanson; and (4) alleged obviousness of claims 7, 11, and 19 over Aginsky in view of Hanson and Dresti.

VII. OVERVIEW OF THE '083 PATENT AND RELATED TECHNICAL BACKGROUND

30. The '083 patent, entitled "System and Method for Voice Actuated Configuration of a Controlling Device," was issued on December 19, 2017 from U.S. Patent Application No. 13/298,629 (filed November 17, 2011). (EX1001 at [21], [22], [45], [54].)

31. The '083 patent and the Challenged Claims generally relate "to remote control systems and, more particularly, to a system and method for setting up and configuring a controlling device such as a universal remote control to command functions of one or more types of remotely controllable appliances of one or more manufacturers." (*Id.* at 1:7-12.) According to the '083 patent, "it has been seen that the process of setting up and configuring a controlling device such as a universal remote control [is] demanding, exacting, and generally frustrating for many users." (*Id.* at 2:14-17.) "For example, user manuals or other documents

containing setup codes and entry instructions may be lost or misplaced, or may be superseded as brand and/or model names evolve or controllable functions are added; a personal computer and/or Internet access may not be readily available at the location of the appliances to be controlled; etc.” (*Id.* at 2:17-23.)

32. To achieve a “a simplified and more user friendly system and method for conveniently setting up and configuring a controlling device” (*id.* at 2:23-25), the ‘083 patent created “a controlling device ... provisioned with means to receive voice input from a user, e.g., a microphone, such that when placed in a setup mode the controlling device may solicit spoken appliance descriptive information, for example brand and model number, to be processed by a speech recognition system in order to identify the appliance to be controlled and the command data to which it is responsive.” (*Id.* at 2:34-41.) This “speech recognition capability may be extended to allow a user to further refine the controlling device configuration, for example by assigning extended functionality to certain keys, verbally accessing infrequently used functions, defining activities, etc.” (*Id.* at 2:47-51.)

33. The ‘083 patent also created a more robust appliance command code database for use in conjunction with the controlling device, wherein the command code database “may comprise a series of brand records 702 each of which points to a group of model records 704 specific to that brand, each model record in turn pointing to a codeset record 706 containing ... [data] applicable to that specific

brand and model of appliance.” (*Id.* at 9:55-62.) “[E]ach code set record 706 may comprise ... a block of protocol and formatting information 752 which may describe the physical protocol requirements for transmitting the command data elements which comprise this codeset...” (*Id.* at 10:47-51.) “Following block 752 may be a series of individual command function entries 754.” (*Id.* at 10:54-55.) “Each entry may comprise a standard function ID 756, ... a function name 758 ... together with its phonetic representation 760; and command data 762.” (*Id.* at 10:56-65.) “In some embodiments, multiple instances of function name 758 and associated phonetic representation 760 may be present to cater for synonyms and/or regional differences.” (*Id.* at 11:1-3.)

34. An example codeset record 706 of the '083 patent is shown below:

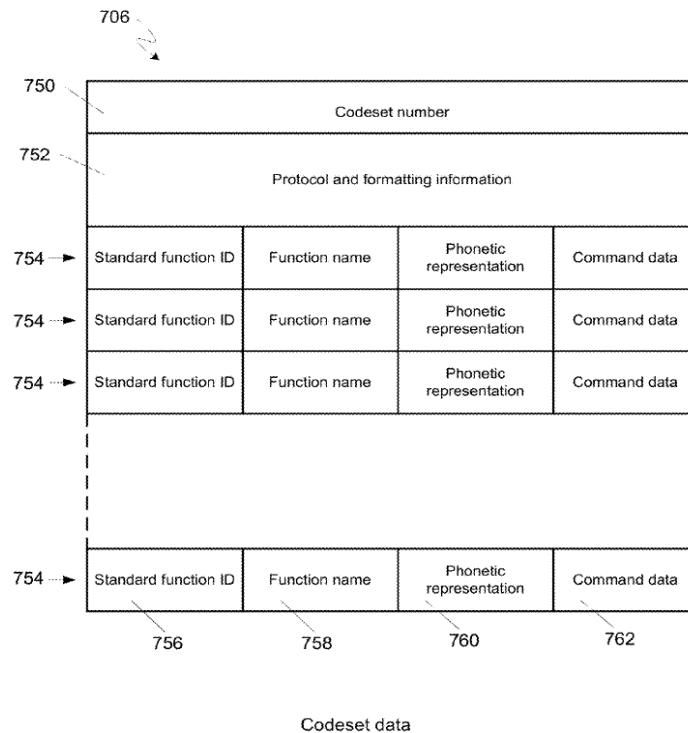


Figure 7b

(*Id.* at FIG. 7b.)

35. According to the '083 patent, “the information contained in the identified codeset record may be transferred to the controlling device being configured.” (*Id.* at 11:5-7.) “Furthermore, in order to identify user-requested extended command functions, the phonetic representations 758 corresponding to the command function entries of the codeset number corresponding to the currently configured appliance may be searched by the speech recognition means ... and the matching command data returned to the requesting controlling device.” (*Id.* at 11:13-20.)

36. Independent Challenged Claims 1 and 12 of the '083 patent are reproduced below:

1. A method for configuring a controlling device to command functional operations of a target appliance, the method comprising:

causing a codeset record to be provisioned to the controlling device for use in commanding functional operations of the target appliance, the provisioned codeset record comprising protocol and formatting information and a plurality of individual command function entries wherein each of the plurality of individual function entries within the codeset record comprises command data, a standard function identifier, data which comprises a phonetic representation of a function name corresponding the standard function identifier, and a plurality of data each of which comprises a phonetic representation of a unique one of a plurality of synonyms of the function name;

causing less than all of the individual command function entries from within the provisioned codeset record to each be matched to one or more of a plurality of user input elements of the controlling device whereupon a subsequent activation of a one of the plurality of user input elements will cause the controlling device to transmit a command communication by using the protocol and formatting information and the command data of a one or more of the plurality of individual command function entries from within the provisioned codeset record that was mapped to the one of the plurality of user input element activated; and

causing the controlling device to transmit a command communication by using the protocol and formatting information and the command data of a one of the one or more of the plurality of individual command function entries from within the provisioned codeset record having

a phonetic representation of the function name or a synonym of the function name which corresponds to voice data provided to a speech recognition engine.

(*Id.* at claim 1.)

12. A system for configuring a controlling device to command functional operations of a target appliance, the system comprising:

a processing device having associated instructions stored on a non-transient readable media which instructions, when executed by the processing device, cause a codeset record to be provisioned to the controlling device for use in commanding functional operations of the target appliance wherein the provisioned codeset record comprises protocol and formatting information and a plurality of individual command function entries wherein each of the plurality of individual function entries within the codeset record comprises command data, a standard function identifier, data which comprises a phonetic representation of a function name corresponding to the standard function identifier, and a plurality of data each of which comprises a phonetic representation of a unique one of a plurality of synonyms of the function name; cause less than all of the individual command codes from within the provisioned codeset record to each be mapped to one or more of a plurality of user input elements of the controlling device wherein a subsequent activation of a one of the plurality of user input elements will cause the controlling device to transmit a command communication by using the protocol and formatting information and the command data of a corresponding one or more of the plurality of individual command function entries from with the provisioned codeset record that was mapped to the one of the plurality of user input elements activated, and cause the controlling device to transmit a command communication by using the protocol and formatting information and the command data of a one of the one or more of the plurality of

individual command function entries from within the provisioned codeset record having a phonetic representation of the function name or a synonym of the function name which corresponds to voice data provided to a speech recognition engine.

(*Id.* at claim 12.)

37. Challenged Claims 1 and 12 of the '083 patent recite a controlling device with a codeset record comprising: (i) protocol information; (ii) formatting information; and (ii) a plurality of command function entries.

38. Each of the command function entries comprises, *inter alia*, (i) a phonetic representation of a function name; and (ii) phonetic representations of a plurality of synonyms of the function name. (*Id.* at claims 1, 12.) When a speech recognition engine recognizes a function name (or a synonym of a function name) in user-provided voice data, the data in the command function entry having the phonetic representation of the recognized function name (or a synonym of the function name) is used to cause the controlling device to transmit a command communication to a target appliance. (*Id.*)

39. Challenged Claims 1 and 12 of the '083 patent expressly require that the claimed phonetic representations of the function name and the synonyms of the function name be stored in a very precise location within the controlling device. (*Id.*) The phonetic representations of the function name and the synonyms of the function name must be stored in:

- a specific codeset record (*i.e.*, the codeset record provided to the controlling device for use in commanding functional operations of the target appliance and comprising protocol and formatting information and a plurality of command function entries); and
- a specific location within the specific codeset record (*i.e.*, in each of the command function entries within the provided codeset record). (*Id.*)

VIII. OVERVIEW OF THE ASSERTED PRIOR ART

40. I understand that Petitioner has asserted the following prior art references. These references are discussed in detail below:

Exhibit Number	Prior Art
1004	U.S. Patent No. 8,995,981 (“Aginsky”)
1005	U.S. Patent No. 6,839,670 (“Stammler”)
1006	U.S. Patent App. Pub. No. 2012/0271639 (“Hanson”)
1007	U.S. Patent App. Pub. No. 2003/0103088 (“Dresti”)

A. Aginsky

41. I have reviewed Aginsky. Aginsky is generally directed to “systems and methods in which a controllable device transfers to [a] remote device, such as to a remote control application (‘app’) located on a smartphone, a data structure identifying various functions that can be controlled by [the] remote device, together with the identity of the signal type that will achieve the desired

operation.” (EX1004 at Abstract.) “The remote device, upon accepting input directly from the remote device, can then allow the remote device user to select how controls of the various functions are to be configured and presented to, or otherwise selectively arranged for a user on a user interface of the remote device.” (*Id.*)

42. Aginsky discloses that a data structure may identify information such as exemplary functions (*e.g.*, on-off, menu, volume, channel, and input) and exemplary command signals (*e.g.*, XY1, XY2, XX1, ZZZ, and XY3). (*Id.* at 8:21-28.) The command signals “denote the type of signal as well as the code or code sequence of the signal.” (*Id.* at 9:9-10.) The command signals cause a function to be carried out when transmitted from the remote device 107-1 to a controllable device 101-1. (*Id.* at 8:28-30.) The data structure may also identify “the appearance, arrangement, and/or assignment of function controls (*e.g.*, left, center, right, button, up, down, button, arrow, one-click, two-click, key word) for a specific function of a controllable device, and an associated status (*e.g.*, on or off).” (*Id.* at 9:24-28.) Aginsky discloses that the memory 109-1 of the remote device 107-1 stores multiple data structures. (*See, e.g., id.* at 2:44-46 (“Small data files also enable the remote device to store many different data structures”); *see also id.* at 7:58-64.)

43. Aginsky generally discloses that the remote device 107-1 is capable of voice control. (*Id.* at 6:1-6, 8:8-12, 9:61-65.)

44. Aginsky does not disclose, teach, or suggest that its data structures include any information relating to voice control technology or how any of its data structures would be constructed to include information relating to voice control technology. (*See generally id.* at 7:58-10:2.)

B. Stammer

45. I have reviewed Stammer. Stammer is generally directed to “a process for automatic control of one or several devices by speech commands or by speech dialog in real-time operation.” (EX1005 at 1:12-14.) Stammer’s system “permits a speech command input or speech dialog control that is for the most part adapted to the natural way of speaking, and that an extensive vocabulary of admissible commands is made available to the speaker for this.” (*Id.* at 2:61-65.) “The extensive vocabulary is used to increase the user friendliness by using synonymous words or different variations in the pronunciation.” (*Id.* at 6:8-10.)

46. Stammer “generally recognizes even non-admissible words, names, sounds or word rearrangements in the speech commands entered by the speaker as such and extracts from these entered speech commands admissible speech commands, which the speaker actually intended.” (*Id.* at 3:1-6.) The provided speech dialog system includes two types of speech recognizers. The first type is a

speaker-independent recognizer with fixed-vocabulary. (*Id.* at 5:8-10.) The second type is a speaker-dependent recognizer with a freely-definable vocabulary. (*Id.* at 5:8-12.)

C. Hanson

47. I have reviewed Hanson. Hanson is generally directed to “a solution for permitting automated speech command discovery via manual event to function mapping.” (EX1006 at [0008].) “In the solution, a manual event (e.g., manually performed operation) within a computing system can be mapped to a function within a speech interface.” (*Id.*) “The mapping can trigger speech command discovery via one or more customizable rulesets” such as “using a grammar tree, utterance length, text strings, and the like.” (*Id.*) The mapping can support synonyms and/or alternative commands for a function. (*Id.* at [0037].) In one example of Hanson’s method, “when a user opens a car window via toggling an electronic power window switch, a speech interface can audibly present an appropriate voice activated command to the user.” (*Id.* at [0018].) In another example, “when a driver adjusts the air conditioning temperature manually, a speech interface of the automobile can announce ‘You could have said increase temperature one degree to adjust the air conditioning.’” (*Id.* at [0008].)

D. Dresti

48. I have reviewed Dresti. Dresti “relates generally to hand-held electronic devices and, more particularly, relates to a user interface for an universal remote control application resident on the hand-held electronic device.” (EX1007 at [0002].) The user interface “functions to display[] operational mode information to a user.” (*Id.* at Abstract.) “The graphical user interface may be used, for example, to setup the remote control application to control appliances for one or more users in one or more rooms, to perform activities, and to access favorites.” (*Id.*)

IX. CLAIM CONSTRUCTION

A. The Claimed “protocol and formatting information” Is Separate And Distinct From The Claimed “plurality of individual command function entries” And The Data Contained In The Individual Command Function Entries.

49. Challenged Claims 1 and 12 recite: “the provisioned codeset record comprising protocol and formatting information and a plurality of individual command function entries...” and “the provisioned codeset record comprises protocol and formatting information and a plurality of individual command function entries,” respectively.

50. The claimed “protocol and formatting information” is separate and distinct from the claimed “plurality of individual command function entries” and the data contained in the command function entries in view of the plain language

of the Challenged Claims, as well as the specification and prosecution history of the '083 patent.

51. I have reviewed the Challenged Claims of the '083 patent. The plain language of the Challenged Claims supports that the claimed “protocol and formatting information” is separate and distinct from the claimed “plurality of individual command function entries” and the data contained in the command function entries.

52. Challenged Claims 1 and 12 of the '083 patent recite a codeset record “comprising protocol and formatting information and a plurality of individual command function entries.” (EX1001 at claims 1 and 12.) The claimed “protocol and formatting information” and the claimed “plurality of individual command function entries” are recited as separate and distinct elements of the claimed “codeset record.” (*Id.*)

53. Challenged Claims 1 and 12 specify that each of the claimed “plurality of individual command function entries” comprises data such as “command data” and “a standard function identifier.” (*Id.*) The Challenged Claims do not recite that the claimed “protocol and formatting information” is part of the claimed “plurality of individual command function entries.” (*Id.*)

54. Challenged Claims 1 and 12 recite that the controlling device transmits a command communication using the claimed “protocol and formatting

information,” as well as “command data” from one or more of the “plurality of individual command function entries.” (EX1001 at claims 1 and 12.) The same “protocol and formatting information” is used to transmit a subsequent command communication to a target appliance regardless of which individual command function entries and their corresponding command data are used therewith. (*Id.*) That the same “protocol and formatting information” is used to transmit a command communication regardless of which individual command function entries and their associated command data are used also supports that the “protocol and formatting information” is separate and distinct from the “plurality of individual command function entries” and the data contained therein.

55. I have reviewed the specification of the ‘083 patent. The specification supports that the claimed “protocol and formatting information” is separate and distinct from the claimed “plurality of individual command function entries” and the data contained in the command function entries.

56. The specification teaches a codeset record 706 that comprises “a block of protocol and formatting information 752 which may describe the physical protocol requirements for transmitting the command data elements which comprise this codeset...” (EX1001 at 10:47-51.) The specification further teaches that following block 752 is “a series of individual command function entries 754.” (*Id.* at 10:54-55.)

57. The “protocol and formatting information 752” is separate and distinct from the “plurality of individual command function entries 754” and the data contained in the command function entries according to Figure 7b:

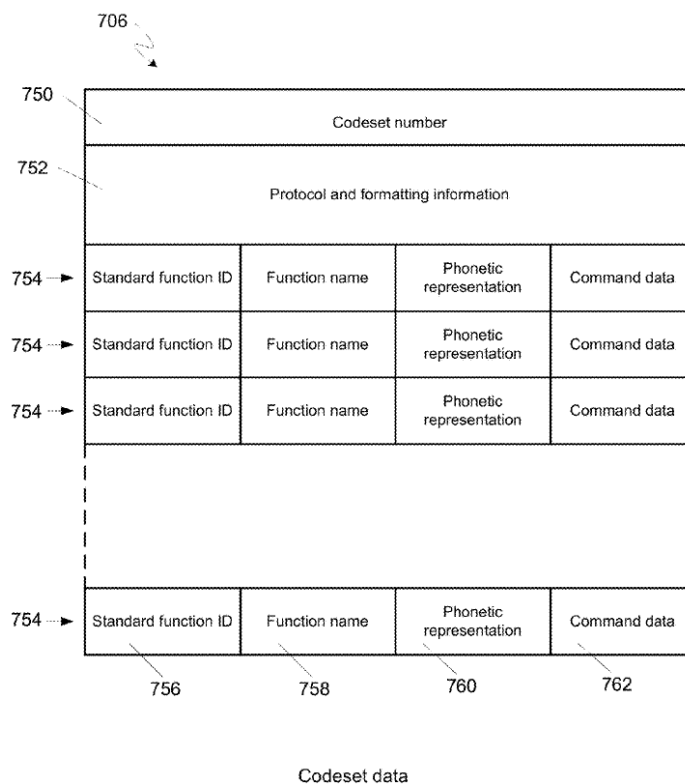


Figure 7b

(*Id.* at FIG. 7b.)

58. The specification of the ‘083 patent does not teach that the “protocol and formatting information” is part of the “plurality of individual command function entries.” (*Id.* at FIG. 7b, 10:47-11:3.) The specification consistently teaches that the “protocol and formatting information” is separate and distinct from

the “plurality of individual command function entries” and the data contained in the command function entries. (*Id.*)

59. I have reviewed the prosecution history of the ‘083 patent. The prosecution history of the ‘083 patent supports that the claimed “protocol and formatting information” is separate and distinct from the claimed “plurality of individual command function entries” and the data contained in the command function entries.

60. The limitation “the provisioned codeset record comprising protocol and formatting information and a series of individual command function entries” was added during prosecution to overcome a prior art obviousness rejection. (EX1002 at 165-173.) The Applicant repeatedly argued that the prior art “does not disclose providing *individual command function entries* within a codeset record, i.e., a data structure that also provides protocol and formatting information...” (*Id.* at 255 (emphases in original); *see also id.* at 267, 282, 352, 397-398, 426.) The Applicant’s argument and the claim amendment supports that the claimed “protocol and formatting information” and the claimed “individual command function entries” are separate and distinct components of the claimed codeset record. (*Id.*)

B. The Claimed “protocol and formatting information” Must Be Included In The Claimed “provisioned codeset record” Itself.

61. The claimed “protocol and formatting information” must be included in the claimed “provisioned codeset record” itself in view of the plain language of the Challenged Claims, as well as the specification of the ‘083 patent.

62. I have reviewed the Challenged Claims of the ‘083 patent. The plain language of the Challenged Claims supports that the claimed “protocol and formatting information” must be included in the claimed “provisioned codeset record” itself.

63. Challenged Claims 1 and 12 recite: “the provisioned codeset record comprising protocol and formatting information” and “the provisioned codeset record comprises protocol and formatting information,” respectively. The Challenged Claims are clear and unambiguous that the claimed “protocol and formatting information” must be included in the claimed “provisioned codeset record” itself.

64. I have reviewed the specification of the ‘083 patent. The specification also supports that the claimed “protocol and formatting information” must be included in the claimed “provisioned codeset record” itself.

65. The specification teaches a codeset record 706 that comprises “a block of protocol and formatting information 752 which may describe the physical protocol requirements for transmitting the command data elements which comprise

this codeset...” (EX1001 at 10:47-51.) As shown below, the “protocol and formatting information 752” is included in codeset record 706:

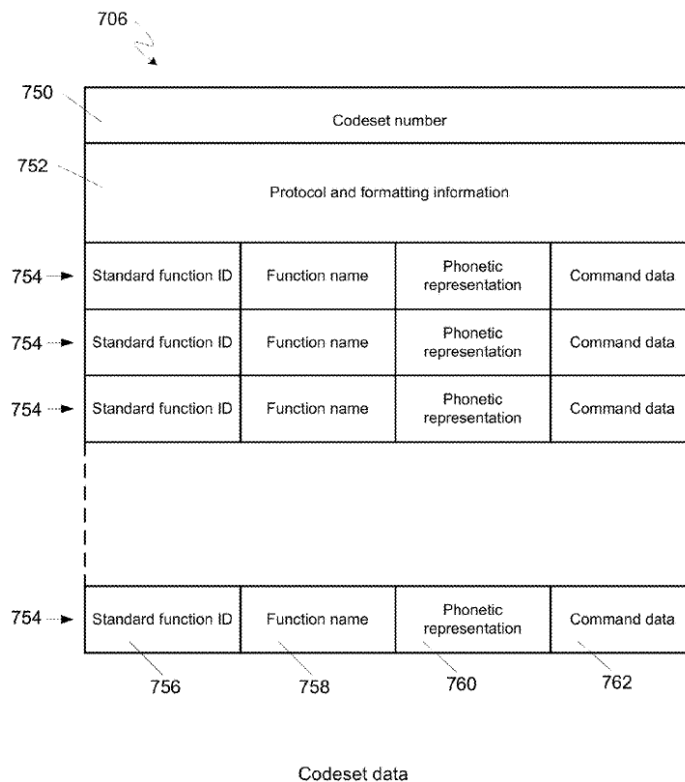


Figure 7b

(*Id.* at FIG. 7b.)

C. The Claimed “protocol and formatting information” Is “the set of procedures needed to transmit commands from one device to another in a way that the receiving device can make sense of and use the commands.”

66. The claimed “protocol and formatting information” is “the set of procedures needed to transmit commands from one device to another in a way that the receiving device can make sense of and use the commands.”

67. I understand that Mr. McNair testified that protocol and formatting information is the set of procedures needed to transmit commands from one device to another in a way that the receiving device can make sense of and use the commands. (*See, e.g.*, EX2002 at 32:19-33:3, 33:22-34:9, 36:5-21.) I agree with Mr. McNair.

68. Protocol information is the set of procedures needed to establish a link between two or more electronic devices for the purpose of communication and information exchange.

69. Formatting information is the set of procedures for transforming digital data into a physical signal (*e.g.*, pulse timing, shaping and duration, the type of carrier to use such as radio or light waves, carrier frequencies, modulation scheme, etc.).

70. The Challenged Claims are consistent with Mr. McNair's and my understanding of the term protocol and formatting information. The Challenged Claims specify that the claimed protocol and formatting information is information that is used, along with command data, to transmit a command communication from the controlling device. (EX1001 at claims 1 and 12.)

71. The specification of the '083 patent is also consistent with Mr. McNair's and my understanding of the term protocol and formatting information. The specification of the '083 patent teaches that protocol and formatting

information describes the physical protocol requirements for transmitting the command data elements (*e.g.*, command codes or code sequences) in the codeset record. (EX1001 at 10:47-54 (“protocol and formatting information ... describe[s] the physical protocol requirements for transmitting the command data elements which comprise this codeset”).) The specification also teaches that the claimed protocol and formatting information may include “items such as carrier frequency, bit encoding, data frame size and structure, appliance address, parity or CRC requirements, etc.” (*Id.*)

X. PETITIONER HAS FAILED TO MEET ITS BURDEN OF PROVING THAT THE CHALLENGED CLAIMS OF THE ‘083 PATENT ARE UNPATENTABLE

A. Ground 1: Petitioner Has Failed To Show That Aginsky In Combination With Stammler Renders Challenged Claims 1-6, 8-10, And 12-18 Obvious.

1. Petitioner Has Failed To Show That Aginsky Discloses, Teaches, Or Suggests “the provisioned codeset record comprising protocol and formatting information.”

(a) Petitioner Has Failed To Show That Aginsky Discloses, Teaches, Or Suggests “the provisioned codeset record comprising protocol and formatting information” Under Patent Owner’s Construction.

72. I understand that Petitioner and Mr. McNair rely solely on Aginsky for the limitation “the provisioned codeset record comprising protocol and formatting information.” (Petition at 36-37; EX1003, ¶¶ 123-124.) Petitioner and

Mr. McNair assert that Aginsky “discloses the provisioned codeset record comprising protocol and formatting information.” (*Id.*)

73. The Board should construe the Challenged Claims to clarify that the claimed “protocol and formatting information” is separate and distinct from the claimed “plurality of individual command function entries” and the data contained in the command function entries.

74. Petitioner and Mr. McNair assert that “Aginsky discloses data structures in tables 115’ and 116’” and that “[e]ach row of the data structures represents an individual command function entry...” (Petition at 37-38; EX1003, ¶¶ 121, 126.) Petitioner and Mr. McNair also assert that Aginsky’s alleged “individual command function entries” include “protocol and formatting information.” (Petition at 36-37; EX1003, ¶ 124.)

75. Petitioner and Mr. McNair do not assert that Aginsky discloses, teaches, or suggests any “protocol and formatting information” that is separate and distinct from Aginsky’s alleged “plurality of individual command function entries.” (*Id.*)

76. Because the claimed “protocol and formatting information” must be separate and distinct from the claimed “plurality of individual command function entries” and the data contained therein under the proper interpretation of the Challenged Claims, Petitioner and Mr. McNair have not shown (and cannot show)

that Aginsky discloses, teaches, or suggests “the provisioned codeset record comprising protocol and formatting information.”

(b) Petitioner Has Failed To Show That Aginsky Discloses, Teaches, Or Suggests “the provisioned codeset record comprising protocol and formatting information” Under Any Construction.

77. Challenged Claims 1 and 12 recite that the codeset record provided to the controlling device comprises protocol and formatting information. (EX1001 at claims 1 and 12.)

78. As discussed above, the Challenged Claims require that the claimed protocol information and formatting information are each in the claimed codeset record itself. (*Id.*; *see also id.* at FIG. 7b.)

79. As also discussed above, the claimed protocol and formatting information is the set of procedures needed to transmit commands from one device to another in a way that the receiving device can make sense of and use the commands. (*See, e.g.*, EX2002 at 32:19-33:3, 33:22-34:9, 36:5-21; EX1001 at 10:47-54.)

80. Petitioner and Mr. McNair assert that Aginsky’s data structures 115’ and 116’ (*i.e.*, the alleged codeset records) include “SIGNAL columns 112-1 and 112-2” that “denote the type of signal as well as the code or code sequence of the signal,” and that the type of signal denoted in Aginsky’s SIGNAL columns 112-1 and 112-2 discloses the claimed protocol and formatting information. (Petition at

36-37 (citing EX1004 at 8:63-9:10); *see also id.* at 25; EX1003, ¶ 124; EX2002 at 28:14-29:1.) Petitioner and Mr. McNair do not assert that “the code or code sequence of the signal” in Aginsky’s SIGNAL columns 112-1 and 112-2 reads on the claimed “protocol information and formatting information.” (Petition at 36-37; EX1003, ¶¶ 123-124; EX2002 at 46:16-47:2, 47:11-20.)

81. Petitioner and Mr. McNair assert that the type of signal denoted in Aginsky’s SIGNAL columns 112-1 and 112-2 “‘can be any type of signal required for control purposes’ such as a frequency set, a coded IR signal, or a Bluetooth signal.” (*Id.*) Petitioner and Mr. McNair also assert that IR and Bluetooth include a protocol and a format, and thus a POSITA would have understood that Aginsky’s example signal types (*i.e.*, frequency set, IR, and Bluetooth) “require protocol and formatting information as defined in [the] ‘083 [patent].” (Petition at 37; EX1003, ¶ 124.)

82. Petitioner and Mr. McNair have failed to show that Aginsky discloses, teaches, or suggests “the provisioned codeset record comprising protocol and formatting information” because Petitioner and Mr. McNair have failed to show (and cannot show) that the type of signal denoted in Aginsky’s SIGNAL columns 112-1 and 112-2 discloses both protocol information and formatting information in the alleged codeset record itself.

83. As Petitioner and Mr. McNair note, Aginsky's SIGNAL columns 112-1 and 112-2 denote the type of signal that is used to communicate with a controllable device for control purposes. (EX1004 at 8:63-9:10.) The indicated signal type may be a frequency set, a coded IR signal, or a Bluetooth signal. (*Id.*) However, an indication of a type of signal that is transmitted (*e.g.*, coded IR, Bluetooth, etc.) is not itself the set of procedures needed to transmit commands from one device to another via the indicated signal type (*i.e.*, protocol and formatting information). The actual set of procedures must still be received, obtained, looked up, etc. Thus, a POSITA would not consider an indication of the type of signal that is transmitted to disclose the claimed protocol and formatting information.

84. U.S. Patent No. 9,716,853 to Arling et al. ("Arling"), which has a priority date of October 28, 2011, further illustrates the above point. Arling discloses a universal control engine ("UCE") that includes a command matrix 700. (EX2003 at 7:19-22, FIG. 7.) The command matrix 700 comprises a series of data cells, each of which corresponds to a specific command 702 and a specific appliance to be controlled 704. (*Id.* at 7:22-26.) Each data cell comprises an indication of a signal type (*e.g.*, IR, CEC, etc.). (*Id.* at 7:26-42, FIG. 7.) Command data and formatting information are stored elsewhere in memory 502. (*Id.*) Arling confirms that an indication of a signal type is not itself the set of

procedures needed to transmit commands from one device to another via the indicated signal type. The actual set of procedures for transmitting a command via the indicated signal type must still be received, obtained, looked up, etc.

85. Petitioner's and Mr. McNair's assertion that Aginsky's example signal types "require protocol and formatting information" fails to fill in the gaps in Aginsky's disclosure. (Petition at 37; EX1003, ¶ 124.) Again, the Challenged Claims expressly recite and require that the claimed protocol information and formatting information must be in the claimed codeset record itself. (EX1001 at claims 1 and 12.) The Challenged Claims also expressly distinguish between the claimed protocol and formatting information stored in the codeset record and a command communication transmitted from the controlling device. (*Id.*) That a Bluetooth or IR transmission allegedly requires protocol and formatting information has no bearing on whether Aginsky's data structures 115' and 116' (*i.e.*, the alleged codeset records) store any protocol and formatting information anywhere—let alone in Aginsky's SIGNAL columns 112-1 and 112-2, as per Petitioner's theory. Aginsky's SIGNAL columns 112-1 and 112-2 merely indicate a signal type and a code or code sequence (EX1004 at 9:8-10), neither of which reads on the claimed protocol and formatting information.

86. Aginsky does not disclose or teach that its SIGNAL columns 112-1 and 112-2 contain protocol and formatting information. (*See, e.g.*, EX1004 at 8:21-9:14.)

87. Petitioner's and Mr. McNair's statement that Aginsky discloses that its data structure may include "protocols, rules, or other information useful to carrying out remote control of the controllable device" is misleading. (Petition at 26 (quoting EX1004 at 13:40-43); EX1003, ¶ 108.) The "protocols" and "rules" mentioned in the above quote refer to (i) user/device permissions and restrictions (*e.g.*, password requirements, child permissions, etc.); and (ii) customized control layouts for devices (*e.g.*, how the buttons are arranged). (EX1004 at 6:7-7:16, 9:15-28, 10:27-50, 11:49-54; *see also id.* at FIG. 1C (at 121-1 and 121-2).) These "protocols" and "rules" are in no way related to the claimed protocol and formatting information, which again is the set of procedures needed to transmit commands from one device to another.

88. I understand that neither Petitioner nor Mr. McNair have asserted that a POSITA would have modified Aginsky's SIGNAL columns 112-1 and 112-2 to include protocol and formatting information, and I understand that Petitioner and Mr. McNair are barred from raising this argument.

89. I also understand that neither Petitioner nor Mr. McNair have asserted that Aginsky suggests that its SIGNAL columns 112-1 and 112-2 contain protocol

and formatting information, and I likewise understand that Petitioner and Mr. McNair are barred from raising this argument. Nevertheless, to the extent Petitioner attempts to argue in its Reply that Aginsky suggests that its SIGNAL columns 112-1 and 112-2 contain protocol and formatting information, such an argument would be without merit.

90. Protocol and formatting information is information that is common to all communications over a particular communication method. The entries in Aginsky's SIGNAL columns 112-1 and 112-2, however, contain a code (or code sequence) that is highly specific to the performance of a certain function (*e.g.*, power on, volume up, etc.). Storing protocol and formatting information in the entries in Aginsky's SIGNAL columns 112-1 and 112-2 would be redundant, impractical, and non-sensical because the same information would need to be repeated each time a specific signal type is indicated. No POSITA would interpret Aginsky's SIGNAL columns 112-1 and 112-2 to contain protocol and formatting information. Thus, Aginsky does not suggest that its SIGNAL columns 112-1 and 112-2 contain protocol and formatting information.

91. Aginsky does not disclose, teach, or suggest that protocol or formatting information is stored in SIGNAL columns 112-1 or 112-2, and Petitioner and Mr. McNair have identified no such disclosure, teaching, or suggestion. (Petition at 25-26, 36-37; EX1003, ¶ 124.)

2. Petitioner Has Failed To Show That Aginsky In Combination With Stammler Discloses, Teaches, Or Suggests “wherein each of the plurality of individual function entries within the codeset record comprises ... data which comprises a phonetic representation of a function name corresponding to the standard function identifier, and a plurality of data each of which comprises a phonetic representation of a unique one of a plurality of synonyms of the function name” (“Phonetic Representations Limitation”).

92. I understand that Petitioner and Mr. McNair rely on Aginsky in combination with Stammler for the Phonetic Representations Limitation. (Petition at 40-42; EX1003, ¶¶ 133, 139.) Petitioner and Mr. McNair assert that Aginsky as modified by Stammler “teaches” the Phonetic Representations Limitation. (*Id.*)

93. The Phonetic Representations Limitation requires that each of the plurality of individual command function entries within the claimed codeset record comprise, *inter alia*: (i) a phonetic representation of a function name; and (ii) phonetic representations of a plurality of synonyms of the function name. (EX1001 at claims 1, 12.)

94. The Phonetic Representations Limitation also requires that the claimed phonetic representations be stored: (i) in a specific codeset record (*i.e.*, the codeset record provisioned to the controlling device for use in commanding functional operations of the target appliance and comprising protocol and formatting information and a plurality of command function entries); and (ii) in a

specific location within that specific codeset record (*i.e.*, in each of the command function entries within the provisioned codeset record). (*Id.*)

95. Petitioner and Mr. McNair read the claimed codeset record on either of the data structures in tables 115' and 116' of FIG. 1B of Aginsky. (Petition at 21-23, 35, 37; EX1003, ¶ 121.) Petitioner and Mr. McNair also assert that each row in tables 115' and 116' represents an individual command function entry. (Petition at 27, 37-38; EX1003, ¶ 126.)

96. Petitioner and Mr. McNair assert that Aginsky as modified by Stammler teaches the Phonetic Representations Limitation. (Petition at 40-42; EX1003, ¶¶ 133, 139.) Petitioner and Mr. McNair assert that Aginsky's remote device 107-1 is generally capable of voice control (Petition at 40 (citing EX1004 at 6:2-6, 8:8-12, 9:60-65); EX1003, ¶ 135), but agree that Aginsky does not disclose, teach, or suggest the Phonetic Representations Limitation. (Petition at 40, 42; *see also id.* at 20-29 (Petitioner failing to assert that Aginsky's data structures include any information relating to voice commands); EX1003, ¶ 135; *see generally* EX1004 at 7:58-10:2 (Aginsky failing to disclose, teach, or suggest that its data structures include any information relating to voice commands).)

97. Petitioner and Mr. McNair also assert that Stammler "discloses a speech dialog system for automatic control or operation of one or more devices by voice commands" that may be based on "phonetic word subunits" and may include

“synonymous words.” (Petition at 29-30; EX1003, ¶ 113.) According to Petitioner and Mr. McNair, “Stammler specifically teaches data structure inputs that would allow Aginsky’s system and methods to advantageously implement voice control.” (Petition at 32; EX1003, ¶ 114.)

98. Petitioner and Mr. McNair have failed to show that Aginsky in combination with Stammler discloses, teaches, or suggests the Phonetic Representations Limitation because neither Aginsky nor Stammler discloses, teaches, or suggests phonetic representations of function names (or synonyms of function names) stored in a codeset record or, more particularly, in command function entries within a codeset record, as the Challenged Claims require.

99. Regarding Aginsky, Petitioner and Mr. McNair agree that Aginsky does not disclose, teach, or suggest that its alleged codeset records include any information related to voice commands. (Petition at 40, 42; *see also id.* at 20-29 (Petitioner failing to assert that Aginsky’s data structures include any information relating to voice commands); EX1003, ¶ 135; *see generally* EX1004 at 7:58-10:2 (Aginsky failing to disclose, teach, or suggest that its data structures include any information relating to voice commands).) Petitioner and Mr. McNair also agree that Aginsky does not disclose, teach, or suggest phonetic representations of function names (or synonyms of function names). (Petition at 20-29, 40-42; EX1003, ¶¶ 133-142.)

100. Regarding Stammler, Petitioner and Mr. McNair argue that “Stammler explicitly discloses storing phonetic representations in memory...” (Petition at 41 (citing EX1005 at 12:19-27); EX1003, ¶ 137.) I disagree with Petitioner and Mr. McNair. The cited portion of Stammler does not “explicitly disclose[] storing phonetic representations in memory.” Rather, the cited portion of Stammler discloses that a memory may be connected to Stammler’s digital signal processor. (EX1005 at 12:19-27.)

101. As Mr. McNair testified, a codeset record is a data structure that contains command data. (EX2002 at 14:5-14.) Stammler does not teach a data structure that contains command data. Stammler does not disclose, teach, or suggest a codeset record. Stammler likewise does not disclose, teach, or suggest storing phonetic representations in a codeset record (or in command function entries within a codeset record).

3. Petitioner Has Failed To Show That Aginsky In Combination With Stammler Discloses, Teaches, Or Suggests “a speech recognition engine.”

102. Independent Challenged Claims 1 and 12 both recite providing voice data to a “speech recognition engine.” (EX1001, ‘083 patent, at claims 1 and 12.)

103. I understand that Petitioner and Mr. McNair do not assert that Aginsky discloses, teaches, or suggests a “speech recognition engine.” (Petition at

45-46; *see also id.* at 51 (“Aginsky does not explicitly disclose how remote device 107-1 receives voice input or creating voice data.”); EX1003, ¶¶ 150-151.)

104. While Petitioner and Mr. McNair assert that Stammer discloses a “speech recognition engine,” Petitioner and Mr. McNair do not propose modifying Aginsky to have a “speech recognition engine.” (Petition at 45-46; *see also id.* at 32 (Petitioner proposing only to modify Aginsky in view of Stammer to include phonetic representations in Aginsky’s data structure); EX1003, ¶¶ 150-151.)

105. Petitioner and Mr. McNair have also failed to identify any reason why a POSITA would have modified Aginsky to have a “speech recognition engine,” which further confirms that Petitioner and Mr. McNair have not proposed modifying Aginsky to have a “speech recognition engine.” (Petition at 45-46; EX1003, ¶¶ 149-151.)

4. Petitioner Has Failed To Show That Aginsky Discloses, Teaches, Or Suggests “a processing device having associated instructions stored on a non-transient readable media which instructions, when executed by the processing device, cause a codeset record to be provisioned to the controlling device” (“Processing Device Limitation”).

106. I understand that Petitioner and Mr. McNair rely solely on Aginsky for the Processing Device Limitation. (Petition at 46-47; EX1003, ¶¶ 183-184.) Petitioner and Mr. McNair assert that Aginsky “discloses” the Processing Device Limitation. (*Id.*)

107. The Processing Device Limitation requires that a processing device execute stored instructions that cause a codeset record to be provisioned to a controlling device. (EX1001 at claim 12.)

108. Petitioner and Mr. McNair assert that Aginsky discloses a controllable device 101-1 that includes a processor 102-1 and a memory 103-1, and that “[p]rocessors execute various logical operations of controllable devices and are well-known to operate on an instruction set.” (Petition at 47; EX1003, ¶ 184.)

109. Regardless of whether processors “execute various logical operations of controllable devices,” Petitioner and Mr. McNair have provided no evidence or argument that Aginsky discloses, teaches, or suggests a processor on controllable device 101-1 that specifically causes a codeset record to be provisioned to a controlling device, as claimed. (*Id.*)

5. Petitioner Has Failed To Show That A POSITA Would Have Been Motivated To Combine Aginsky With Stammler To Arrive At The Phonetic Representations Limitation.

110. The claimed invention of the ‘083 patent requires that phonetic representations of a function name and synonyms of the function name be stored in a specific codeset record on the controlling device (*i.e.*, the codeset record provisioned to the controlling device for use in commanding functional operations of the target appliance and comprising protocol and formatting information and a plurality of command function entries), and in a specific location within that

specific codeset record (*i.e.*, in each of the command function entries within the provisioned codeset record). (EX1001 at claims 1 and 12.)

111. According to Petitioner and Mr. McNair, a POSITA would have been motivated to modify Aginsky in view of Stammer: (i) to enable voice control in general, which was purportedly a known replacement for the alleged drawbacks of user interfaces; and (ii) to take advantage of Stammer's larger, expanded vocabulary to improve upon prior speech dialog systems that allegedly suffered from limited vocabularies, which would purportedly have improved command recognition accuracy and user friendliness. (Petition at 32-33, 40-42; EX1003, ¶¶ 114-116, 137-138.)

112. I understand that in the Institution Decision the Board stated that “we understand Petitioner to be asserting that Aginsky suggests that the voice command-relevant information for a particular command would be included in the command function entry for that command in tables 115' and 116,' because the command function entry includes data related to that particular command.” (Institution Decision (“ID”) at 32 (citing Petition at 25).)

113. I disagree. There is simply no evidence or argument in the Petition or in Mr. McNair's declaration that Aginsky “suggests” that voice command-relevant information for a particular command would be included in the command function entry for that command. (*See generally* Petition at 25, 31-33, 40-42; EX1003, ¶¶

114-116, 137-138.) At best, Petitioner and Mr. McNair broadly state that Aginsky “leaves it to a POSITA to ... integrate[] voice command-relevant information into the data structure...” (Petition at 25 (citing EX1004 at 9:30-33, 13:34-36); EX1003, ¶ 106.) The Phonetic Representations Limitation requires that the claimed phonetic representations be stored in a specific location within a specific codeset record. Merely adding voice command information to a data structure is not enough.

114. A POSITA would not have used Stammer’s alleged phonetic representations in the data structures provisioned to Aginsky’s controlling device.

115. Vocabulary size is a critical factor in the selection of the type of basic units used for speech recognition. Such systems have been classified as small vocabulary (up to approximately 100 words), moderate vocabulary (up to approximately 500 words), and large vocabulary (more than 500 words). (EX2004 at 6.)

116. For a system that uses a relatively small vocabulary of individually spoken words, a POSITA would have used a whole-word model because in this vocabulary range such models (i) have relatively simple and fast computational requirements, making them very efficient; (ii) have a relatively short development time, resulting in efficiencies in development cost; (iii) have relatively small memory requirements; and (iv) can be implemented on simpler and less expensive

hardware platforms. (*See, e.g.,* EX2004 at 3-4; EX2005 at 4-5; *see generally* EX2006; EX2007; EX2008.)

117. Whole-word models are particularly useful for remote-control applications where the vocabulary used is limited to a small, pre-defined collection of individually-spoken words (*e.g.,* “pause,” “fast forward,” “power on,” etc.). Remote-control applications also typically have limited storage capacity and processing capabilities, which whole-word models are also ideally suited for.

118. Aginsky’s remote-control system is limited to a small, pre-defined collection of individually-spoken words (*e.g.,* “on,” “off,” “menu,” etc.). (*See, e.g.,* EX1004 at FIGS. 1B-1C.) As shown in FIG. 1B, Aginsky’s remote control stores only a handful of controllable device functions comprised of single word or two-word commands (*e.g.,* “fast forward”). (*Id.* at FIG. 1B (listing at most fourteen unique commands).) The functions listed in Aginsky’s FIG. 1B make up essentially all the functions that are included in a standard remote control. Even if several additional functions were added to Aginsky (*e.g.,* “play”), and if even synonyms were added for some (or all) of Aginsky’s functions, the total vocabulary would be limited to a relatively small, pre-defined collection of individually-spoken words. As noted above, a POSITA would have used a whole-word model in such an implementation.

119. Unlike Aginsky, Stammer's phoneme-based system incorporates a large vocabulary and is designed to process conversational speech. While Stammer's phoneme-based model is useful in such an application, Stammer's phoneme-based dialog system is undesirable when it comes to handling a limited vocabulary of individually spoken commands because the efficiencies in development cost, computational load, and memory use that a whole-word model provides cannot similarly be achieved with Stammer's phoneme-based model.

120. Because Aginsky's vocabulary is limited to a relatively small, pre-defined collection of individually-spoken words, a POSITA would not have been motivated to modify Aginsky to use Stammer's phoneme-based model. Instead, a POSITA would have used a whole-word model to take advantage of the efficiencies in development cost, computational load, and memory use that whole-word models provide over phoneme-based models. In a remote-control application such as Aginsky where functions are provided as isolated commands, discovery of user intention via sentence analysis and hypothesis is not required, making phoneme-based speech recognition unsuitable and unnecessary.

6. Petitioner Has Failed To Show That A POSITA Would Have Been Motivated To Modify Aginsky To Have A “speech recognition engine.”

121. Petitioner and Mr. McNair have failed to identify any reason why a POSITA would have modified Aginsky to have a “speech recognition engine.” (Petition at 45-46; EX1003, ¶¶ 149-151.)

122. I understand that in the Institution Decision the Board stated that a POSITA “would have understood that a mechanism for recognizing voice commands would have been necessary.” (ID at 37.) I disagree. There is no evidence in the Petition or in Mr. McNair’s declaration to support this finding. (Petition at 45-46; EX1003, ¶¶ 149-151.) Neither Petitioner nor Mr. McNair asserted that a mechanism for recognizing voice commands would have been necessary. (*Id.*) Further, even if there were evidence in the record demonstrating that an unspecified “mechanism” would be necessary for recognizing voice commands (there is none), there is certainly no evidence that this unspecified “mechanism” must be the claimed “speech recognition engine.” (*Id.*)

123. Additionally, a speech recognition engine would not have been “necessary.” A speech recognition engine is a turnkey solution for recognizing speech with an unrestricted vocabulary. Rather than use a speech recognition engine, a POSITA could have used a speech recognizer using Dynamic Time Warping, Hidden Markov Models, Neural Networks, etc. Such speech recognizers

could be customized for remote-control applications to recognize the specific vocabulary associated with controlling appliances.

7. Petitioner Has Failed To Show That Aginsky In Combination With Stammler Renders Dependent Challenged Claims 2-6, 8-10, And 13-18 Obvious.

124. Petitioner and Mr. McNair have failed to show that Aginsky in combination with Stammler renders Challenged Claims 2-6, 8-10, and 13-18 obvious in view of their dependency on Challenged Claims 1 and 12.

125. Petitioner and Mr. McNair have also failed to show that Aginsky in combination with Stammler renders dependent Challenged Claims 2-6, 8-10, and 13-18 obvious for the reasons discussed below.

(a) Challenged Claims 6 And 18.

126. For Challenged Claims 6 and 18, Petitioner and Mr. McNair rely entirely on their analysis of Challenged Claim 1. (Petition at 55 (“*See* [1.b.1], [1.c].”); *id.* at 59 (“*See* [1.c], [6].”); EX1003, ¶¶ 170-171, 215-216.)

127. Challenged Claims 6 and 18 are materially different than Challenged Claim 1.

128. Challenged Claim 1 recites, *inter alia*, “voice data provided to a speech recognition engine.” (EX1001 at claim 1.)

129. Challenged Claims 6 and 18, on the other hand, recite, *inter alia*, receiving at the speech recognition engine voice data for “*map[ping] each of the*

less than all of the individual command function entries ... to the one or more of the plurality of user input elements of the controlling device.” (EX1001 at claims 6 and 18 (emphasis added).)

130. Petitioner and Mr. McNair have failed to explain how any received voice data is used for mapping anything, let alone mapping command function entries to user input elements as claimed. (Petition at 43-46, 55, 59; EX1003, ¶¶ 170-171, 215-216.)

(b) Challenged Claims 8-10.

131. Challenged Claim 8 recites, *inter alia*, “receiving ... voice data indicative of at least a brand of the target appliance” and “us[ing] the voice data indicative of at least a brand of the target appliance to identify within a library of codeset records the codeset record that is caused to be provisioned to the controlling device.” (EX1001 at claim 8.)

132. Petitioner and Mr. McNair assert that it “would have been obvious to a POSITA to use voice data associated with at least a brand name of a controllable device 101-1 to identify the desired controllable device 101-1, and accordingly, a data structure associated with controllable device 101-1 to be provisioned to remote device 107-1” because “each controllable device 101-1 may contain multiple data structures ... specialized for ‘a specific brand, model, or category of

remote devices 107-1 to 107-N.” (Petition at 56 (quoting EX1004 at 5:22-42); EX1003, ¶¶ 174-175.)

133. I disagree with Petitioner and Mr. McNair. Aginsky does not teach that controllable device 101-1 (*i.e.*, the alleged “target appliance”) stores data structures related to other controllable devices. (EX1004 at 5:18-45, FIG. 1C.) Rather, Aginsky teaches that controllable device 101-1 stores data structures specific to remote devices 107-1 to 107-N and/or to specific users. (*Id.*)

10c

CONTROLLABLE DEVICE MEMORY/STORAGE		
REMOTE DEVICE 107-1 = NAME : MASTER		
FUNCTION <u>119-1</u>	STATUS <u>120-1</u>	RULES <u>121-1</u>
ON - OFF	YES	UNLIMITED
VOLUME	YES	UNLIMITED
MENU	YES	-
CHANNEL	YES	ALL
INPUT	NO	-
REMOTE DEVICE 107-2 = NAME : CHILD 1		
FUNCTION <u>119-2</u>	STATUS <u>120-2</u>	RULES <u>121-2</u>
ON - OFF	YES	NOT AFTER MIDNIGHT
VOLUME	YES	OFF AFTER 9PM
MENU	NO	-
CHANNEL	YES	NOTHING ABOVE 100 NO PREMIUM NO PAY-PER-VIEW
INPUT	NO	-

FIG. 1C

(*Id.* at FIG. 1C.)

134. If a user were to provide voice data indicative of a brand of controllable device 101-1, such voice data would not identify a specific data structure within the plurality of data structures stored in controllable device 101-1 because every data structure stored in controllable device 101-1 is related to

controllable device 101-1. Only an indication of a specific remote device or user would identify a data structure within the plurality of stored data structures because the data structures in controllable device 101-1 are specific to remote devices 107-1 to 107-N and/or to specific users. (EX1004 at 5:18-45, FIG. 1C; *see also* Petition at 36 (“controllable device 101-1 selects a data structure based upon the brand, model, etc. of remote device 107-1”).) It would not have been obvious to use voice data indicative of a brand of controllable device 101-1 (*i.e.*, the alleged “target appliance”) to identify a data structure within the plurality of data structures stored in controllable device 101-1 to be provisioned to remote device 107-1 (*i.e.*, the alleged “controlling device”), as claimed.

135. Petitioner and Mr. McNair alternatively assert that “[w]here remote device 107-1 is ‘programmed’ with a library of the applicable data structures, it would have been obvious to a POSITA to use a brand identification to identify the appropriate data structure entry within memory 109-1.” (Petition at 57; EX1003, ¶ 176.) I disagree with Petitioner’s and Mr. McNair’s alternative argument because it is irrelevant to the claims.

136. Challenged Claim 8 requires that “the speech recognition engine use[] the voice data ... to identify ... the codeset record ***that is caused to be provisioned to the controlling device.***” (EX1001 at claim 8 (emphasis added).) Merely identifying a codeset record is insufficient. (*Id.*)

137. While Petitioner and Mr. McNair assert that it would have been obvious “to use a brand identification to identify the appropriate data structure entry within memory 109-1,” Petitioner and Mr. McNair do not identify any subsequent provisioning of a “data structure” to a controlling device. (Petition at 57; EX1003, ¶ 176.) In Petitioner’s and Mr. McNair’s example, the data structures (*i.e.*, the alleged “codeset records”) have already been provisioned to memory 109-1 of remote device 107-1 (*i.e.*, the alleged “controlling device”). (*Id.*)

138. Aginsky does not disclose, teach, or suggest that data structures 115’ or 116’ are provisioned anywhere else once they have been programmed to memory 109-1. (EX1004 at 7:58-8:62.) Rather, Aginsky discloses that certain information in the data structures can subsequently be used to send command signals to controllable devices. (*Id.*)

139. Challenged Claims 9 and 10 are dependent on Challenged Claim 8, and Petitioner and Mr. McNair have failed to prove these claims obvious because of their dependency on Challenged Claim 8. (EX1001 at claims 9-10.)

(c) Challenged Claims 13 And 14.

140. Challenged Claim 13 recites that the claimed “instructions” that, when executed by the processing device, cause a codeset record to be provisioned to the controlling device, “are downloaded to the controlling device in a downloadable

app.” (EX1001 at claims 12-13.) Challenged Claim 14 depends from Challenged Claim 13, and thus incorporates every limitation of Challenged Claim 13.

141. According to Petitioner and Mr. McNair, “Aginsky discloses transferring [a] data structure to ‘a remote control application’” and downloading from an “app store” to remote device 107-1 “a control application that is designed to control controllable devices.” (Petition at 58; EX1003, ¶¶ 203-206.) However, Petitioner and Mr. McNair do not assert—and provide no evidence to demonstrate—that the claimed “instructions” are “downloaded to the controlling device in a downloadable app,” as claimed. (*Id.*)

B. Ground 2: Petitioner Has Failed To Show That Aginsky In Combination With Stammler And Dresti Renders Challenged Claims 7, 11, And 19 Obvious.

142. Petitioner and Mr. McNair have failed to show that Aginsky in combination with Stammler and Dresti renders Challenged Claims 7, 11, and 19 obvious in view of their dependency on Challenged Claims 1 and 12.

143. Petitioner and Mr. McNair have also failed to show that Aginsky in combination with Stammler and Dresti discloses, teaches, or suggests every limitation of Challenged Claims 7, 11, and 19.

144. Challenged Claim 7 recites “using at least location data to identify the codeset record that is caused to be provisioned to the controlling device.” (EX1001 at claim 7.)

145. Challenged Claims 11 and 19 include similar limitations (*id.* at claims 11 and 19), and Petitioner and Mr. McNair rely entirely on their analysis of Challenged Claim 7 for these claims. (Petition at 66; EX1003, ¶¶ 227-230.)

146. Petitioner and Mr. McNair agree that “neither Aginsky nor Stammler explicitly disclose using location data to identify [a] codeset record.” (Petition at 64; EX1003, ¶ 224.) Nevertheless, Petitioner and Mr. McNair assert that Dresti “teaches a universal remote provisioned with particular code sets after a user selects an appropriate region.” (Petition at 64 (citing EX1007 at [0321]); EX1003, ¶ 225.)

147. I disagree with Petitioner and Mr. McNair. Dresti discloses a remote control application that “may be shipped with a world-wide IR code database.” (EX1007 at [0321].) The user may select a region and, “[b]ased on this input, the behavior of the remote control application may be adjusted.” (*Id.*) “For example, the order in which IR device codes are presented to the user for testing ... during device setup may be varied from region to region.” (*Id.*)

148. Dresti does not teach provisioning code sets to the remote control application based on the selection of a region. (*Id.*) As noted above, Dresti’s remote control application is shipped with a comprehensive “world-wide IR code database.” (*Id.*) The selection of a region does not cause additional code sets or code databases to be provisioned to the remote control application. (*Id.*) Thus, the

prior art does not disclose, teach, or suggest using location data to identify a codeset record that is caused to be provisioned to a controlling device, as claimed.

149. Petitioner and Mr. McNair have also failed to explain how Aginsky would be combined with Stammmler and Dresti to arrive at the claimed invention. According to Petitioner and Mr. McNair, “[i]t would have been obvious to a POSITA to implement Aginsky’s methods and systems as modified by Stammmler to thus include location data.” (Petition at 65; EX1003, ¶ 226.) However, Petitioner and Mr. McNair do not explain how “location data” would (or could) be used in Aginsky as modified by Stammmler to identify a codeset record that is caused to be provisioned to a controlling device. (*Id.*) The alleged codeset records stored on Aginsky’s controllable device 101-1 are specific to remote devices 107-1 to 107-N and/or to specific users. (EX1004 at 5:18-45, FIG. 1C.) “Location data” would not identify any of these alleged codeset records—only an indication of a specific remote device or user would.

C. Ground 3: Petitioner Has Failed To Show That Aginsky In Combination With Hanson Renders Challenged Claims 1-6, 8-10, And 12-18 Obvious.

1. Petitioner Has Failed To Show That Aginsky Discloses, Teaches, Or Suggests “the provisioned codeset record comprising protocol and formatting information.”

150. Petitioner and Mr. McNair failed to show in Ground 1 that Aginsky discloses, teaches, or suggests “the provisioned codeset record comprising protocol

and formatting information.” In Ground 3, Petitioner and Mr. McNair rely entirely on their Ground 1 analysis for this limitation. (Petition at 71; EX1003, ¶¶ 241-242.) Thus, for the reasons discussed above regarding Ground 1, Petitioner and Mr. McNair have again failed to show that Aginsky discloses, teaches, or suggests “the provisioned codeset record comprising protocol and formatting information” in Ground 3.

2. Petitioner Has Failed To Show That Aginsky In Combination With Hanson Discloses, Teaches, Or Suggests The Phonetic Representations Limitation.

151. Petitioner and Mr. McNair have failed to show that Aginsky in combination with Hanson discloses, teaches, or suggests the Phonetic Representations Limitation because neither Aginsky nor Hanson discloses, teaches, or suggests phonetic representations of function names (or synonyms of function names) stored in a codeset record or, more particularly, in command function entries within a codeset record, as claimed.

152. As discussed above, Aginsky alone indisputably does not disclose, teach, or suggest the Phonetic Representations Limitation. (Petition at 40, 42; *see also id.* at 73-75; *see generally* EX1004 at 7:58-10:2.)

153. Regarding Hanson, Petitioner and Mr. McNair assert that Hanson discloses a “command mapping 240 [that] is a ‘data set’ that includes an ‘arbitrary quantity of commands, synonyms, and/or alternative commands for a function.’”

(Petition at 68; EX1003, ¶ 234.) Petitioner and Mr. McNair also assert that Hanson discloses that speech can be processed through “phonetic algorithms” and that a “POSITA would have understood that ‘phonetic algorithms’ index and recognize words according to phonetic representations, such as phonemes.” (Petition at 73-74; EX1003, ¶ 256.)

154. While Hanson’s command mapping 240 is a data set, command mapping 240 is not a codeset record as claimed because command mapping 240 does not contain any command data. (EX2002 at 14:5-14.) Rather, Hanson’s command mapping 240 is a mapping used for automated discovery of speech commands in response to a manual event by associating a manual event with an available speech command. (EX1006 at [0030], [0037].) For example, when a driver adjusts the air conditioning temperature manually, the command mapping 240 can be used to inform the driver that speech commands are available to adjust the air conditioning. (*Id.* at [0008].)

155. Hanson also does not disclose, teach, or suggest that its command mapping 240 contains phonetic representations of commands. Hanson’s command mapping 240 contains whole words, not phonetic representations of words. (EX1006 at FIG. 2.) While Hanson discloses that its speech engine 254 can include “phonetic algorithms,” the “phonetic algorithms” are used to process the user’s speech. (*Id.* at [0040].) The command mapping 240, on the other hand, is

used to present available speech commands to the user that correspond with a manual event. The “phonetic algorithms” in the speech engine 254 are unrelated to the command mapping 240 and do not demonstrate that Hanson discloses, teaches, or suggests that its command mapping 240 contains phonetic representations of commands.

3. Petitioner Has Failed To Show That Aginsky In Combination With Hanson Discloses, Teaches, Or Suggests “a speech recognition engine.”

156. Petitioner and Mr. McNair do not assert that Aginsky discloses, teaches, or suggests a “speech recognition engine.” (Petition at 75-76; *see also id.* at 51 (“Aginsky does not explicitly disclose how remote device 107-1 receives voice input or creating voice data.”); EX1003, ¶¶ 264-266.) While Petitioner and Mr. McNair assert that Hanson discloses a “speech recognition engine,” Petitioner and Mr. McNair do not propose modifying Aginsky to have a “speech recognition engine.” (*Id.*)

157. Petitioner’s and Mr. McNair’s failure to identify any reason why a POSITA would have modified Aginsky to have a “speech recognition engine” further confirms that Petitioner and Mr. McNair have not proposed modifying Aginsky to have a “speech recognition engine.” (Petition at 69-70, 75-76; EX1003, ¶¶ 264-266.)

4. Petitioner Has Failed To Show That Aginsky In Combination With Hanson Discloses, Teaches, Or Suggests The Processing Device Limitation.

158. Petitioner and Mr. McNair failed to show in Ground 1 that Aginsky discloses, teaches, or suggests the Processing Device Limitation. In Ground 3, Petitioner and Mr. McNair primarily rely on their Ground 1 analysis for this limitation. (Petition at 76; EX1003, ¶¶ 288-290.) While Petitioner and Mr. McNair add that Hanson generally discloses “computer program instructions” (*id.*), Petitioner and Mr. McNair fail to fill in the gaps in their Ground 1 analysis.

5. Petitioner Has Failed To Show That A POSITA Would Have Been Motivated To Combine Aginsky With Hanson To Arrive At The Phonetic Representations Limitation.

159. The claimed invention of the ‘083 patent requires that phonetic representations of a function name and synonyms of the function name be stored in a specific codeset record on the controlling device (*i.e.*, the codeset record provisioned to the controlling device for use in commanding functional operations of the target appliance and comprising protocol and formatting information and a plurality of command function entries), and in a specific location within that specific codeset record (*i.e.*, in each of the command function entries within the provisioned codeset record). (EX1001 at claims 1 and 12.)

160. According to Petitioner and Mr. McNair, a POSITA would have been motivated to modify Aginsky in view of Hanson: (i) to achieve a voice control

system that executes a command in response to a variety of synonymous commands, which purportedly would have increased user friendliness; (ii) because “implementing a data set with phonetic representations and synonyms” would have been “the mere application of a known technique”; and (iii) “to achieve the predictable result of using phonetic representations to process voice commands.” (Petition at 70, 72, 74-75, 77; EX1003, ¶¶ 235-236, 256, 259.)

161. For the same reasons discussed above in Ground 1, a POSITA would not have used Hanson’s alleged phonetic representations in the data structures provisioned to Aginsky’s controlling device.

6. Petitioner Has Failed To Show That A POSITA Would Have Been Motivated To Modify Aginsky To Have A “speech recognition engine.”

162. As with Ground 1, Petitioner and Mr. McNair have failed to identify any reason why a POSITA would have modified Aginsky to have a “speech recognition engine.” (Petition at 69-70, 75-76; EX1003, ¶¶ 264-266.)

7. Petitioner Has Failed to Show That Aginsky In Combination With Hanson Renders Dependent Challenged Claims 2-6, 8-10, And 13-18 Obvious.

163. Petitioner and Mr. McNair have failed to show that Aginsky in combination with Hanson renders dependent Challenged Claims 2-6, 8-10, and 13-18 obvious in view of their dependency on Challenged Claims 1 and 12.

164. Regarding dependent Challenged Claims 6, 8-10, 13-14, and 18, Petitioner and Mr. McNair rely entirely on their Ground 1 analysis for these claims. (Petition at 79-80; EX1003, ¶¶ 278-285, 309-312, 319-320.) For the same reasons discussed above regarding Ground 1, Petitioner and Mr. McNair have again failed to show that dependent Challenged Claims 6, 8-10, 13-14, and 18 are obvious.

D. Ground 4: Petitioner Has Failed To Show That Aginsky In Combination With Hanson And Dresti Renders Challenged Claims 7, 11, And 19 Obvious.

165. Petitioner and Mr. McNair have failed to show that Aginsky in combination with Hanson and Dresti renders Challenged Claims 7, 11, and 19 obvious in view of their dependency on Challenged Claims 1 and 12.

166. In Ground 4 Petitioner and Mr. McNair rely entirely on their Ground 2 analysis. (Petition at 80; EX1003, ¶¶ 322-323.) Thus, for the same reasons discussed above regarding Ground 2, Petitioner and Mr. McNair have failed to show that Aginsky in combination with Hanson and Dresti renders Challenged Claims 7, 11, and 19 obvious.

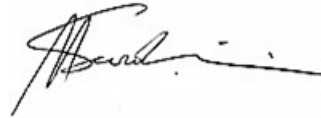
XI. CONCLUSIONS

- The Challenged Claims of the '083 patent are not obvious in light of the disclosures of the asserted prior art references.

- The Challenged Claims of the '083 patent are not unpatentable and were properly issued by the Patent and Trademark Office.

I have prepared this Declaration based upon my review of the materials referenced, and my own personal knowledge, education, skill and experience. I declare, under penalty of perjury under the laws of the United States of America, that the foregoing is true and correct.

Dated: July 7, 2023

A handwritten signature in black ink, appearing to read "Michael S. Scordilis", written over a horizontal line.

Dr. Michael S. Scordilis

Exhibit 1

Expertise

- | | |
|---------------------------------------|----------------------------------|
| ▪ Electrical and Computer Engineering | ▪ Natural Language Processing |
| ▪ Analog and Digital Communications | ▪ Speech and Speaker Recognition |
| ▪ Computer Networks | ▪ Speech Synthesis |
| ▪ Data Watermarking & Security | ▪ Engineering Acoustics |
| ▪ Digital Signal Processing | ▪ Psychoacoustics |
-

Professional Summary

Dr. Michael Scordilis retired from his academic position at the Department of Electrical and Computer Engineering at the University of Miami, Florida in May 2021. He holds a Ph.D. in Electrical and Computer Engineering from Clemson University (1990). He has also held academic positions at Universities in Australia and Greece and visiting scientist positions at Bell Communications Research and Sun Microsystems Laboratories. He has supervised several Master and Ph.D. projects in acoustics, digital speech and audio processing research. He was associate editor of the Journal of the Franklin Institute, has served in the Audio Technical Group of the MPEG Standards Committee, the International Coordinating Committee for Speech Databases and Assessment and in the organization and technical committees of numerous conferences. He holds patents in the area of audio watermarking. His expertise, research and consulting experience include acoustics, digital signal processing, signal enhancement and noise suppression, speech and speaker recognition, speech and audio coding, speech synthesis, intelligent man-machine interfaces, natural language processing, multimedia signal processing, telecommunications, computer networking and security, digital watermarking, and biometrics.

Education

<u>Year</u>	<u>College/University</u>	<u>Degree</u>
1990	Clemson University	Ph.D. in Electrical and Computer Engineering
1986	Clemson University	M.S. in Electrical Engineering
1983	Royal Melbourne Institute of Technology	Bachelor of Engineering in Communications Engineering

Employment History

From:	1997	University of Miami,
To:	2021	Coral Gables, FL
Position:	<i>Associate Professor, Research Professor and Associate Professor of Practice</i> Teaching and research in electrical and computer networks; real time digital signal processing, acoustics, speech, audio and music processing, pattern recognition, machine learning, speech recognition and synthesis, biometrics, digital watermarking, immersive audio for telepresence applications; communication systems; engineering acoustics.	
From:	1995	University of Patras
To:	1996	Greece
Position:	<i>Visiting Senior Scientist</i>	
From:	1990	The University of Melbourne,
To:	1995	Melbourne, Australia

Position: *University Lecturer*

1994 **Sun Microsystems Laboratories**, Chelmsford, MA
 Position: *Visiting Senior Scientist, Speech Recognition Group*
 Adapting speech recognizers to new acoustic environmental conditions

From: 1994 **Bell Communications Research (Bellcore)**
 Morristown, NJ
 Position: *Visiting Senior Scientist, Speech Analysis and Synthesis Group*
 Improving the ORATOR speech synthesis system

From: 1984 **Department of Electrical and Computer Engineering**
 To: 1990 Clemson, SC
 Position: *Graduate Research Fellow and Teaching Assistant*
 Neural networks and speech processing research

From: 1982 **LM Ericsson**
 To: 1984 Melbourne, Australia
 Position: *Technical Officer*
 Production and Testing of the AXE and ASB900 Digital Telephone Exchanges and
 Centers and Computer communication modems

From: 1980 **CompuServe**
 To: 1981 Newcastle, Australia
 Position: *Computer Hardware Developer (summer intern)*

Consulting History (supported parties are in bold)

2022-23 **Law firms of Greenberg Traurig and Alston & Bird LLP**
 IPR Expert Declarations on smart audio devices and automatic speech recognition in
 Roku v. **Universal Electronics**

2022-23 **Law firm of Fish & Richardson P.C.**
 Voice detection and noise suppression in Jawbone Innovations v. **Apple**

2022 **Law firm of Arnold & Porter**
 Expert reports on patent invalidity on microphone arrays for noise suppression in headset
 and cellular phone devices, in Jawbone Innovations v. **Samsung**

2022 **Law firm of Labaton Sucharow LLP**
 Prelitigation, discovery work and Expert Report on voice-activated smart devices

2022 **Law firm of Dykema Gossett**
 Prelitigation, discovery work and Expert Report on **Honeywell** speech recognition
 technologies, as related to biometrics and the Illinois Biometric Information Privacy Act
 (BIPA)

2022 **Law firm of Wolf Greenfield**
 IPR Expert Declaration on audio watermarking in MZ Audio Sciences, v. **Sony**

2022 **Law firm of Fisch Sigler**
 5G architecture and physical layer, technical analysis of three IPR Declarations for
5G IP Holdings

2020 **Law firm of Baker & Hostetler**
 Expert report: Computer network security & watermarking in patents infringement in
 Blue Spike v. **Comcast**

2018 **Law firm of Fisch Sigler LLP**
 IPR Expert Declarations on Computer network security & watermarking in patents
 infringement Blue Spike v. **Juniper Networks**

2017 **Law firm of Fisch Sigler LLP**
 IPR Expert Declarations on multisource 3D spatial audio processing in Broadcom v.
Amazon

2017 **Law firm of Colson Hicks Eidson**
 Expert report on physical injuries caused by electric burns (**private**)

2016 **Law firm of Greenspoon Marder**

- Expert report on electrical circuit and prediction analysis of physical injuries caused by electrical burns in **Nico Goodman v Ningbo Litesun Electric Co., Ltd.**
- 2015 **Law firm of Cooley LLP, Law firm of Upshaw LLP**
Expert report and analysis of patents, standards, algorithms, source code for digital communications and speech coding in mobile telephony and devices applications for:
SLC v **HTC** (Law firm of Upshaw PLLC)
SLC v **Motorola** (Law firm of Cooley LLP)
SLC v **ZTE** (Law firm of Upshaw PLLC)
- 2015 **Law firm of Colson Hicks Eidson**
Analysis and evaluation of electrical systems involved in a pool electrocution (**private**)
- 2013 **Soundmouse, London, U.K.**
Audio watermark development for Digital Rights Management
- 2011 **Patent portfolio evaluation for Alcatel-Lucent**
EVRC speech coding and communication protocols (3GPP2) patents analyses and technical reports.
- 2008 **Patent portfolio evaluation for Alcatel-Lucent**
MPEG-2 and MPEG-4) patents analyses and technical reports
- 2007 **Patent portfolio evaluation for Alcatel-Lucent**
AAC audio coding patents analyses and technical reports
- 2007 **Patent portfolio evaluation for Alcatel-Lucent**
MP3 audio coding European patents analyses and technical reports
- 2005 **SunnComm, Phoenix, AZ**
Audio watermark development
- 2003 **TradeHarbor, St. Luis, MO**
Robust Speech Recognition and Speaker Verification
- 2003 **US Department of Justice**
Forensic Audio Signal Analysis
- 2001 **KNOWLEDGE, S.A., Greece**
Speech Synthesis
- 1988- **Several private companies and public institutions, Australia and the U.S.**
- 1996 Project Consultant and Software Developer: Digital signal processing, data security, analog and digital modem design, speech, and audio research projects, engineering in-house training, speech pathology issues, aids for the handicapped, development of a Greek speech synthesizer for the blind.
- 1995 **Robotron, Melbourne, Australia**
R&D for the world's first Greek text-to-speech speech synthesis.
- 1994 **Sun Microsystems Laboratories, Chelmsford, MA**
Automatic speech recognition systems
- 1993 **Analog Devices, Norwood, MA and Melbourne, Australia**
Professional development and seminars on digital signal and speech processing for Analog Devices; R&D into real-time enhanced stereo systems
- 1993 **EDL, Melbourne, Australia**
R&D of digital audio coding. Modem design.
- 1992 **Australia National Acoustic Laboratories, Melbourne, Australia**
Evaluation of acoustic phonetics from speech pathology practitioners using digital signal processing techniques for speech analysis, feature display and evaluation.
- 1992 **Royal Eye & Ear Hospital, Melbourne, Australia**
Software development for ocular melanoma growth monitoring using an ultrasound.

Court Case Support - Deposition Experience

- 2023 Client: **Law firm of Greenberg Traurig**
Case: Expert Deposition in Roku v. **Universal Electronics**, Case IPR2022-00943
Subject: Speech algorithms and audio signal conditioning for voice-enabled smart remote control devices.

- 2022 Client: **Law firm of Arnold & Porter**
Case: Invalidity of three patents in Jawbone Innovations v. **Samsung**, Case No. NO. 2:21-CV-0186-JRG-RSP
Subject: Microphone arrays for noise suppression in in headset and cellular phone devices.
- 2021 Client: **Law firm of Greenspoon Marder**
Case: **Nico Goodman** v Ningbo Litesun Electric Co., Ltd., a Chinese Company.
Subject: Physical injuries caused by electrocution.

Patents

<u>Patent Number</u>	<u>Date Issued</u>	<u>Title</u>
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US 6,996,521	02/07/2006	Auxiliary channel masking in an audio signal

Publications

Iliev, A.I. and Scordilis, M.S., "Spoken Emotion Recognition using Glottal Symmetry," EURASIP Journal on Advances in Signal Processing – Special Issue on Emotion and Mental State Recognition from Speech, 2012

Nocito, C.D., Scordilis, M.S., "Monitoring jitter and packet loss in VoIP networks using speech quality features," Proceedings of the 8th Annual IEEE Consumer Communications and Networking Conference - Work in Progress (Short Papers), January 9-12, 2011, Las Vegas, NV, (CCNC2011), pp. 685-686

Jin W., Liu, X., Scordilis, M.S., Han L., "Speech Enhancement Using Harmonic Emphasis and Adaptive Comb Filtering," IEEE Transactions on Audio, Speech and Language Processing, Volume 18 (2), Feb. 2010, pp. 356 - 368

Scordilis, M.S., Iliev, A.I., Papa, J.P., Falcão, A.X., "Spoken emotion recognition through optimum-path forest classification using glottal features," Journal of Computer Speech and Language - Special Issue on Emergent Artificial Intelligence Approaches for Pattern Recognition in Speech and Language Processing, 24 (2010) 445–460

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Iliev, I.A., Zhang, Y., Scordilis, M.S., "Spoken Emotion Classification Using ToBI Features and GMM," Proceedings of the 14th International Workshop on Signals and Image Processing 2007 and the 6th EURASIP Conference focused on Speech and Image Processing, Multimedia Communications and Services, IWSSIP 2007, Maribor, Slovenia, June 27-30, 2007, pp. 495-498

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Abdou, S., Scordilis, M.S., "Beam Search Pruning in Speech Recognition Using a Posterior Probability-Based Confidence Measure," *Journal of Speech Communication*, Vol. 423-4, 2004, pp. 409-428, (University of Miami, College of Engineering 2005 Research Paper Award Finalist for Eliahu I. Jury Award for Excellence in Research, November 2005)

Jin, W., Scordilis, M.S., "Single Channel Speech Enhancement by Frequency Domain Constrained Optimization and Temporal Masking," *Proceedings of the International Conference on Spoken Language Processing, INTERSPEECH 2006*, Pittsburgh, PA, USA, September 17-21, 2006, pp. 1411-1414

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Scordilis, M.S., Gowdy, J. N., "Text Processing for Speech Synthesis Using Parallel Distributed Models," Proceedings of the IEEE Southeast Conference, Columbia, S.C., USA, April 1989

Scordilis, M.S., Gowdy, J. N., "A Phoneme-Dependent Voicing Source for Speech Synthesis," Proceedings of the IEEE Southeastern Symposium on Systems Theory, Charlotte, NC, USA, 1988

Scordilis, M.S., Gowdy, J. N., "Comparison of Computerized Speech Synthesis Techniques," Proceedings of the IEEE Southeast Conference, Richmond, VA, USA, April 1986

Selected Funded Projects

“Spoken database collection and channel modeling for automatic speech recognition retraining”, 12/15/2006-12-14/2007, IBM Corporation, December 2006 – August 2008

“SGER: Music Telepresence”, 11/12/2005-10/31/2006, National Science Foundation (NSF), November 2005.

“Multi-microphone long probe for otoacoustic emissions (OAE) acquisition”, The National Institutes of Health (NIH), May 2005

“Auxiliary channel masking in audio signals”, Watermark Technologies, May 2001

“Acoustic Compensation of Miniature Speakers in Hearing Diagnosis and Hearing Aid Applications”; Summer Award in Natural Sciences and Engineering, The University of Miami; Principal Investigator; Summer 2000

“High Speed, ATM Networking for Improving Quality of Service (QoS) in Multimedia Communications”; The National Science Foundation (NSF); Principal Investigator; June 1997 – May 1999

Selected Proposals

Restoration and enhancement of sound in old cinematographic records: Bridging the quality gap,” National Endowment for the Humanities (NEH), March 2012

“Robust glottal airflow signal enhancement with application to speech analysis and emotion classification across various languages,” 2012 Air Force Summer Faculty Fellowship Program, December 2011

“Innovative enhancement of monophonic cinematographic records using audio and image processing techniques for immersive viewing experience”, National Endowment for the Humanities (NEH), September 2011

“Center for Computational Audio & Hearing Research”, NSF Science and Technology Center preliminary proposal headed by the UM School of Music, May 2011

“Enhanced acoustic detection and localization of partial discharge sources in high-power electrical transformers”, Florida Power & Light Company (FPL), June 1, 2011

“Remote detection and monitoring of cardiopulmonary functions using an ultrasonic Doppler radar system”, Provost Research Award Application 2011, P.I., October 2010

“Intelligent Loudspeaker Arrays for Enhancing the Learning Experience in Classrooms with Students of Varying Hearing Capabilities”, Capital Foundation, P.I., June 1, 2010

“Robust Biometric Identification Based on Otoacoustic Emissions”, The National Institute of Justice, P.I., March 24, 2010

“A Telehealth System Based on Remote Voice Quality Analysis and Assessment”, University of Miami Telehealth Network Grant Program, P.I., 2010

“Speech processing for the aid of foreign language learning”, U.S. Department of Education, co-P.I. with Center of Latin America Studies, Spring 2010

“Monitoring Patient Rehabilitation Progress Based on Remote Speech Quality Analysis and Assessment”, University of Miami Interdisciplinary Research Development Initiative, July 2008

“Collaborative Research: Music Telepresence” with University of Rochester and Wright State University, National Science Foundation (NSF), November 2006

“Music Telepresence”, National Science Foundation (NSF), January 2005

“Acoustical Design of School Classrooms for Enhanced Education and Learning”, Mondialogo Engineering Award, United Nations UNESCO and DaimlerChrysler, October 2004. Phase I approved. Currently, Phase II pending

“Improving Resources for Instruction and Research in Audio Engineering”, National Science Foundation (NSF) CISE Minority Institutions Infrastructure Program - Planning Grant, February 2004

Robust Video Communications Design for Ad Hoc Wireless Networks for Defense and Civil Applications”, U.S. Air Force, co-P.I. (collaboration with Florida Institute of Technology and Wright State University), May 2004

Editorial Responsibilities

Associate Editor, Journal of the Franklin Institute (2007-2015)

Finance Chair and Technical Committee Member for the 2009 IEEE 13th Digital Signal Processing Workshop & 5th IEEE Signal Processing Education Workshop (DSP/SPE)

Technical Reviewer and Session Organizer, 17th International Artificial Intelligence Research Symposium, FLAIRS 2004, Miami, Florida

Technical Reviewer and Session Organizer, 5th European Conference on Speech Communication and Technology, Rhodes, Greece; Member of the International Scientific Committee; 1997

Technical Reviewer and Session Organizer, 5th Intl. Conference on Spoken Language Processing Sydney, Australia; Member of the International Review Committee; 1998

Scientific Reviewing Services

Reviewer for several journals including, IEEE Transactions on Audio, Speech and Language Processing, IEEE Signal Processing Letters, Speech Communication, Signal Processing, Journal of the Franklin Institute, EURASIP Audio, Speech and Music Processing, MIT Press Computer Music Journal, Journal of the Acoustical Society of America, Informatica - An International Journal of Computing and Informatics, and others

Professional Associations

IEEE (Computer and Signal Processing Societies); Senior Member 2003; Member 1984

The International Speech Communication Association (ISCA); Member 1989-2000

Professional Engineer (P.E.): The Institute of Engineers, Australia; Member 1984

Professional Engineer (P.E.): The Technical Chamber of Greece; Member 1996

The Audio Engineering Society; Member 1998-2005

Honors & Awards

University of Miami, College of Engineering 2005 Research Paper Award Finalist for the Eliahu I. Jury Award for Excellence in Research, November 2005

University of Miami Invention Recognition Award - UM04-23 for “High Capacity for Monophonic Audio Signals Using Differential Encoding in the Short-Phase Spectrum,” November 2004

The University of Miami, College of Engineering 2003 Winner of the Eliahu I. Jury Award for Excellence in Research, November 2003

University of Miami Invention Recognition Award, “Auxiliary Channel Masking in Audio Signals,” February 2001

NCR Research Fellowship; 1984 – 1986