

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ROKU INC.,

Petitioner

v.

UNIVERSAL ELECTRONICS,

Patent Owner

Case IPR2022-01289

U.S. Patent No. 9,847,083

DECLARATION OF BRUCE McNAIR

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I, Bruce McNair, declare as follows:

I. INTRODUCTION

1. My name is Bruce McNair. I am over the age of eighteen and am competent to make this Declaration.

A. Engagement

2. I submit this report on behalf of Roku Inc. in connection with its request for *inter partes* review (IPR) of U.S. Patent No. 9,847,083 (“the ’083 patent”)—to review and to provide my opinion on the scope and content of “prior art” predating the application for the ’083 patent and regarding the subject matter recited in the claims of the ’083 patent.

3. For my efforts in connection with the preparation of this declaration, I have been compensated at my standard hourly consulting rate. My compensation is in no way contingent on the results of these or any other proceedings relating to the above-captioned patent. I have no expectation or promise of additional business with the petitioner in exchange for the positions explained herein.

4. I make this declaration based on personal knowledge.

B. Background and Qualifications

5. A detailed description of my professional qualifications, including a listing of my specialties/expertise and professional activities, is contained in my curriculum

vitae, a copy of which is attached as Appendix A. In what follows, I provide a short summary of my professional qualifications.

6. I have over 55 years of experience in the areas of electronic circuits, starting as an amateur radio operator in 1963 and including seven years as a GS-0855 Electronic Engineer working for the US Army Electronics Command, one year at ITT Defense Communications Division, 24 years as a Member of Technical Staff at AT&T/Bell Laboratories and 15 years as a full-time faculty member of the Electrical and Computer Engineering Department at Stevens Institute of Technology.

7. While I was working for the US Army Electronics Command at Fort Monmouth, NJ, I was responsible for research and development for the data transmission, electronic counter-counter measures (ECCM), and cryptographic aspects of SINCGARS, the Single Channel Ground/Airborne Radio System. As part of this work, I built speech compression hardware and software, microprocessor-based systems, digital hardware and analog circuits to accomplish my research. In addition, as part of this work, I studied speech compression techniques to allow high-quality secure voice transmission at low data rates.

8. While I was at ITT Defense Communications Division, I designed digital hardware for a satellite communications system used by the White House. I also designed hardware and software to realize the first hardware implementation of a

Linear Predictive Coder, a technology used extensively to this day for speech communications and speech recognition in virtually all communication today.

9. At Bell Labs, I worked on several projects involving public data networks, encryption, analog modems, network security and wireless systems. This included security for an X.25 pre-Internet public data network (Advanced Communications Service/Net-1000). I designed digital hardware and microprocessor-based systems to improve the operation of analog modems. I also initiated and led an IR&D (independent research and development) project to investigate and prototype a secure voice terminal based on newly evolving AT&T high-speed digital services. This involved analog and digital hardware design, microprocessor programming, and controlling systems through a signaling and control network. Part of this work involved interfacing with the analog telephone network, interfacing with audio input and output devices and digital speech and signal processing. I then led a group developing encryption add-ons for analog modems. I supervised a Bell Labs group investigating speech recognition and speaker verification. This work included the design of the voice control features for the AT&T 3450 mobile cellular phone that would accept voice control for dialing and call control in the mid-1980s. I used and still possess the device. I led the Bell Labs Security Architecture Group, setting security and encryption standards for all AT&T products and services. Finally, while I was at Bell Labs, I performed research into future wireless systems, including

modulation techniques and voice coding to maximize performance. This involved the design of digital and analog hardware, programming embedded systems, writing real-time digital signal processing (DSP) software and extensive testing of the system performance.

10. At Stevens Institute of Technology, I have taught undergraduate courses, including Electronic Circuits (EE359) dealing with analog and digital circuits. I was also responsible for the Capstone Senior Design Project in the Electrical and Computer Engineering Department. This project, a two-semester course required of all engineering seniors, requires the investigation, design, and prototyping of a complex electrical or computer system. Besides conducting the course, I was also responsible for directly advising a significant fraction of the projects. I have taught graduate courses (EE584 – Wireless System Security and CpE691 – Information Systems Security) which have heavy emphasis on the application of cryptography, including challenge-response systems and public-key cryptography. I also taught Physical Design of Wireless Systems (EE585) which deals with the detailed design of wireless systems such as cellular phones and other wireless communications equipment. I also have taught a graduate course, EE517, Digital and Computer Systems Architecture and undergraduate courses, CpE450, Architecture, Design and Implementation of Embedded Systems for Real-Time Applications and CpE-358,

Switching Theory and Logical Design, involving microprocessor design and interfacing.

11. As part of the amateur radio hobby I have practiced since 1963, I have designed, implemented and various electronic devices involving analog, digital, RF and system control circuitry.

C. Basis of My Opinion and Materials Considered

12. I have reviewed the '083 patent and the prior art and other documents and materials cited herein. For ease of reference, the full list of documents that I have considered is included in Appendix B. My opinions in this declaration are based on my review of these documents, as well as upon my education, training, research, knowledge, and experience.

13. I have reviewed, had input into, and endorse as set forth fully herein the discussions in the accompanying petition.

D. Legal Standards for Patentability

14. I am not an attorney and I offer no opinions on the law itself. My understanding of the relevant principles of law in this section is based on information provided to me by counsel.

1. Obviousness

15. I have been informed that a claim may be unpatentable under 35 U.S.C. § 103(a) if the subject matter described by the claim as a whole would have been

obvious in view of a prior art reference or in view of a combination of references at the time the alleged invention was made. I have been informed that obviousness is determined from the perspective of a hypothetical person of ordinary skill in the art (“POSITA” or “person of ordinary skill”) and that the challenged claims of the patent should be read from the point of view of such a person at the time the alleged invention was made. I have been informed that a hypothetical person of ordinary skill is assumed to know and to have all relevant prior art in the field of endeavor covered by the patent in suit, and would thus have been familiar with each of the references cited herein, as well as the background knowledge in the art, and the full range of teachings they contain.

16. I have been informed that there are two criteria for determining whether prior art is analogous and thus can be considered prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the patentee’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the patentee is involved. I have also been informed that the field of endeavor of a patent is not limited to the specific point of novelty, the narrowest possible conception of the field, or the particular focus within a given field. I have also been informed that a reference is reasonably pertinent if, even though it may be in a different field from that of the patentee’s endeavor, it is one which, because of the matter with which it deals,

logically would have commended itself to a patentee's attention in considering his problem.

17. I have also been informed that an analysis of whether an alleged invention would have been obvious should be considered in light of the scope and content of the prior art, the differences (if any) between the prior art and the alleged invention, and the level of ordinary skill in the pertinent art involved. I have been informed as well that a prior art reference should be viewed as a whole.

18. I have also been informed that in considering whether an invention for a claimed combination would have been obvious, I may assess whether there are apparent reasons to combine known elements in the prior art in the manner claimed in view of interrelated teachings of multiple prior art references, the effects of demands known to the design community or present in the market place, and/or the background knowledge possessed by a person of ordinary skill. I have been informed that other principles may be relied on in evaluating whether an alleged invention would have been obvious, and that these principles include the following:

- A combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results;
- When a device or technology is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one, so that if a person of ordinary skill can implement a predictable variation, the variation is likely obvious;
- If a technique has been used to improve one device, and a person of ordinary skill would recognize that it would improve similar devices in the same way,

using the technique is obvious unless its actual application is beyond his or her skill;

- An explicit or implicit teaching, suggestion, or motivation to combine two prior art references to form the claimed combination may demonstrate obviousness, but proof of obviousness does not depend on or require showing an explicit teaching, suggestion, or motivation to combine;
- Market demand, rather than scientific literature, can drive design trends and may show obviousness;
- In determining whether the subject matter of a patent claim would have been obvious, neither the particular motivation nor the avowed purpose of the named inventor controls;
- One of the ways in which a patent's subject can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims;
- Any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed;
- "Common sense" teaches that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle;
- A person of ordinary skill is also a person of ordinary creativity, and is not an automaton;
- A patent claim can be proved obvious by showing that the claimed combination of elements was "obvious to try," particularly when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions such that a person of ordinary skill would have had good reason to pursue the known options within his or her technical grasp; and
- One should be cautious of using hindsight in evaluating whether an alleged invention would have been obvious.

19. I have further been informed that, in making a determination as to whether or not the alleged invention would have been obvious to a person of ordinary skill, the Board may consider certain objective factors if they are present, such as: commercial

success of products practicing the alleged invention; long-felt but unsolved need; teaching away; unexpected results; copying; and praise by others in the field. These factors are generally referred to as “secondary considerations” or “objective indicia” of nonobviousness. I have been informed, however, that for such objective evidence to be relevant to the obviousness of a claim, there must be a causal relationship (called a “nexus”) between the claim and the evidence and that this nexus must be based on what is claimed and novel in the claim rather than something in the prior art. I also have been informed that even when they are present, secondary considerations may be unable to overcome primary evidence of obviousness (*e.g.*, motivation to combine with predictable results) that is sufficiently strong.

20. I have been asked to consider the patentability of claims 1-19 (the “Challenged Claims”) of the ’083 patent that are challenged in the Petition. I have been informed that for IPRs, unpatentability must be shown under a preponderance of the evidence. I have been informed that to establish something by a preponderance of the evidence one needs to prove it is more likely true than not true. I have concluded that the Challenged Claims are unpatentable under 35 U.S.C. § 103 based on Aginsky (EX1004) in view of Stammli (EX1005), Aginsky (EX1004) in view of Stammli (EX1005) and in further view of Dresti (EX1007), Aginsky (EX1004) in view of Hanson (EX1006), and Aginsky (EX1004) in view of Hanson (EX1006) and in further view of Dresti (EX1007) as described below, under both the preponderance

of the evidence standard as well as the higher standard of clear and convincing evidence.

2. Claim Construction

21. I have been informed that patent claims are construed from the viewpoint of a person of ordinary skill at the time of the alleged invention. I have been informed that patent claims generally should be interpreted consistent with their plain and ordinary meaning as understood by a person of ordinary skill in the relevant time period (i.e., at the time of the purported invention, or the so called “effective filing date” of the patent application), after reviewing the patent claim language, the specification and the prosecution history (i.e., the intrinsic record).

22. I have further been informed that a person of ordinary skill must read the claim terms in the context of the claim itself, as well as in the context of the entire patent specification. I understand that in the specification and prosecution history, the patentee may specifically define a claim term in a way that differs from the plain and ordinary meaning. I understand that the prosecution history of the patent is a record of the proceedings before the U.S. Patent and Trademark Office, and may contain explicit representations or definitions made during prosecution that affect the scope of the patent claims. I understand that an applicant may, during the course of prosecuting the patent application, limit the scope of the claims to overcome prior art or to overcome an examiner’s rejection, by clearly and unambiguously arguing

to overcome or distinguish a prior art reference, or to clearly and unambiguously disavow claim coverage.

23. In interpreting the meaning of the claim language, I understand that a person of ordinary skill may also consider “extrinsic” evidence, including expert testimony, inventor testimony, dictionaries, technical treatises, other patents, and scholarly publications. I understand this evidence is considered to ensure that a claim is construed in a way that is consistent with the understanding of a person of ordinary skill in the art at the time of the alleged invention. This can be useful for technical terms whose meaning may differ from its ordinary English meaning. I understand that extrinsic evidence may not be relied on if it contradicts or varies the meaning of claim language provided by the intrinsic evidence, particularly if the applicant has explicitly defined a term in the intrinsic record.

II. DESCRIPTION OF THE RELEVANT FIELD AND THE RELEVANT TIMEFRAME

24. I have carefully reviewed the '083 patent and its prosecution history.

25. I understand that the '083 patent issued from U.S. Patent Application 13/298,629 (filed November 17, 2011).

26. I have been instructed by counsel to assume the relevant timeframe for my analysis in this declaration to be on or before November 17, 2011. I have not been asked to consider whether this date is the correct priority date.

27. Based on my review of this material, I believe that the relevant general field for the purposes of the '083 patent is voice-controlled remote control systems.

III. THE PERSON OF ORDINARY SKILL IN THE RELEVANT FIELD IN THE RELEVANT TIMEFRAME

28. My opinions are provided based on what a person of ordinary skill in the art in the technical field of the invention would have understood at the time of the invention of the challenged claims. As I explained above, the relevant timeframe in this Declaration is on or before November 17, 2011. I have been informed and understand that the content of a patent and prior art should be interpreted the way a person of ordinary skill would have interpreted those references at the time of the invention of the patent using the ordinary and customary meanings of the claim terms. I understand that the factors considered in determining the ordinary level of skill in a field of art include the level of education and experience of persons working in the field; the types of problems encountered in the field; the teachings of the prior art; and the sophistication of the technology at the time of the alleged invention. I understand that a person of ordinary skill is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above. I understand that a person of ordinary skill would also have knowledge from the teachings of the prior art, including the art cited below.

29. Taking these factors into account, it is my opinion that, on or before November 17, 2011, a person of ordinary skill in the field of the Challenged Claims

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 remote control systems. A person of ordinary skill in the field could have also obtained similar knowledge and experience through other means. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education. The basis for my familiarity with the level of ordinary skill is my own technical experience in this field. In reaching this opinion as to the hypothetical person of ordinary skill, I have considered the types of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level and professional capabilities of workers in the field.

30. Before November 17, 2011, my level of skill in the art was at least that of a person of ordinary skill. I am qualified to provide opinions concerning what a person of ordinary skill would have known and understood at that time, and my analysis and conclusions herein are from the perspective of a person of ordinary skill. I have extensively taught and worked with others who meet the criteria of such a person, and I can provide opinions from the perspective of what would be understood by such a person. As such, I am qualified to provide an opinion about what a person of

ordinary skill would have understood, known, or concluded as of the priority dates for the '083 patent.

IV. TECHNICAL BACKGROUND AND STATE OF THE ART

A. Problems Discussed in the '083 Patent

31. The '083 patent describes that a purported “need exists for a simplified and more user friendly system and method for conveniently setting up and configuring a controlling device,” *i.e.*, a remote control. '083 patent, 2:23-25. For example, the '083 patent discusses the problems associated with preprogramming universal remotes with command codes to exert control over another device ('083 patent, 1:28-52), researching command codes online ('083 patent, 1:53-62), and customizing assignment of commands to particular buttons on a universal remote ('083 patent, 1:63-2:12).

32. To solve these problems, the '083 patent proposes a method of provisioning a codeset that includes certain types of data from a “target appliance” to a “controlling device.” '083, Abstract, 4:41-55 (“For example, when a command function key is actuated on the controlling device 100, the controlling device 100 may retrieve from the command data stored in memory 204, 205, 206 a command value and control protocol corresponding to the actuated function key and, where necessary, current device mode and transmit that command to an intended target appliance, *e.g.*, STB 106, in a format recognizable by that appliance to thereby control one or more

functional operations of that appliance.”). Such needs and solution to address such needs were well known and conventional, however, before the effective filing date of the ’083 patent.¹

B. Voice Control Technology Has Existed For Decades

33. Voice control has been well-known for decades, as the first speech recognition device was built in 1952 by researchers at Bell Laboratories: “Audrey” (the Automatic Digit Recognition machine). Audrey was capable of understanding spoken digits 0 – 9 (“zero”, “one”, “two”, etc.), as long as a speaker paused between each, and could help the user dial a phone number hands free. However, Audrey occupied a six-foot-high relay rack, consumed substantial power, and had streams of cables. Moreover, Audrey could only recognize the voices of designated speakers. Needless to say, Audrey did not become a widely distributed commercial success. EX1010, 3-4.

34. The next major iteration of a voice-controlled device was IBM’s “Shoebox” in 1962, which was a voice-activated calculator that understood 10 digits (like Audrey) and six English control words: plus, minus, total, subtotal, false, and off. Users could thus command the Shoebox to execute simple calculations. EX1011.

¹ All emphasis and annotations, including color annotations to figures, added unless noted.

35. Harpy—a joint project between the Defense Advanced Research Projects Agency and Carnegie Mellon University—followed in 1976. It had a 1,011-word vocabulary and could understand entire phrases, including where different words started and stopped. Harpy processed speech that followed pre-programmed vocabulary, pronunciation, and grammar structures. EX1012,² 810-811.

36. In the mid-1980s, AT&T introduced the AT&T 3450 cellular phone, a consumer cellular phone that allowed voice control of dialing and other call control functions. That same decade, IBM introduced another breakthrough in voice recognition technology: Tangora. Tangora recognized approximately 20,000 words and connected to a typewriter, enabling users to dictate text. But there still remained a need for greater processing power and reduced cost before voice recognition could be widely disseminated. EX1011; EX1012, 811.

37. This need was satisfied in the 1990s when significant improvements were achieved in personal home computing that enabled the next breakthrough in voice recognition technology: NaturallySpeaking. NaturallySpeaking was (and still is) a

² I understand that EX1012 was publicly accessible at least as early as June 20, 2007. EX1041 (“Hoffman Declaration”) at ¶¶19-25.

continuous speech and voice recognition program for general-purpose use with a vocabulary of 23,000 words. EX1013.³

38. After the success of NaturallySpeaking, many other companies also began offering voice recognition technology. The work that went into these foundational devices and software programs, amongst others, laid the groundwork for voice-control devices that can receive voice commands, execute functions, and even exert control over other devices—such as smart home hubs (for example, Amazon Echo and Google Nest Hub) or voice-controlled remote controls. Such devices allow users to easily control multiple devices with simple voice commands.

1. It was Well Known to Use Phonetic Subunits in Voice Recognition Systems

39. At the time of the '083 patent's filing, there were numerous well known methods and systems by which electronic devices could implement speech recognition. In *An Overview of Modern Speech Recognition*, Huang & Deng describe how speech recognition systems convert speech into a sequence of words

³ I understand that EX1013 was publicly accessible at least as early as March 19, 2005. Hoffman Declaration at ¶¶26-31.

by using computer programs. EX1014⁴ (“Huang & Deng”), 339. Typical speech recognition applications included “voice dialing, call routing, data entry and dictation, command and control, and computer-aided language learning.” Huang & Deng, 339.

40. The accuracy of automatic speech recognition in such systems and applications has been—and continues to be—of paramount concern in speech recognition systems. Huang & Deng, 340. Ideally, speech recognition systems are able to accurately decode a speech input (“W,” below) into a word sequence (“ $\hat{W}$ ”):

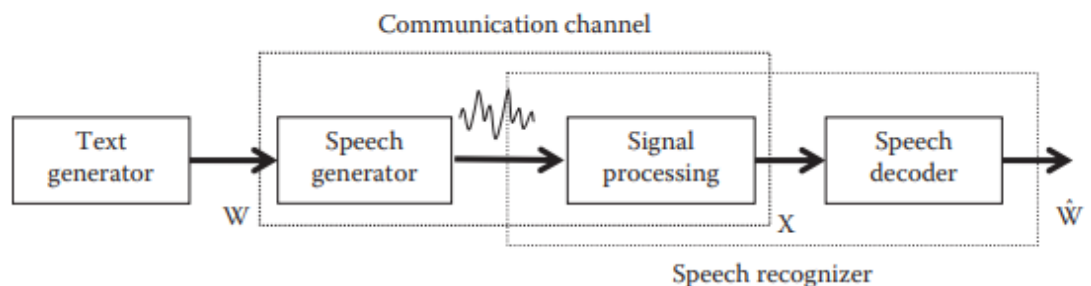


FIGURE 15.1 A source-channel model for a typical speech-recognition system.

Huang & Deng, 340.

41. Typically, acoustic and language models are used to help accurately decode a speech input. As Huang explains:

⁴ I understand that EX1014 was publicly accessible at least as early as May 12, 2011. Hoffman Declaration at ¶¶32-39.

Acoustic models include the representation of knowledge about acoustics, phonetics, microphone and environment variability, gender and dialect differences among speakers, etc. *Language models* refer to a system's knowledge of what constitutes a possible word, what words are likely to co-occur, and in what sequence. The semantics and functions related to an operation a user may wish to perform may also be necessary for the language model. Many uncertainties exist in these areas, associated with speaker characteristics, speech style and rate, the recognition of basic speech segments, possible words, likely words, unknown words, grammatical variation, noise interference, nonnative accents, and the confidence scoring of results. A successful speech-recognition system must contend with all of these uncertainties. The acoustic uncertainty of the different accents and speaking styles of individual speakers are compounded by the lexical and grammatical complexity and variations of spoken language, which are all represented in the language model.

Huang & Deng, 340-341.

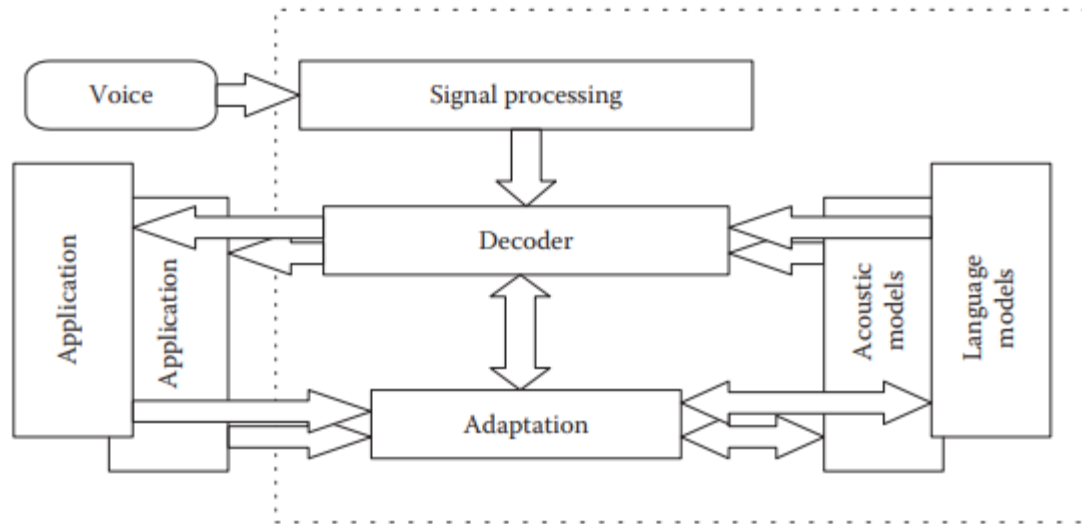


FIGURE 15.2 Basic system architecture of a speech-recognition system.

42. In accordance with these principles, a decoder uses both acoustic and language models to generate the word sequence that has the maximum posterior probability for the speech input feature vectors. Huang & Deng, 341. One aspect of acoustic models is “pronunciation modeling,” which describes how a sequence or multi-sequences of fundamental speech units—including phonemes, phones, or phonetic features—are used to represent larger speech units such as words or phrases that are the object of speech recognition. Huang & Deng, 342, 347, 361-62. Such pronunciation modeling is particularly important for large vocabulary speech recognition systems, as the systems need to recognize a large number of words. Huang & Deng, 341. Such acoustic modeling is well-known, and has been used since the early 1970s. Huang & Deng, 351.

43. With respect to the inputs for these pronunciation models, a phoneme is the minimal unit of sound that has semantic content. EX1016,⁵ 2; EX1017⁶ (“Scanlon”) (“The phoneme can be defined as the smallest phonetic unit in a language that is capable of conveying a distinction in meaning...”); *see also* EX1018⁷ (“Phonemes are the basic sound groups of a language”). For example, the phoneme “AE” versus the phoneme “EH” captures the difference between the words “bat” and “bet.” EX1016, 2. Phonemes may fall into several major classes: vowels, diphthongs, semi-vowels, stops, fricatives, nasals, and silence; these phonemes may be combined to create words. Scanlon, 806.

44. In 1997, the Laboratory of Computer Science at Massachusetts Institute of Technology published its work on a speech recognition system called “The BeBe System.” The BeBe System utilized numerous detection algorithms, each of which recognized a specific phoneme. Each phoneme had a corresponding phonetic

⁵ I understand that EX1016 was publicly accessible at least as early as November 4, 2003. Hoffman Declaration at ¶¶40-46.

⁶ I understand that EX1017 was publicly accessible at least as early as March 20, 2007. Hoffman Declaration at ¶¶47-55.

⁷ I understand that EX1018 was publicly accessible at least as early as July 12, 2010. Hoffman Declaration at ¶¶56-64.

representation based on phonetic alphabets and phonetic symbols. Through this system, BeBe delivered more reliable and consistent speech recognition. EX1018.

45. As another example, prior to November 17, 2011, speech recognizers were utilizing “phonetic representations (phoneme strings or lattices)” in voice-to-phoneme conversion algorithms, which was known to enhance speech recognition capability. In fact, it was known that the use of such algorithms would have “important consequences given the globalization of mobile devices and the subsequent demand to provide voice technology in new markets.” EX1019.⁸

46. As a further example, U.S. Patent Application Publication No. 2008/0059193 to Huang, filed February 7, 2007 and published March 6, 2008 (“Huang-193,” described in further detail below) discloses a voice recognition system that uses word-to-phoneme algorithms to convert phoneme strings and other phonetic data. EX1020 (“Huang-193”), ¶[0024]. “Default voice keyword field 24*b* comprises machine-generated phonetic data including phoneme string converted from the name entries through word-to-phoneme algorithm and the corresponding speaker independent models for speech recognition and text-to-speech generated voice.” Huang-193, ¶[0024].

⁸ I understand that EX1019 was publicly accessible at least as early as October 4, 2007. Hoffman Declaration at ¶¶65-71.

2. The Benefits of Using Phonetic Representations in Voice-Controlled Systems were Well Known

47. The foregoing methods and techniques of recognizing speech command were well-known in the art, and numerous publications described the benefits of implementing voice-controlled systems that used phonemes and other types of phonetic subunits to understand voice commands.

48. For example, U.S. Patent No. 6,584,439 to Geilhufe, filed on May 21, 1999 and published June 24, 2003, discloses a “Method and apparatus for controlling voice controlled devices.” EX1021 (“Geilhufe”), *Title*. Specifically, Geilhufe discloses “a standard voice user interface...to control various devices by using standard speech commands.” Geilhufe, 5:30-33. Geilhufe teaches that voice controlled devices may include any type of speech recognition system, but further indicates that speaker independent speech recognition systems are preferred. Geilhufe, 7:35-49. In such a preferred embodiment, Geilhufe discloses that “a speaker-independent representation of speech is a phonetic representation of speech,” wherein a speaker dependent system is a system where the speech patterns are constructed to a single speaker, and a speaker independent system is capable of handling a wide range of speakers Geilhufe, 7:35-49; *see also* Geilhufe, 9:50-10:47; EX1016, 1. Geilhufe further discloses the known benefits and advantages of using phonetic representations in speech recognition systems, including the fact that “[o]ld and new generations of equipment can interoperate without prior coordination by

using phonetic representations,” “no legacy restrictions...unlike waveform-storage based systems,” and increased reliability under less than ideal situations. See Geilhufe, 10:11-47.

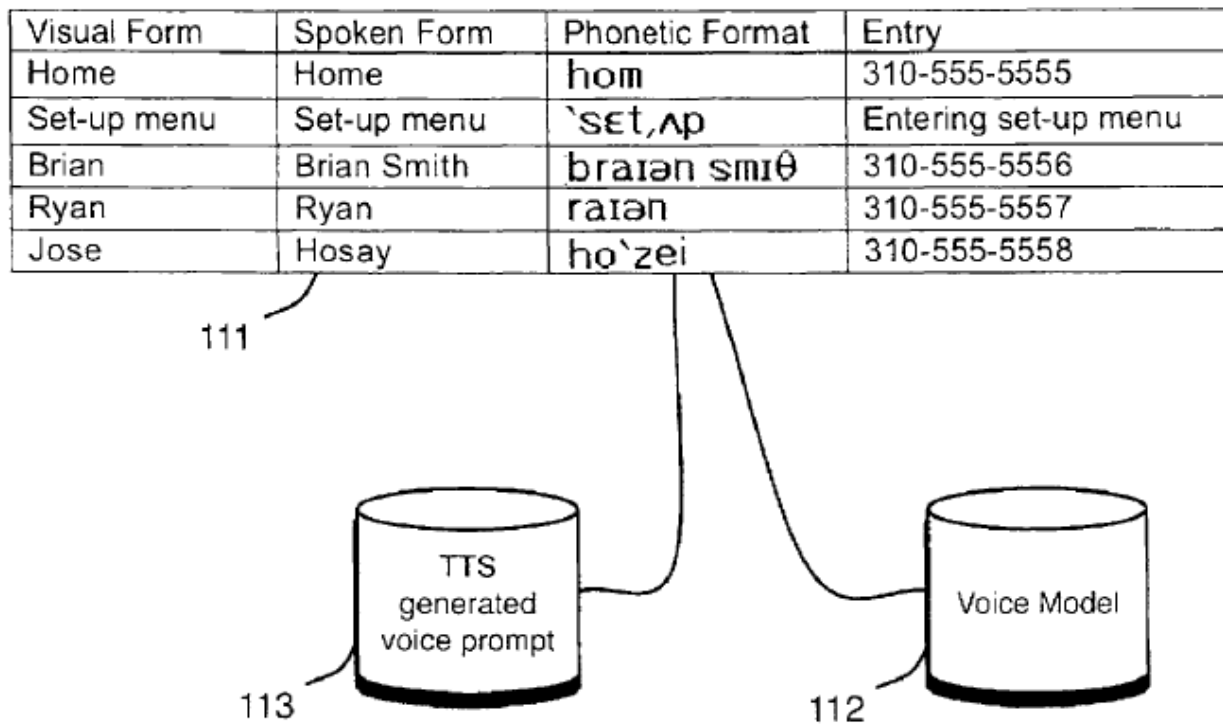
49. As a further example, Huang-193 discloses “Voice recognition system and method thereof.” Huang-193, *Title*. Specifically, Huang-193 discloses a “voice keyword table VKT” comprising “voice recognizable keywords and corresponding application instructions.” Huang-193, ¶¶[0018], [0024]-[0025]. Huang-193 further discloses command function entries within the VKT that comprise phonetic representations in the form of voice keyword field 24b. Huang-193, ¶[0024], Fig. 2b. “Default voice keyword field 24b comprises machine-generated phonetic data including phoneme string converted from the name entries through word-to-phoneme algorithm and the corresponding speaker independent models for speech recognition and text-to-speech generated voice.” Huang-193, ¶[0024]. Huang teaches that using such phonemes improves voice recognition. ¶¶[0026], [0021].

20b Label	22b Adaptive voice keyword	24b Default voice keyword	26b Application
Brian Smith	Brian	bræɪ ən smɪθ	Dialing 123-555-1000
家	Jia	dʒiɑ	Dialing 123-555-1001

FIG. 2b

Huang-193, Fig. 2b.

50. U.S. Patent No. 7,689,417 to Huang discloses “Method, system, and apparatus for improved voice recognition.” EX1022 (“Huang-417”), *Title*. Specifically, Huang-417 discloses “generating a Voice Keyword Table (VKT) and downloading the VKT to the voice recognition device; upgrading a voice recognition system on the voice recognition device; and modifying a voice model in the voice recognition device.” Huang-417, 1:52-56. As shown below, a VKT table “preferably comprises ... phonetic format data.” Huang-417, 1:57-58.



Huang-417, Fig. 2B, 5:48-62 (“table 111 comprises phonetic format data corresponding to the spoken form data”). Huang-417 further discloses that voice recognition device 200 (which “may be, for example, a speakerphone, an earset or an earset/speakerphone combo with [voice recognition] functionality”) may command application device 300 (which “may be, for example, a mobile telephone, a PDA, a global positioning device, a home appliance or information appliance, a personal computer, a control system for a DVD/MP3 player, a car radio, or a car function controller”). Huang-417, 4:41-53, 4:6-5:1.

C. It Was Well Known for Universal Remotes to Execute Voice Control Over Controllable Devices

51. By the filing date of the '083 patent, voice control technology had started permeating every day life—it had become a common feature of phones, cars, data entry, and even remote controls.

52. For example, U.S. Patent No. 7,944,370 to Harris, filed on November 3, 2005 and published May 17, 2011, discloses “Configuration method for a remote control via model number entry for a controlled device.” EX1023 (“Harris”), *Title*. Specifically, Harris discloses a universal remote control that may be programmed to “recognize a plurality of external electronic devices.” Harris, 2:46-51. Harris further discloses that the disclosed universal remote control may receive user input in a variety of ways, including “voice recognition.” Harris, 7:4-15.

53. As another example U.S. Patent No. 5,247,580 to Kimura, filed July 22, 1992 and published September 21, 1993, discloses a “voice-operated remote control system.” EX1024 (“Kimura”), *Title*. Kimura discloses that the voice-controlled system contains a microphone for converting a voice command into an electric signal, which is recognized by the speech recognition circuit to produce corresponding command data. Kimura, 3:25-4:2. This command data corresponds to various remote control signals used to control a remote device. Kimura, 3:25-4:2.

54. As a further example, International Publication No. WO2008096944 to Lee, filed February 9, 2007 and published August 14, 2008, discloses “Universal remote

controller and control code setup method thereof.” EX1025 (“Lee”), *Title*. Specifically, Lee discloses a voice-controlled universal remote control. Lee, 2:28-34. Lee discloses that voice detecting unit 80 may be a microphone that “detects a voice command.” Lee, 7:12-15.

55. As a further example, U.S. Patent No. 6,397,186 to Bush, filed December 22, 1999 and published May 28, 2002, discloses “Hands-free, voice-operated remote control transmitter.” EX1026 (“Bush”), *Title*. Bush discloses a voice-controlled remote control with “[a] universal remote control code library ... for control of different types of appliances as well as appliances manufactured by different manufacturers.” Bush, 4:34-51.

56. As a further example, U.S. Patent Application Publication No. 2006/0235701 to Cane, filed September 9, 2005 and published October 19, 2006, discloses “Activity-based control of a set of electronic devices.” EX1027 (“Cane”), *Title*. Cane discloses it was “well known to use voice recognition technologies in association with a remote control device to enable a user to speak certain commands in lieu of having to identify and select control buttons.” Cane, ¶[0009]. Cane further discloses tables of activity code sequences that include standard phrases used to invoke activities of a remote device. Cane, ¶[0120], Figs. 7A-7B.

FIG. 7A

Configuration 700								
			Device Settings					
Activit ies	Volume	Default	display	receiver	DVD	cable tuner	VCR	
off			off	off	off	off	off	
tv	Receiver	Cable Tuner	on inB	on inVideo1	off	on incable	off	
dvd	Receiver	DVD	on inA	on inDVD	on	off	off	
vcr	Receiver	VCR	on inA	on inVideo2	off	on inaux	off	
cd	Receiver	DVD	off	on inDVD	on	off	off	
fm	Receiver	Receiver	off	on inFM	off	off	off	

Cane, Fig. 7A.

FIG. 7B

Set Activity 700								
			Device Codes					
Action	Volume	Default	display	receiver	DVD	cable tuner	VCR	
tv-OFF			off	power		power		
tv-ON	Receiver	Cable Tuner	on inputA	power		power		
dvd-OFF			off	input input power	power			
dvd-ON	Receiver	DVD	on inputB	power input input	power			
vcr-OFF			off	input input input power			power	
vcr-ON	Receiver	VCR	on inputC	power input			power	
fm-OFF				input power				
fm-ON	Receiver	Receiver		power input input input				

Cane, Fig. 7B.

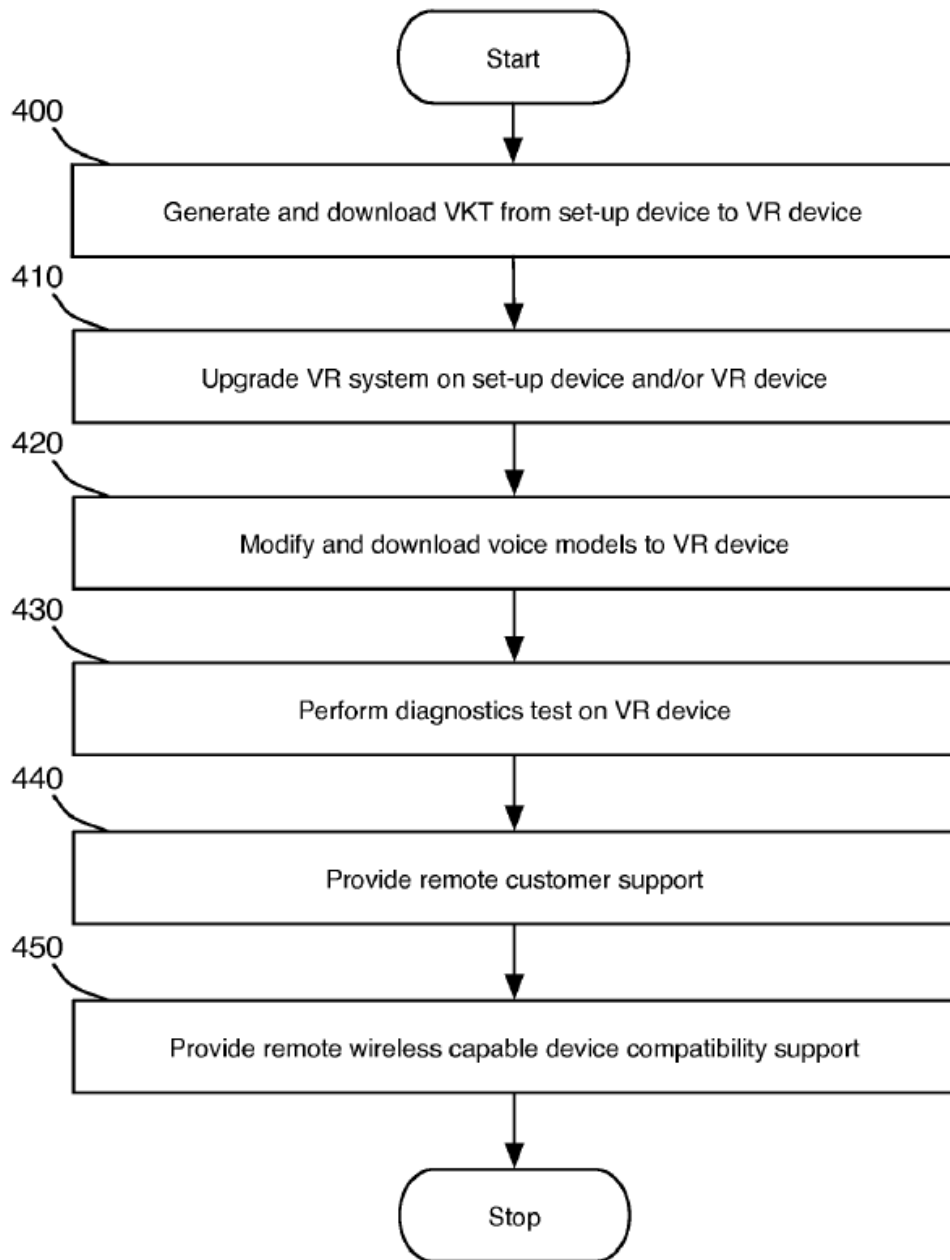
D. It Was Well Known to Provision Controlling Devices, Such as Universal Remotes, With Codeset Records

57. For the foregoing remote controls to exert control over controllable devices in their environments, they needed some type of information to allow them to know

what types of commands to send that the controllable devices would be responsive to. To aid with that control, it was well-known to provide such remote controls with codesets records including the requisite information.

58. U.S. Patent Application Publication No. US 2006/0041655 to Holloway, filed January 5, 2005 and published February 23, 2006, discloses a “Bi-directional remote control for remotely controllable apparatus.” EX1028 (“Holloway”), *Title*. Holloway teaches that the control of the devices is accomplished through IR technology, including an IR blaster that “issue[s] commands for the third party hardware to be controlled.” Holloway, ¶¶[0282]-[0283]. Holloway explains that “[t]he technology for these commands is well understood; libraries of these commands for individual pieces of equipment exist.” Holloway, ¶[0283].

59. Huang-417 further discloses that its set-up device 100—in other words, the controlled device—sends to voice recognition device 200 the “Voice Keyword Table (VKT).” Huang-417, 3:32-35, 8:1-34, Fig. 5. Specifically, Huang-417 discloses that “voice models are modified and downloaded from set-up device 100 to VR device 200.” Huang-417, 8:10-11.



Huang-417, Fig. 5.

60. Bush further discloses that its “system may be pre-programmed with a universal library of codes for controlling various appliance categories and appliances.” Bush, *Abstract*. Bush further discloses “[a] universal remote control code library may be provided which allows codes to be selected for control of

different types of appliances as well as appliances manufactured by different manufacturers.” Bush, 4:39-42; *see also* Bush, 14:63-67, 30:40-44, 32:20-37.

61. U.S. Patent Application Publication No. US 2009/0254778 to Huang, filed April 9, 2009 and published October 8, 2009, discloses a “User interface for a remote control application. EX1029 (“Huang-778”), *Title*. Huang teaches that this interface may be used to setup the remote control application to control appliances. Huang, *Abstract*. More specifically, Huang discloses configuring the remote control application with a “command code set” used to command functions of the appliances. Huang, ¶¶[0129], [0156], [0317].

62. U.S. Patent Application Publication No. US 2005/0216606 to Hayes, filed March 24, 2005 and published September 29, 2005, discloses a “System and method for using a mark-up language page to command an appliance.” EX1030 (“Hayes”), *Title*. Specifically, Hayes claims a universal remote control device containing “a memory storing a library of commands for commanding the operation of a plurality of different consumer appliances.” Hayes, Claim 25; *see also* Hayes, ¶[0120].

63. European Patent No. 1,209,661 to Hayes, filed November 22, 2001, discloses a “Universal remote control adapted to receive voice input.” EX1031 (“Hayes-661”), *Title*. Hayes-661 teaches that “[u]niversal remote controls capable of controlling the operation of consumer electronic devices are well known in the art.” Hayes-661, ¶[0001]. Specifically, Hayes-661 discloses a universal remote control

containing “an operational command code library...comprised of a plurality of operational command codes” used “to control the operation of a consumer electronic device.” Hayes-661, ¶[0017].

E. It Was Well Known for Codeset Records to Include a Wide Variety of Information

1. Protocol and Formatting Information

64. U.S. Patent Application Publication No. US 2007/0052549 to Le, filed August 22, 2005, and published March 8, 2007, discloses an “Apparatus and method for updating encoded signal information stored in a remote control unit through direct key entry.” EX1035 (“Le”), *Title*. Specifically, Le discloses “[a] method for updating a memory of a universal remote control unit” including “entering...a signal formatting data entry which includes signal formatting data...to be stored in the memory of the remote control unit.” Le, *Abstract*. Le teaches that “universal remote control units include a memory which stores a plurality of encoded signal formatting information which correspond to signal structures to which specific manufacturer and model number devices are responsive” and that “[t]he signal formatting information commonly varies based on the device to be controlled.” Le, ¶[0004]. Le further teaches that its apparatus and method include “an exemplary signal formatting data entry (or record).” Le, ¶[0029], Fig. 3; *see also id.* Fig. 4. Le also discloses that “[t]he signal configuration portions of the signal formatting data include the protocol type.” Le, ¶[0029]. Le further discloses

“signal formatting data information” and “additional protocol information” as part of the remote control record. ¶[0041]. Further still, Le teaches that “the signal formatting data is divided into three portions” including “the first portion corresponding to protocol information, the second portion corresponding to key data information, [and] the third portion corresponding to additional protocol information.” ¶[0056].

Figure 3

Record Length
Protocol Type
Manufacturer Name
Device Type
ON
OFF
0 -- 9
CH +
CH -
VOL +
VOL -
Mute
⋮
End of Record

Figure 4

Record Length
Protocol Type
Manufacturer Name
Alternate Device Type
ON
OFF
0 -- 9
CH +
CH -
VOL +
VOL -
Mute
⋮
End of Record

Le, Figs. 3-4.

65. U.S. Patent No. 7,259,710 to Kisliakov, filed August 7, 2003, and published April 22, 2004, discloses a “User input device” “configured with a communication protocol for communicating transmission data with predetermined apparatus.” EX1036 (“Kisliakov”), *Title, Abstract*. Kisliakov discloses that its user input device is a “remote control device” configured to communicate “protocol data and an associated format function” with a plurality of predetermined apparatus. Kisliakov, 6:20-30; *see also id.*, *Abstract*. And Fig. 27 discloses a “protocol module” which includes “protocol properties” and “format functions.” Kisliakov, 41:29-48, Fig. 27; *see generally id.* 41:29-49:45. Throughout its 98-page disclosure, Kisliakov teaches various well-known protocol and formatting information and data including “carrier frequency,” bit encoding, and parity, among others. *E.g.*, Kisliakov, 1:16-51.

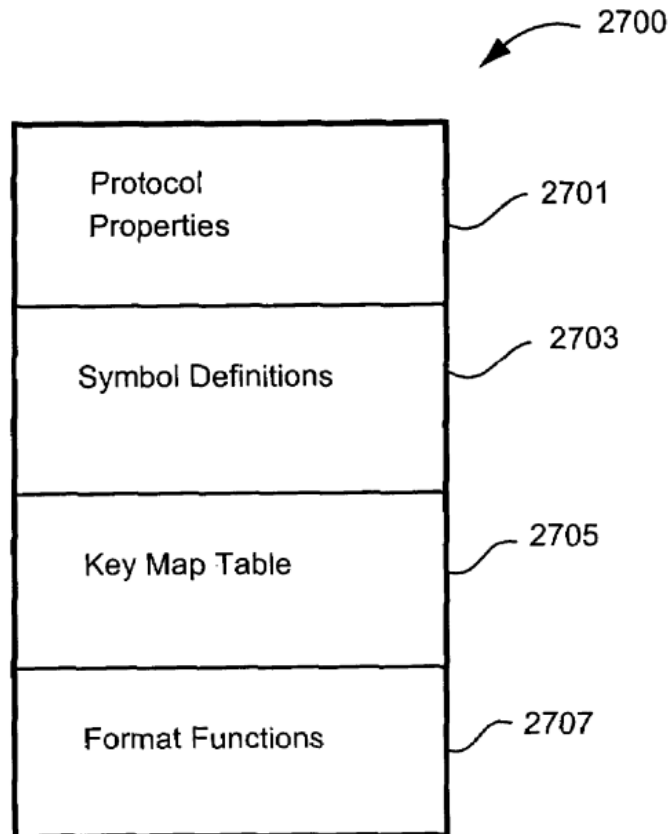
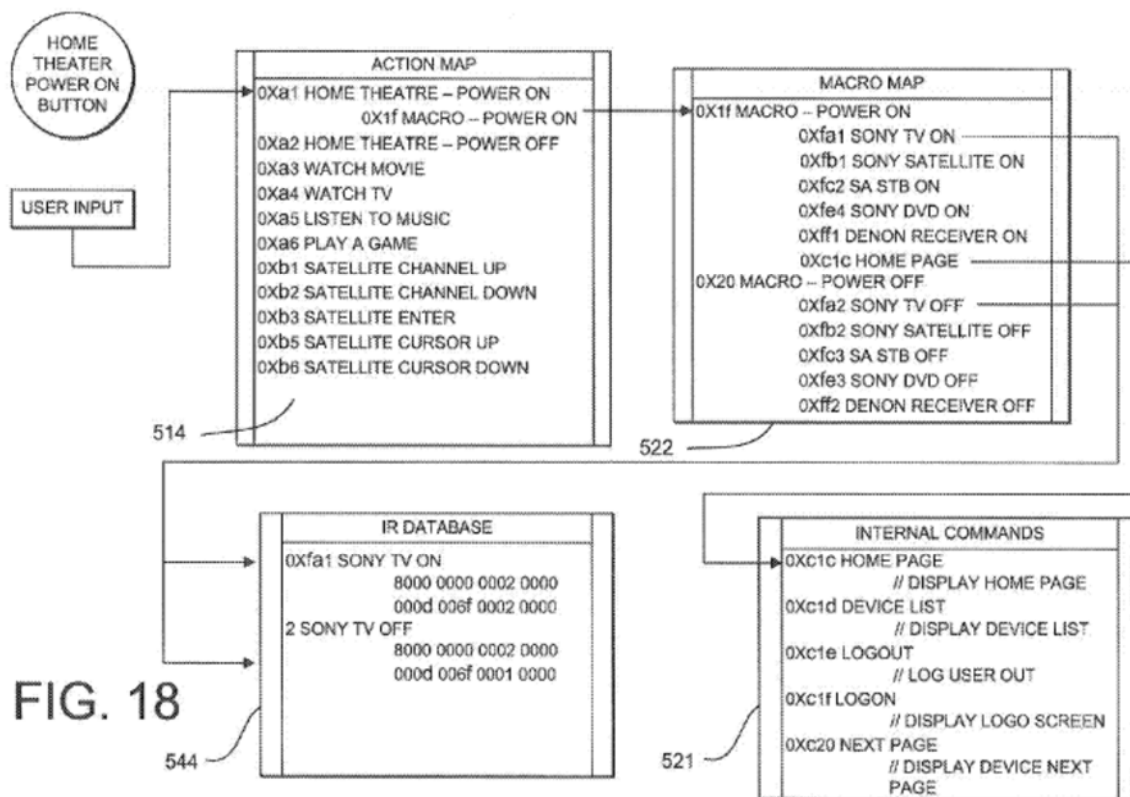


Fig. 27

Kisliakov, Fig. 27.

2. Command Data

66. Huang-778 further discloses that the appropriate codeset with command and IR format information is used to control the selected device. See Huang-778, ¶[0152], Fig. 18.



67. Comerford further discloses spoken commands that correspond to a command and data needed to execute that command from the command and data lists. See Comerford, 6:44-53, 9:47-52, 16:16-17:4.

68. Indeed, as explained above, it was well-known for remote controls to transmit data associated with a user command input to controllable devices that command the controllable device to perform an indicated action because that it precisely what remote controls are mean to transmit. See *supra*, §IV.C.

3. Standard Function Identifier

69. U.S. Patent No. 7,046,161 to Hayes, filed March 12, 2003, and published July 31, 2003, discloses a “System and method for automatically setting up a universal

remote control.” EX1037 (“Hayes-161”), *Title*. Specifically, Hayes-161 discloses a “system and method for configuring a remote control to command the operation of appliances” through the use of “[c]ommand codes, graphical user interface elements, and services [that] are accessed and downloaded to the remote control.” Hayes-161, *Abstract*. Hayes-161 further discloses that “[t]he function configuration process...may be used to setup function identity and operating parameters within the remote control.” Hayes-161, 7:1-13. Hayes-161 discloses that, during this configuration process, “a set of possible functions is defined and each function is assigned a unique numeric identifier which is communicated to the remote control.” Hayes-161, 7:1-13. These “function identifiers” are shown in Figures 8a and 8b below. Hayes-161, 7:14-16.

DEVICE TYPE: TV		DEVICE TYPE: VCR	
#	Function	#	Function
1	Power	1	Power
2	Volume up	2	Play
3	Volume down	3	Stop
4	Mute	4	Fast forward
5	Channel up	5	Rewind
6	Channel down	6	Pause
7	0	7	Record
8	1	8	Slow+
9	2	9	Slow-
10	3	10	Frame advance
11	4	11	Tracking+
12	5	12	Tracking-
13	6	13	Index search forward
14	7	14	Index search reverse
15	8	15	Stereo/mono
16	9	16	Channel+
17	0	17	Channel-

FUNCTION IDENTIFIERS FOR TV AND VCR DEVICES

FIG. 8A

Hayes-161, Fig. 8a.

DEVICE TYPE: TV		DEVICE TYPE: VCR	
#	Function	#	Function
18	Enter	18	1
19	Previous channel	19	2
20	Input select	20	3
21	Menu	21	4
22	Menu up	22	5
23	Menu down	23	6
24	Menu left	24	7
25	Menu right	25	8
26	Select	26	9
27	Exit	27	0
28	Closed caption on/off	28	Enter
29	Sleep timer	29	TV/VCR
30	Brightness+	30	Menu
31	Brightness-	31	Menu up
32	Tint+	32	Menu down
33	Tint-	33	Menu left
34	Surround on/off	34	Menu right
35	Rear vol+	35	Select
36	Rear vol-	36	Volume+
37	Center vol+	37	Volume-
38	Center vol-	38	Mute
39	Favorite channel+	39	VCR plus
40	Favorite channel-	40	Program
41	+100	41	...
42	Displat on/off	42	...
43	...	43	...
...	Etc.	...	Etc.

FUNCTION IDENTIFIERS FOR TV AND VCR DEVICES

FIG. 8B

Hayes-161, Fig. 8b.

70. Bush discloses standard function identifiers through “default menu words associated with a selected target appliance” that allow a user to control functions of the target appliance via voice commands. Bush, 45:46-46:16; *see also* Bush, 46:41-47:23, 49:45-50:50, Tables 1-7. When spoken and recognized by the remote control’s speech recognition system, the function is performed. Bush, 45:46-46:16.

TABLE 1

Power	Channel	Change	Volume	Sound	Control	Private
-------	---------	--------	--------	-------	---------	---------

Bush, Table 1.

TABLE 3

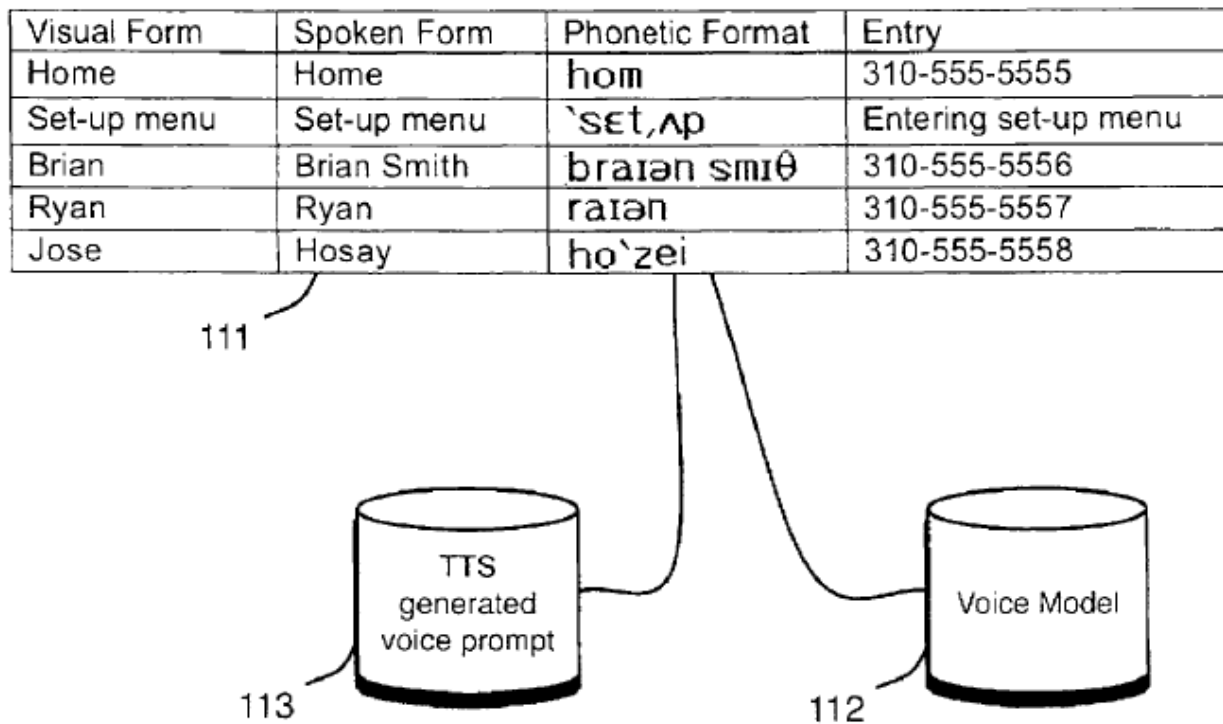
Power	Channel	Change	Volume	Sound	Control	Private
		Up				
		Down				
		Back				

Bush, Table 3.

4. Phonetic Representation

71. As I explained in detail above, it was well-known to use phonetic representations, such as phonemes, in voice recognition systems, and it was well-known to include them in data structures transmitted to allow for remote control.

72. Huang-417 discloses “generating a Voice Keyword Table (VKT) and downloading the VKT to the voice recognition device.” Huang-417, 1:52-56. As shown below, Huang-417’s VKT table “preferably comprises ... phonetic format data.” Huang-417, 1:57-58.



Huang-417, Fig. 2B, 5:48-62 (“table 111 comprises phonetic format data corresponding to the spoken form data”).

73. Huang-193 discloses a “voice keyword table VKT” comprising “voice recognizable keywords and corresponding application instructions.” Huang-193, ¶¶[0018], [0024]-[0025]. Huang-193 further discloses command function entries within the VKT that comprise phonetic representations in the form of voice keyword field 24b. Huang-193, ¶[0024], Fig. 2b. “Default voice keyword field 24b comprises machine-generated phonetic data including phoneme string converted from the name entries through word-to-phoneme algorithm and the corresponding

speaker independent models for speech recognition and text-to-speech generated voice.” Huang-193, ¶[0024].

20b Label	22b Adaptive voice keyword	24b Default voice keyword	26b Application
Brian Smith	Brian	brəɪ ən smɪθ	Dialing 123-555-1000
家	Jia	dʒɑ	Dialing 123-555-1001

FIG. 2b

5. Synonyms

74. As it was well-known to include phonetic representations of commands in data structures, it was similarly well-known to include phonetic representations of synonyms to those commands as well to help expand the vocabulary of a voice-control system.

75. U.S. Patent No. 6,748,361 to Comerford, filed December 14, 1999, discloses “Personal speech assistant supporting a dialog manager.” EX1032 (“Comerford”), *Title*. Specifically, Comerford discloses a “personal speech assistant (PSA)” which includes “a command vocabulary.” Comerford, 16:16-43. When the PSA detects that one of the words within the command vocabulary has been spoken, a command

that correlates to the spoken word may be executed. Comerford further discloses “that the vocabulary file system permits any number of spoken commands to correspond to the same command and data,” allowing for “the creation of synonyms for command words or phrases to improve the recognition accuracy obtained by a given user or simplify the user’s task in memorizing the command set.” Comerford, 16:44-53. This is shown below in Figure 11A:

new	nw	null
scroll_up	su	10
scroll_down	sd	10
top	to	null
bottom	bo	null
next	nx	null
previous	pr	null
edit_entry	ed	null
done	ok	null
repeat	rp	1
list_all_entries	al	null
list_all_names	an	null
address_please	ad	null
address	ad	null
what_is_the_address	ad	null
continue	co	null
stop_reading	nop	x
find_homer_simpson	fi	simpson
find_Ed_Smith	fi	smith
find_David_Frank	fi	frank

In this way, “[i]f one word does not get recognized, a synonym can be made to replace it.” 2:56-63. A person of ordinary skill in the art would have readily

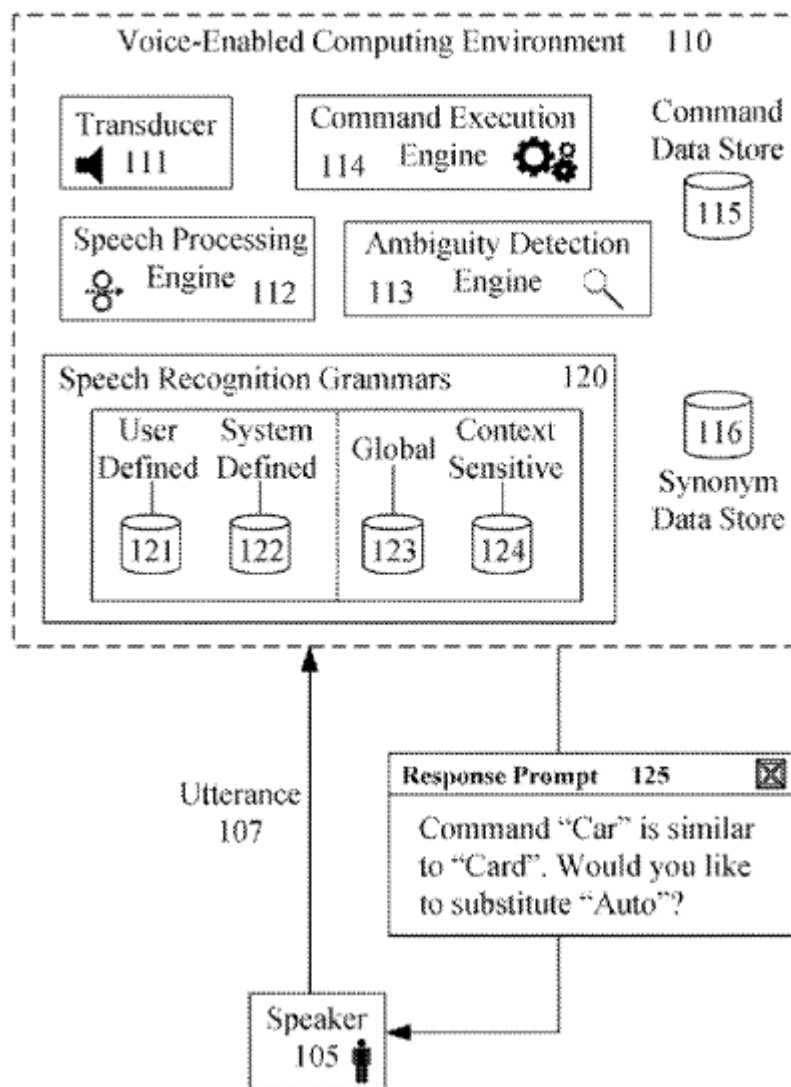
recognized that such a system beneficially increases the likelihood that a voice recognition system correctly recognizes a user command, even if the user's command doesn't precisely match a preprogrammed command.

76. U.S. Patent Application Publication No. 2002/0095286, filed January 12, 2001, to Ross discloses "System and method for relating syntax and semantics for a conversational speech application." EX1033 ("Ross"), *Title*. Specifically, Ross discloses a voice recognition system that receives user voice commands. The system includes "domain models" that may include "a lexicon of words associated with [a] speech-enabled application. The lexicon provides synonyms and parts of speech information for elements of an ontological description of the domain model, and the grammatic specification along with the ontological description and the syntax templates is based on the lexicon." Ross, ¶[0012]. Further, the lexicon "links each word to all the information known about that word, including ontology classes (e.g., as part of the ontology 64) that it may belong to, and the various syntactic forms that the word might take." Ross, ¶[0069].

77. U.S. Patent Application Publication No. 2008/0133244, filed December 5, 2006, to Bodin, discloses "Automatically providing a user with substitutes for potentially ambiguous user-defined speech commands." EX1034 ("Bodin"), *Title*. Specifically, Bodin discloses "[a] method for alleviating ambiguity issues of new user defined speech commands." Bodin, *Abstract*.

78. To do so, Bodin discloses suggesting a “synonym or substitute” word or phrase for a new user defined speech command. Bodin, ¶[0009]. For example, if a user tries to define a new command “car”, the system suggests substituting the synonym “auto” for “car” because “car” is phonetically too similar to the preexisting command “card.” Bodin, ¶[0023].

100



Bodin, Fig. 1.

V. THE '083 PATENT

A. Overview of the '083 Patent

79. At the time of '083's filing, it was well-known to use unique **codesets** in universal remotes to control the function of various electronic device makes and models. See '083, 1:19-2:11. '083 adds voice commands as part of a **codeset record**. *E.g.*, '083, 2:29-51 ("The subject disclosure generally relates to controlling devices such as universal remote controls, and more specifically to improved methods for setup and configuration of such devices, i.e., the identification and selection of appropriate sets of command data to be associated with the specific appliances to be controlled. To this end, a controlling device may be 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. As will become apparent, speech recognition and command data identification processing may be performed on the controlling device itself; on a locally situated device such a personal computer or a set top box; remotely at a Web server; or a combination thereof as appropriate for a particular embodiment. Additionally, in certain embodiments the 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.”), 6:28-40 (“As appropriate for a particular embodiment, all or part of said speech recognition processing may be performed by programming on the controlling device itself or, with reference to FIGS. 5a and 5b, may be performed by programming on a local appliance such as STB 104 which is in bidirectional communication 504 with the controlling device; or may be performed by programming resident on a remote server 500 accessible via a network 502 such as the Internet or PSTN. In the latter case, access to such network may be via an intermediary appliance such as STB 104, illustrated at 506, or may be via a local network connection 508, such as WiFi or Bluetooth, through a gateway device such as a router (not illustrated).”), 9:20-28 (“As with the methods described previously, all or part of said speech recognition processing may be performed by programming on the controlling device itself; may be performed by programming on a local appliance which is in bidirectional communication with the controlling device; or may be performed by programming resident on a remote server accessible via a network such as the Internet or PSTN.”).

The voice commands enable a **controlling device 100** to control the function of a **controllable appliance** such as **television 102** with a user’s voice or spoken commands. ’083 patent, 3:20-24 (“Turning now to FIG. 1a, there is illustrated an

exemplary system in which a controlling device 100 is configured to control various controllable appliances, such as a television 102, a set top box (“STB”) 104, a DVD player 106 and an AV receiver 108.”), 10:47-67 (“With reference to FIG. 7b, each code set record 706 may comprise a unique codeset identity number, 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, including for example items such as carrier frequency, bit encoding, data frame size and structure, appliance address, parity or CRC requirements, etc. Following block 752 may be a series of individual command function entries 754. Each entry may comprise a standard function ID 756, which may be a normalized tag indicative of the function or operation invoked by this command (i.e. so that within a universal remote control system the same functionality may be mapped to a key regardless of any variations in appliance manufacturer-specific nomenclature, for example as may be seen in Table 2 above); a function name 758 corresponding to the name by which that function is commonly referenced by this appliance’s manufacturer together with its phonetic representation 760; and command data 762 which, when transmitted using the protocol specifications of block 752, will command the appliance to perform the indicated action.”), Figs. 1a, 5a, 7b.

80. As described by ’083, a user may issue voice commands to the voice control system, and “speech recognition means” processes the voice commands; these

“speech recognition means” may be located in the **controlling device 100**, the **controllable appliance**, or a remote server. *See, e.g.*, ’083 patent, 6:15-40, 9:11-28 (“Regardless of the purpose, at step 604 the user may be prompted to speak the desired function name. As before this prompt may take the form of an illuminated LED and/or “speak” symbol, a displayed text or image, etc., as appropriate. The resulting spoken syllables may be digitized and presented to a speech recognition means for processing and comparison to a phonetic database of command function names which have been cross referenced to command data within a codeset that is applicable to the particular appliance model currently configured, for example as illustrated in Table 1b above.”). As ’083 describes, such voice commands may control the **controllable appliance** through corresponding information contained within the **codeset record** appropriate for commanding the function of the particular **controllable appliance**. *See, e.g.*, ’083 patent, 8:34-9:49 (“Further, since different appliance manufacturers may use differing terminology for the same function, a generic function label used for a key on a universal controlling device may not always correspond to the term used by the original equipment manufacturer to reference that function. By way of example, Table 2 below lists some of the known synonyms for the command function which may be used to cause a device such as a TV set or STB to tune from a currently selected channel to the immediately previous channel, which function may simply be labeled with the generic term “Last” on the

keypad of a universal controlling device.”), 10:47-11:3 (“With reference to FIG. 7b, each code set record 706 may comprise a unique codeset identity number, a block of protocol and formatting information 752 which may 50 describe the physical protocol requirements for transmitting the command data elements which comprise this codeset, including for example items such as carrier frequency, bit encoding, data frame size and structure, appliance address, parity or CRC requirements, etc. Following block 752 may be a series of individual command function entries 754. Each entry may comprise a standard function ID 756, which may be a normalized tag indicative of the function or operation invoked by this command (i.e. so that within a universal remote control system the same functionality may be mapped to a key regardless of any variations in appliance manufacturer-specific nomenclature, for example as may be seen in Table 2 above); a function name 758 corresponding to the name by which that function is commonly referenced by this appliance’s manufacturer together with its phonetic representation 760; and command data 762 which, when transmitted using the protocol specifications of block 752, will command the appliance to perform the indicated action. 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.”).

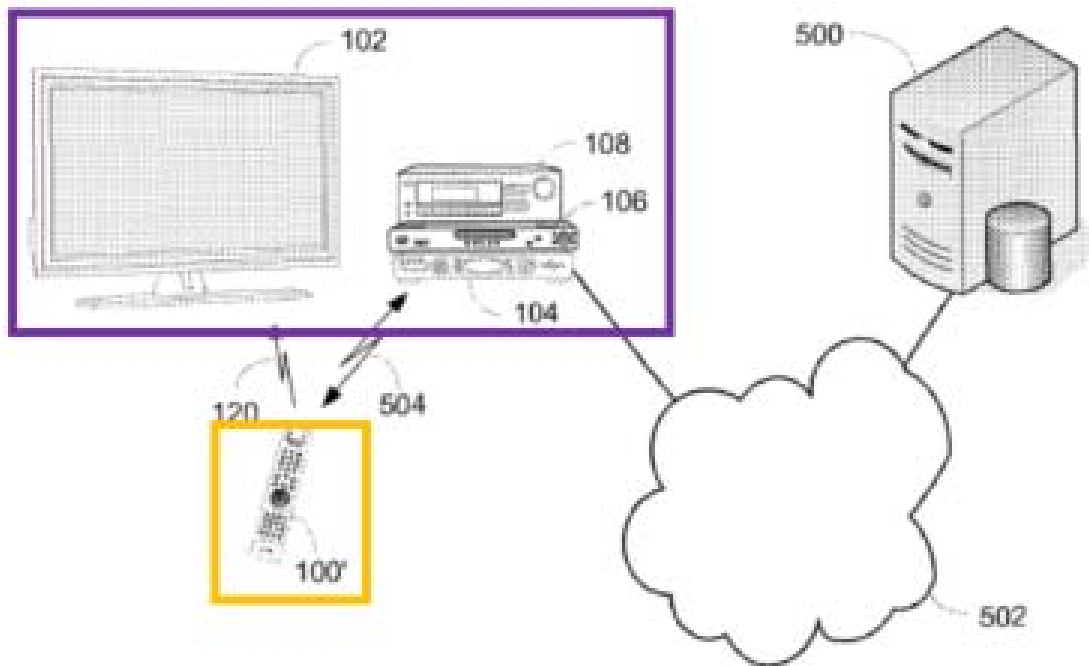
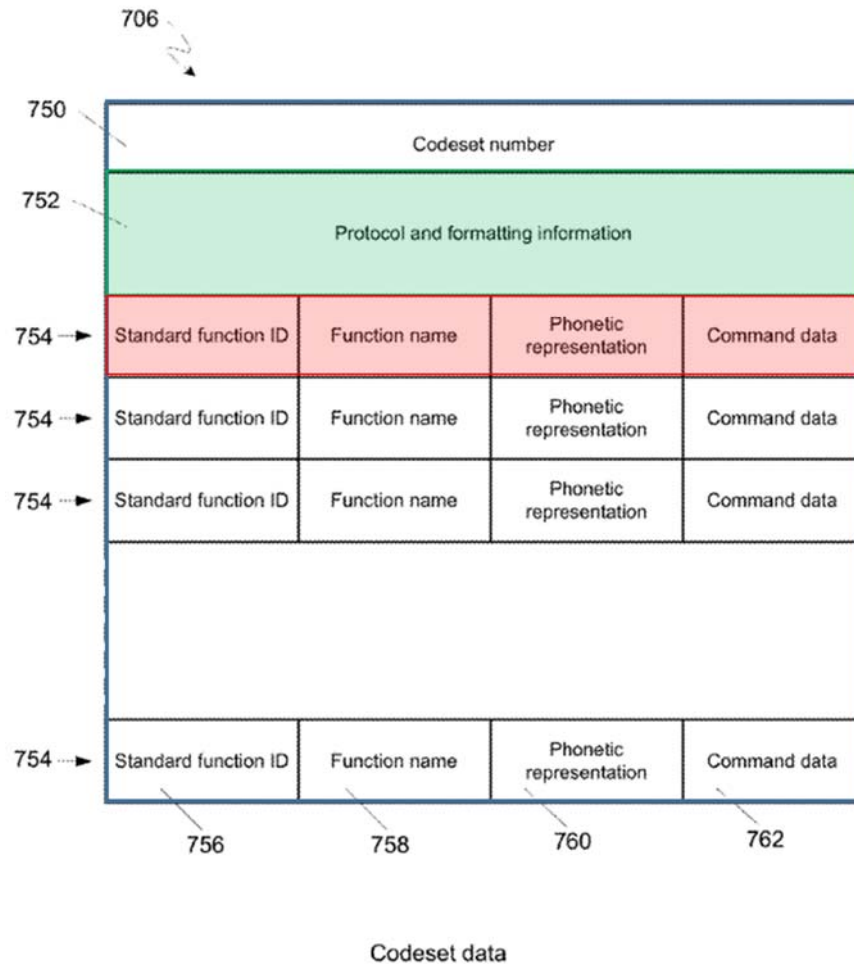


Figure 5a

'083, Fig. 5a.

81. The **codeset record 706**'s composition is the alleged novelty of the '083 patent. **Codeset record 706** may include “a multiplicity of command codes and protocols suitable for controlling various appliances—also referred to as sets of command data or codesets,” as described in detail further below. '083 patent, 4:65-5:2. '083 discloses such a **codeset record 706** in Fig. 7b (shown below).



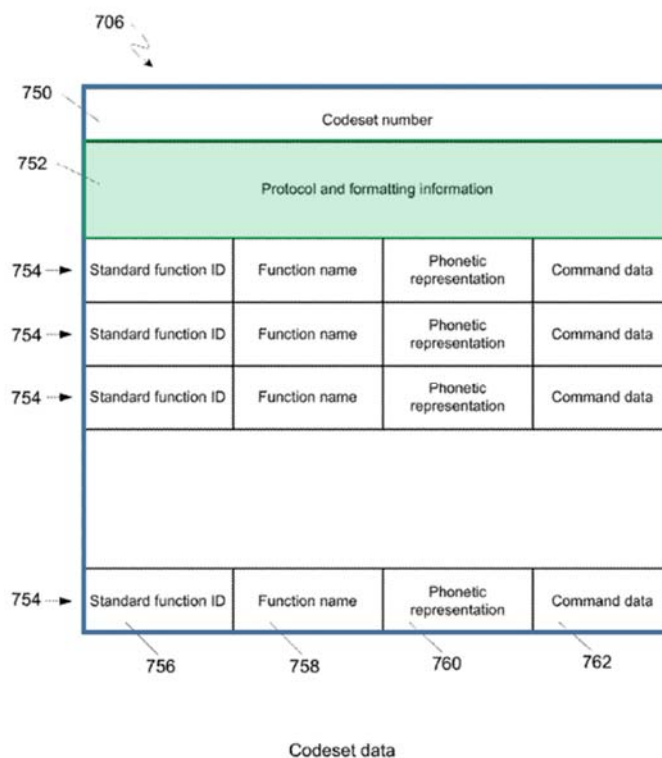
'083 patent, Fig. 7b. **Codeset record 706** may be provisioned to the **controlling device** in several ways—for example downloading **codeset record 706** directly from the **controllable appliance**. '083 patent, 7:25-36 (“Depending upon the particular embodiment, communication of the setup data may comprise downloading of a complete set of command code data into the controlling device from an off-platform database of codesets located for example on local appliance such as STB 104 or on a remote server 500....”); *see also* '083 patent, 6:3-14, 6:28-34, 9:38-43, 11:4-13.

Controlling device 102 may use the **codeset record**, after it has been provisioned, to issue command functions to the **controllable appliance**. '083 patent, 10:47-11:3.

1. Protocol and Formatting Information

82. **Codeset record 706** includes **protocol and formatting information 752**.

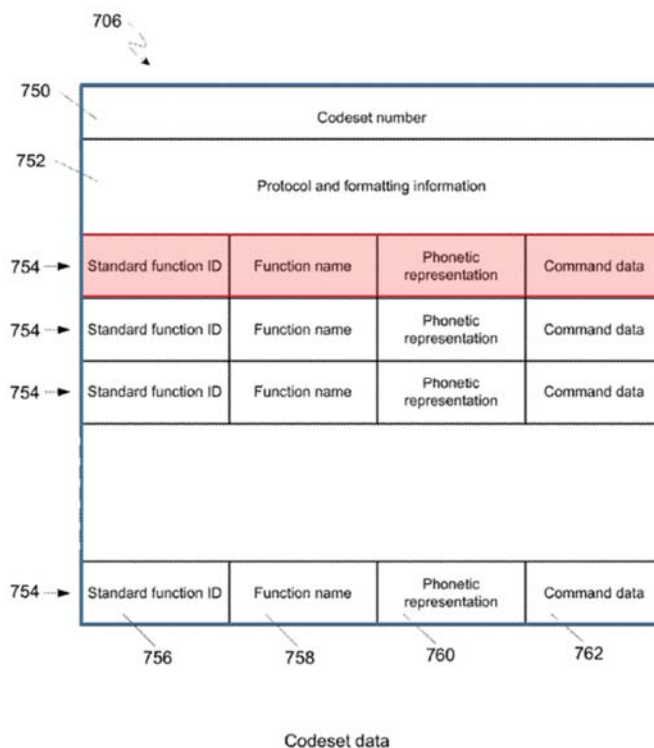
'083, 10:47-54 (“With reference to FIG. 7b, each code set record 706 may comprise a unique codeset identity number, a block of protocol and formatting information 752 which may 50 describe the physical protocol requirements for transmitting the command data elements which comprise this codeset, including for example items such as carrier frequency, bit encoding, data frame size and structure, appliance address, parity or CRC requirements, etc.”).



'083 patent, Fig. 7b. **Protocol and formatting information 752** “may describe the physical protocol requirements for transmitting the command data elements which comprise this codeset, including for example items such as carrier frequency, bit encoding, data frame size and structure, appliance address parity or CRC requirements, etc.” '083 patent, 10:47-54.

2. Command Function Entries

83. In addition to **protocol and formatting information 752**, **codeset record 706** includes rows of **individual command function entries 754**. '083 patent, 10:47-11:3. **Individual command function entries 754** include various types of information, including **command data 762**, **standard function ID 756**, **phonetic representation 760**, and **function name 758**. '083 patent, 10:47-11:3.



'083 patent, Fig. 7b.

(a) Command Data

84. Command data 762 “when transmitted...will command the [controllable] appliance to perform [an] indicated action.” '083 patent, 10:65-67.

(b) Standard Function Identifier

85. Standard function ID 756 “may be a normalized tag indicative of the function or operation invoked by [a] command (i.e. so that within universal remote control system the same functionality may be mapped to a key regardless of any variations in appliance manufacturer-specific nomenclature, for example as may be seen in Table 2 [below]).” '083, 10:56-62. For example, the standard function ID for a “fast forward” function could be “FF.”

(c) Phonetic Representation Data of a Function Name

86. Function name 758 “correspond[s] to the name by which that function is commonly referenced by [an] appliance’s manufacturer together with its **phonetic representation 760**.” '083, 10:62-65. Table 1a (below) provides several examples of potential **function names 758**:

TABLE 1a

DVD player standard functions		
Power on	Fast forward	Menu
Power off	Fast reverse	Up/down
Digits 0-9	Skip forward	Left/right
Play	Skip reverse	Select
Pause	Stop	Open/close

'083 patent, 8:1-8; *see also* '083 patent, 7:59-64 (“By way of example, Tables 1a and 1b below illustrate a specific set of remote control commands which may be supported by a particular model of DVD player. Table 1a lists those commonly used commands which may be included in the default key configuration of a typical universal controlling device....”). Based on Table 1a, one function name could be “fast forward.”

87. Phonetic representation 760 may “compris[e] digitized phoneme templates, cepstral coefficients or vectors, etc., as appropriate for the speech recognition algorithms of a particular embodiment.” '083 patent, 10:3-6, 11:1-3.

(d) Phonetic Representation Data of Synonyms of a Function Name

88. Table 2 (below) provides an example of **function name 758** (“Last channel”) and numerous potential **synonyms**, such as “alternate channel,” “last channel,” or “return”:

TABLE 2		
“Last channel” synonyms		
Alternate channel	Go back	Quick view
Back	Jump	Recall
Channel recall	Last channel	Return
Channel return	Previous channel	Revue
Flashback	Swap	R-Tune

'083, 8:48-55, Table 2.

B. Prosecution History

89. The '083 patent issued from U.S. Application No. 13/298,629, filed November 17, 2011. *See generally* EX1002.

90. The Examiner issued numerous Office Actions rejecting the presented claims, forcing the Applicant to amend or cancel the presented claims, or present entirely new claims. EX1002, 82-98, 115-123, 128-145, 164-173, 181-196, 217-225, 230-246, 390-398. On October 3, 2013, the Examiner rejected all pending claims—claims 1, 8-9, 11, 13-15, 22, and 24 (issued as claims 1, 5-7, 12-14, and 18-19) over U.S. Pub. No. 2009/0254778 (“Huang”), and claims 2-7, 12, 16-21, and 25 (issued as claims 2-4, 9-11, and 15-17) over Huang in further view of U.S. Patent No. 7,944,370 (“Harris”). EX1002, 84-96. On December 19, 2013, Applicant responded by canceling certain claims and amending others to recite, among other things, “mapping a select one or more command codes from within the codeset to each of a plurality user input elements of the controlling device” and “causing the controlling device to transmit a command communication corresponding to a generically labeled command code from within the codeset in response to the speech recognition engine receiving voice data.” EX1002, 116. Applicant argued that Huang does not disclose, teach, or suggest the newly added limitations. EX1002, 122.

91. On April 9, 2014, the Examiner rejected all pending claims in a Final Office Action—claims 1, 8-9, 11, 13-15, 22 and 24 (issued as claims 1, 5-7, 12-14, and 18-

19) over Huang in further view of U.S. Pub. No. 2006/0235701 (“Cane”), and claims 2-7, 12, 16-21 and 25 (issued as claims 2-4, 9-11, and 15-17) over Huang and Cane and in further view of Harris. EX1002, 130-144. In response, on June 4, 2014, Applicant amended claim 1 to eliminate the “a brand of the target appliance” limitation and added “the provisioned codeset record comprising protocol and formatting information and a series of individual command function entries wherein each of the series of individual function entries comprises command data,” arguing that neither Huang nor Cane disclose “using protocol and formatting information and command data of a one of a plurality of individual command function entries *from within a codeset provisioned to a controlling device.*” EX1002, 165-173 (emphasis in original).

92. On July 14, 2014, the Examiner again rejected all pending claims over Huang in further view of U.S. Pub. No. 2008/0059193 (“Huang193”). EX1002, 183-196. On October 10, 2014, Applicant amended the presented claims, including adding a “unique one of a plurality of function name synonyms” to claim 1’s recited codeset, arguing that neither Huang nor Huang193 disclosed the use of synonyms. EX1002, 217-225.

93. On November 10, 2014, the Examiner rejected all pending claims in a Final Office Action over Huang in view of Huang193 and further in view of US Patent No. 6,748,361 (“Comerford”). EX1002, 230-246. On January 8, 2015, Applicant

filed a Response After Final arguing that none of the prior art references disclose “providing *individual command function entries* within a codeset record, i.e., a data structure that also provides protocol and formatting information as well as command data as claimed, with a phonetic representation of a unique one of a plurality of function name synonyms *by which each of the one or more of the series of individual command function entries is to be referenced.*” EX1002, 253-256 (emphasis in original).

94. On January 22, 2015, the Examiner issued an Advisory Action Before the Filing of an Appeal Brief, noting that Applicant’s request for reconsideration was considered but did not place the application in condition for allowance because the “combination of prior art teaches the limitations of the claims.” EX1002, 260-262. On February 3, 2015, Applicant filed a Request for Pre-Appeal Review, again arguing that the prior art does not disclose “*individual command function entries within a codeset record* *having a phonetic representation of a unique one of a plurality of function name synonyms by which each of the one or more of the series of individual command function entries is to be referenced.*” EX1002, 265-268 (emphasis in original).

95. On March 19, 2015, Applicant filed an Appeal Brief with the Board, again arguing, among other things, that “*individual command function entries* within a codeset record, i.e., a data structure that also provides protocol and formatting

information as well as command data as claimed, with a phonetic representation of a unique one of a plurality of function name synonyms *by which each of the one or more of the series of individual command function entries is to be referenced.*” *Id.*, 277-291 (emphasis in original). The Examiner maintained his rejections in an Answer on May 28, 2015. *Id.*, 339-343. On July 27, 2015, Applicant submitted a Rely Brief in response to Examiner’s Answer. *Id.*, 351-354. On December 30, 2016, the Board affirmed the Examiner’s rejection of all pending claims in the application, adopting as its own “the findings and conclusions set forth by the Examiner in the Final Action and the Examiner's Answer.” EX1002, 362-367, 377-380.

96. On February 15, 2017, Applicant filed a Request for Rehearing. *Id.*, 369-372. On March 2, 2017, the Board denied Applicant’s request. *Id.*, 377-380. On March 29, 2017, Applicant filed another RCE, amending claim 1 to include “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,” arguing that the prior art does not disclose this limitation. EX1002, 390-398.

97. On April 24, 2017, the Examiner rejected all pending claims over Huang in view of U.S. Pub. No. 2012/01271639 (“**Hanson**”) and further in view of Huang 193. EX1002, 400-417. On July 21, 2017, Applicant responded, arguing that **Hanson** does not disclose “a plurality of individual function entries within a codeset record...wherein each of the plurality of individual function entries with the codeset record comprises” the recited data fields. EX1002, 425-426 (emphasis in original). Applicant specifically argued that Hanson discloses “provid[ing] speech data 230 to an application 252 such that a speech command *can be enunciated to a user to thereby assist a user in discovering/learning the command*” rather than “provid[ing] command mapping 240] to activate a particular command.” EX1002, 426-427 (emphasis in original).

98. On August 14, 2017, the Examiner withdrew his rejections and mailed a Notice of Allowance. EX1002, 432-440. In his attached Statement of Reasons for Allowance, the Examiner simply quoted Applicant’s arguments from the previous Response: “the prior art of record does not disclose, teach, or suggest ‘a plurality of individual function entries within a codeset record, i.e., a record in which command data as well as protocol and formatting information for use in generating an appliance command communication is stored, wherein each of the plurality of individual function entries within the codeset record comprises a standard function identifier, 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.”
EX1002, 437-438 (emphasis in original).

VI. CLAIM INTERPRETATION

99. I have been informed that for purposes of this IPR, the standard for claim construction is the same as the standard used in the federal district courts: claim terms should generally be given their ordinary and customary meaning as understood by one of ordinary skill at the time of the invention and after reading the patent and its prosecution history. I have been asked to interpret the claims according to their plain and ordinary meaning.

VII. GROUND 1: CLAIMS 1-6, 8-10, AND 12-18 ARE RENDERED OBVIOUS BY AGINSKY IN VIEW OF STAMMLER

100. It is my opinion that Claims 1-6, 8-10, and 12-18 are rendered obvious by Aginsky in view of Stammler.

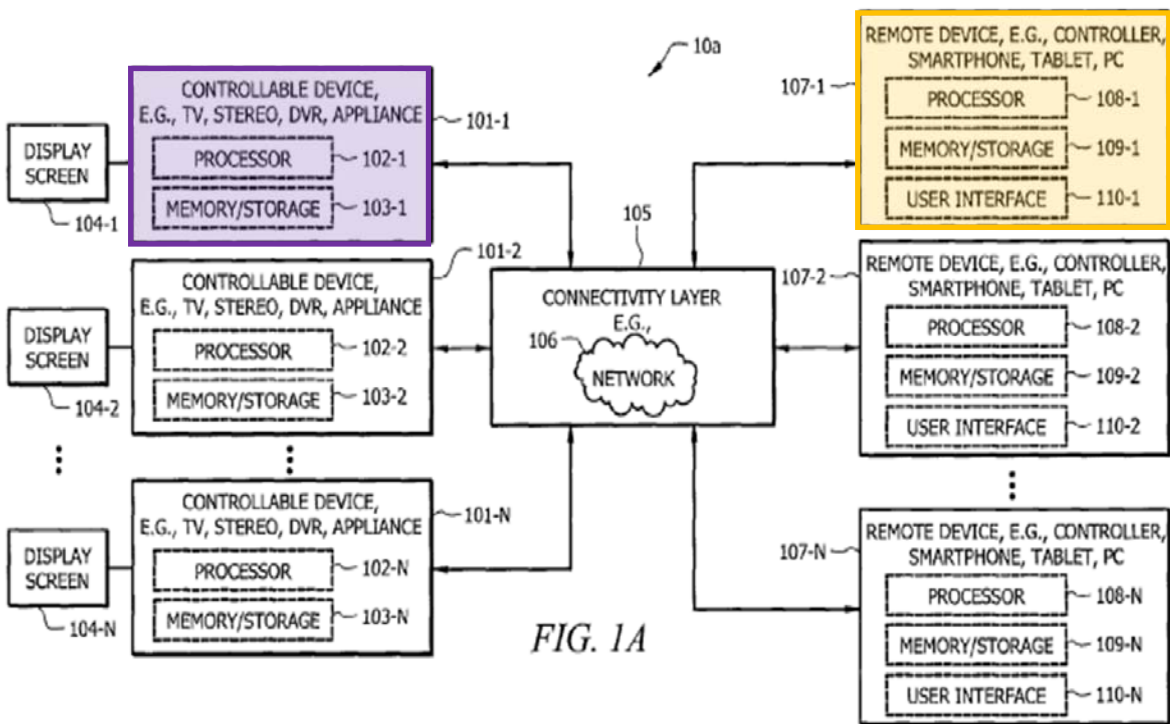
A. Overview of Aginsky

101. **Aginsky** discloses a universal remote control system where a remote device receives a data structure from a controllable device allowing the remote device to control the function of the controllable device. Aginsky, *Abstract* (“The present disclosure is directed to systems and methods in which a controllable device transfers to the 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 a remote device, together with the identity of the signal type that will achieve the desired operation.”). Prior art universal remotes were designed to control various brands and types of appliances. See Aginsky, 1:15-2:15. **Aginsky** explains that different manufacturers have different proprietary internal structures, and therefore functions and data structures vary from one device to another, making it difficult for a user to effectively control multiple devices. Aginsky, 1:43-57 (“Such prior art programming methods for remotes are not sufficiently flexible nor customizable to meet the specific needs of users. For example, it would be difficult, if not impossible, to use prior art programming methods to configure a remote in one way for one user (for example, with the pause button on the top of the device), and the same remote configured another way for another user (for example, with the pause button on the bottom of the device). A further issue is that manufacturers of different controllable electronic devices have proprietary internal structures that accept signals from remote devices and then convert the received signals into specific actions. The various functions that are performed for different devices vary from device to device and different devices use different data structures to achieve their operations.”).

102. To solve this issue, **Aginsky** discloses a system in which **remote device 107-1** controls specific functions of **controllable device 101-1**. Aginsky, 3:50-4:4, 7:57-8:62. **Remote device 107-1** may be one of a variety type of devices designed to control the function of another device, such as a remote control. Aginsky, 5:46-49

(“FIG. 1A also illustrates remote devices 107-1 to 107-N. These may be, for example, a smart clicker, smartphone, tablet computer, personal computer, or any other programmable processor-based device.”). **Controllable device 101-1**, on the other hand, may be a device that is controllable by an external device. Aginsky, 2:59-61 (“Controllable devices can range from TVs and DVRs to printers, computers, and cameras, or even kitchen appliances or automobiles.”); Fig. 1A.



Aginsky, Fig. 1A.

103. Controllable device 101-1 stores data structure(s)⁹ in memory/storage 103-1. Aginsky, 4:65-5:1 (“In the embodiment shown, controllable devices 101-1 to 101-N have stored in memory/storage 103-1 to 103-N. respectively, data structures that are available for communication to one or more remote devices 107-1 to 107-N.”); Fig. 1B. **Aginsky’s Tables 115'-116'** are examples of **Aginsky’s data structures**, as shown in Fig. 1B. Aginsky, 7:58-8:8 (“FIG. 1B shows an embodiment 10b of a portion of memory/storage 109-1 of remote device 107-1 that has been “programmed” with data structures of two controllable devices: controllable device 101-1 (memory portion 115 having table 115) and controllable device 101-2 (memory portion 116 having table 116').... The data structures (similar to tables stored in memory portions 115 and 116) for the additional controllable devices would like wise be stored in memory/storage 109-1 of remote device 107-1.”).

⁹ The term “data structure” is synonymous with “codeset record” by PO’s own admission. See, *e.g.*, EX1002, 255, 282.

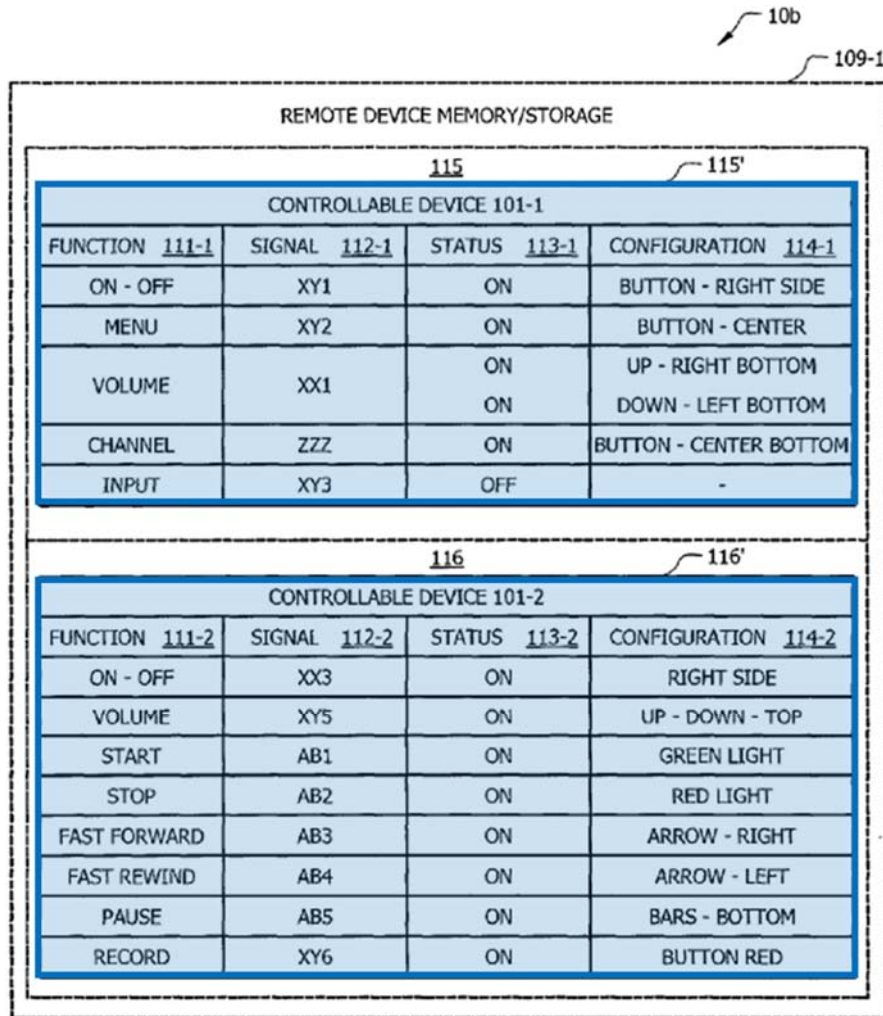


FIG. 1B

Aginsky, Fig. 1B. As discussed in further detail below, the transmitted data structures within **tables 115'-116'** include various types of data related to the commands. Indeed, “any number of rows and columns can be used to store specialized information, preferences, associations, and/or restrictions,” and “any desired function, signal, and/or other structure” may be included. Aginsky, 9:30-33, 13:34-36.

104. Aginsky discloses that a TV (“controllable device”) transfers data structures in tables 115'-116' to a smartphone (“remote device”) through connectivity layer 105. Aginsky, 7:58-67 (“FIG. 1B shows an embodiment 10b of a portion of memory/storage 109-1 of remote device 107-1 that has been “programmed” with data structures of two controllable devices: controllable device 101-1 (memory portion 115 having table 115) and controllable device 101-2 (memory portion 116 having table 116'). The data structures were delivered to remote device 107-1 through connectivity layer 105. In this embodiment, controllable device 101-1 is a TV, controllable device 101-2 is a DVR, and remote device 107-1 is a smartphone.”); *see also* Aginsky 4:56-65 (“In some situations, connectivity layer 105 between controllable devices 101-1 to 101-N and remote device 107-1 to 107-N may be wired, in whole or in part. The only requirement for connectivity layer 105 is that both controllable devices 101-1 to 101-N (or a proxy working in conjunction with the controllable device) and remote devices 107-1 to 107-N be capable of establishing a communication path between or among them So as to facilitate an exchange of data.”). Figure 3 (below) depicts an exemplary process by which a controllable device transmits a data structure. Aginsky, 12:15-30 (“FIG. 3 shows one example 30 of a typical life cycle of the controllable device. Process 30 begins with boot process 301 which turns on the system and causes process 302 to expose a signal for discovery by a remote device. In the system

shown, the remote device will search for the controllable device and initiate communication. In another embodiment, the controllable device will seek out remote devices detected. Returning to example 30, the system then waits under control of process 303 for a remote to “sniff” its transmitted signal and to respond with a handshake offer. When such an offer arrives, process 304 either accepts the pairing or rejects it. If accepted, process 304 causes process 305 to send the proper data structure to the remote device. At this stage, the initialization is finished and process 306 causes the controllable device to wait for a command signal to be received from any of its paired remote devices.”).

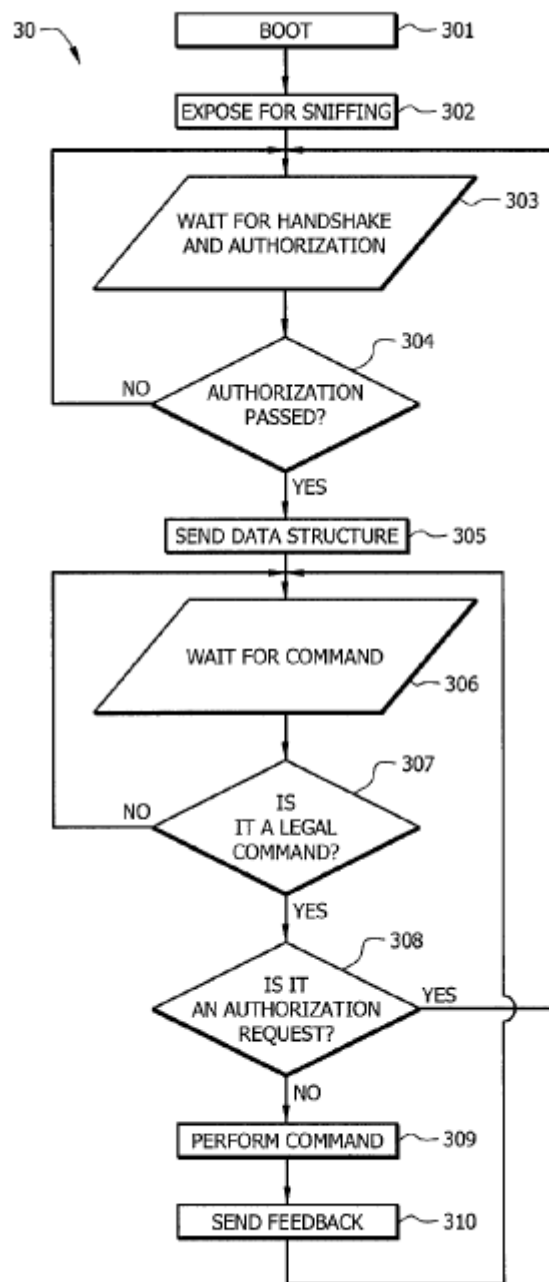


FIG. 3

Aginsky, Fig. 3.

105. The **remote device** may cause a **controllable device** to execute a function by speaking or entering a command listed in FUNCTION column 111-1 of an exemplary **data structure**, such as “turn **TV** on.” Aginsky, 8:38-45 (“For example,

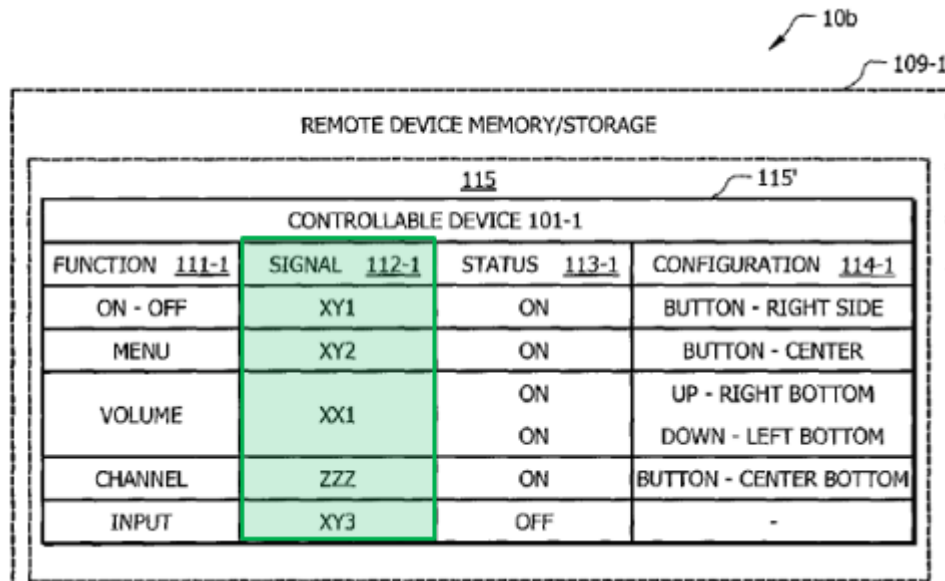
from smartphone (remote device 107-1), a user may enter a command, e.g., turn TV on, by pressing a right side button of the function controls presented via user interface 110-1. This command will be converted to a command signal. Based on the data structure of the controllable device, the proper command signal for “on” is known to be XY1. Command signal XY1 is therefore sent to the TV (controllable device 101-1) causing the TV to turn on.”). The **remote device** receives the user command input (whether voice or manual input), and converts the command input to a command signal XY1, based on the **data structure**. Aginsky, 8:38-45. **Remote device** then sends command signal XY1 to the TV causing it to turn on. Aginsky, 8:38-45.

106. Critically, while **Aginsky** focuses its discussion on an embodiment where user input is through physical manipulation of buttons, **Aginsky** also broadly teaches “voice commands...can be used for one or more of the functions performed by the remote device,” and explicitly discloses that **remote device 107-1** allows for voice command of **controllable devices**. Aginsky, 6:2-6 (“Remote devices 107-1 to 107-N also include user interfaces 110-1 to 110-N that allow a user to control operation of a paired controllable device by various methods, including buttons (via touch screen or mechanical), voice, and motion.”), 8:8-12 (“When a remote device controls multiple controllable devices, a user will typically be presented with an option, via a user interface, such as user interface 110-1 (e.g., screen, speaker, and/or other

sensor) to select (e.g., by touch, voice, and/or motion) the controllable device to be controlled.”), 9:60-65 (“Any type of input from the user can be utilized. Thus, voice commands, motion commands (e.g., with the user waiving his or her finger), and/or motion commands (e.g., with the remote device itself being moved), can be used for one or more of the functions performed by the remote device, such as remote device 107-1.”). **Aginsky** otherwise leaves it to a person of ordinary skill in the art to implement known methods of interpreting voice commands and integrating voice command-relevant information into the **data structure**, and makes clear that the **data structure** may be customized to include information allowing **remote device 107-1** to execute the disclosed functions. **Aginsky**, 9:30-33 (“It should be understood by those skilled in the art that any number of rows and columns can be used to store specialized information, preferences, associations, and/or restrictions.”), 13:34-43 (“The data structure can be any desired function, signal, and/or other structure as discussed above with reference to FIGS. 1B and 1C.. In a typical system, the data structure will be limited, that is, it will include only the identity of the functions that may be controlled, and the associated command signal (or other like instruction) for remotely controlling the function. In other embodiments, the exchanged data structure may be more robust and include protocols, rules, or other information useful to carrying out remote control of the controllable device.”).

(a) Protocol and Formatting Information

107. SIGNAL columns 112-1 and 112-2 of Aginsky “can be any type of signal required for control purposes” such as a frequency set, a coded IR signal, or a Bluetooth signal. Aginsky, 8:63-9:7 (“Command signals (e.g., SIGNAL columns 112-1 and 112-2) for implementing a change in the state of a controllable device’s function can be any type of signal required for control purposes, typically a frequency set or a coded IR signal generated in the well-known manner by, for example, remote device 107-1, such as are discussed in U.S. Pat. No. 4,623, 887, entitled “Reconfigurable Remote Control,” hereby incorporated herein by reference. Alternatively, the data structure can be a new or proprietary structure known only to a specific controllable device or to a family of controllable devices. In some situations this signal may be a Bluetooth signal or any other type of signal desired.”). Not only that, but **Aginsky** further explains that the “**SIGNAL columns 112-1 and 112-2**” of the data structures “denote the type of signal as well as the code or code sequence of the [command] signal.” Aginsky, 9:7-10.



Aginsky, Fig. 1B (partial).

108. Moreover, **Aginsky** discloses “the exchanged **data structure** may be more robust and include **protocols, rules, or other information** useful to carrying out remote control of the controllable device.” Aginsky, 9:30-33, 13:34-43 (“The data structure can be any desired function, signal, and/or other structure as discussed above with reference to FIGS. 1B and 1C. In a typical system, the data structure will be limited, that is, it will include only the identity of the functions that may be controlled, and the associated command signal (or other like instruction) for remotely controlling the function. In other embodiments, the exchanged data structure may be more robust and include protocols, rules, or other information useful to carrying out remote control of the controllable device.”). In fact, **Aginsky** expressly discloses the types of protocol and formatting data described by ’083, namely frequency and device address and identification. *Compare* Aginsky, 8:63-

9:10 (“Command signals (e.g., SIGNAL columns 112-1 and 112-2) for implementing a change in the state of a controllable device’s function can be any type of signal required for control purposes, typically a frequency set or a coded IR signal generated in the well-known manner by, for example, remote device 107-1, such as are discussed in U.S. Pat. No. 4,623,887, entitled “Reconfigurable Remote Control,” hereby incorporated herein by reference. Alternatively, the data structure can be a new or proprietary structure known only to a specific controllable device or to a family of controllable devices. In some situations this signal may be a Bluetooth signal or any other type of signal desired. In the embodiment shown, the notation used in SIGNAL columns 112-1 and 112-2 denote the type of signal as well as the code or code sequence of the signal.”), *with* ’083 patent, 10:47-54 (“With reference to FIG. 7b, each code set record 706 may comprise a unique codeset identity number, 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, including for example items such as carrier frequency, bit encoding, data frame size and structure, appliance address, parity or CRC requirements, etc.”).

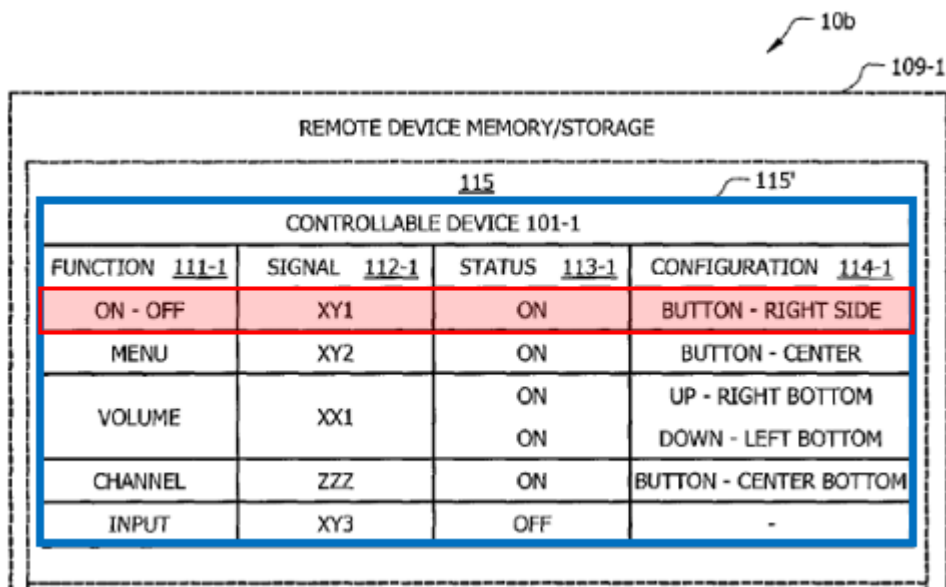
Based on these disclosures, in my opinion **Aginsky** teaches protocol and **formatting information** in the **data structure**.¹⁰

(b) Command Function Entries

109. Each row in **table 115'** represents an **individual command function entry** within that data structure. Aginsky, 8:21-37 (“In FIG. 1B, FUNCTION columns 111-1 and 111-2 and SIGNAL columns 112-1 and 112-2 contain the data structures delivered from their respective controllable devices 101-1 and 101-2. In the embodiment shown, the data structure in table 115’ identifies a plurality of exemplary functions or commands (e.g., on-off, menu, volume, channel, input) associated with a plurality of exemplary command signals (e.g., XY1, XY2, XX1, ZZZ, XY3) that when sent from remote device 107-1 to controllable device 101-1, the function/command is carried out. Similarly, the data structure in table 116’ identifies a plurality of exemplary functions or commands (e.g., on-off, volume, start, stop, fast forward (“FF), fast rewind, pause, and record) associated with a plurality of exemplary command signals (e.g., XX3, XY5, AB1, AB2, AB3, AB4,

¹⁰ Further, it is important to note that ’083’s claims do not require that the recited information be stored in a particular structure. ’083 patent, cl. 1; *see infra*, §VIII.A.4.(a).

AB5, XY6) that when sent from remote device 107-2 to controllable device 101-2, the function/command is carried out.”); Fig. 1B.



10b

109-1

REMOTE DEVICE MEMORY/STORAGE			
115			
CONTROLLABLE DEVICE 101-1			
FUNCTION 111-1	SIGNAL 112-1	STATUS 113-1	CONFIGURATION 114-1
ON - OFF	XY1	ON	BUTTON - RIGHT SIDE
MENU	XY2	ON	BUTTON - CENTER
VOLUME	XX1	ON	UP - RIGHT BOTTOM
		ON	DOWN - LEFT BOTTOM
CHANNEL	ZZZ	ON	BUTTON - CENTER BOTTOM
INPUT	XY3	OFF	-

Aginsky, Fig. 1B (partial).

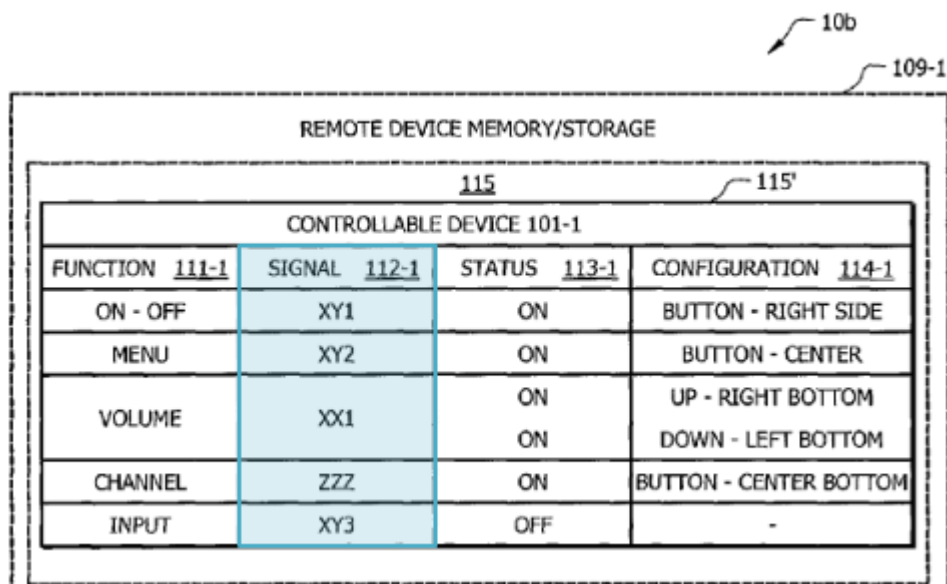
110. As shown in Fig. 1B above, each **command function entry** includes data related to a particular function or command (column 111-1), signal (column 112-1), status (column 113-1), and configuration (column 114-1), which is information used to control the functions of a controllable device. Aginsky, 8:21-37; Fig. 1B. As **Aginsky** explains, “the data structure in **table 115'** identifies a plurality of exemplary functions or commands...associated with a plurality of exemplary command signals...that when sent from **remote device 107-1** to **controllable device 101-1**, the function/command is carried out.” Aginsky, 8:21-37. These individual entries or rows in the data structure of **table 115'** command the function of

controllable device 101-1. Compare Aginsky 2:31-40, 3:64-4:11, 8:21-45, Fig. 1B with '083 patent, 10:47-11:3, Fig. 7b.

(i) Command Data

111. Aginsky explains that **remote device 107-1** sends a command to **controllable device 101-1**, which subsequently carries out an associated function/command. Aginsky, 8:21-37. When a user selects a command, **remote device 107-1** “convert[s] the command] to a **command signal**” that causes **controllable device 101-1** to execute the indicated function. Aginsky, 8:38-42 (“For example, from smartphone (remote device 107-1), a user may enter a command, e.g., turn TV on, by pressing a right side button of the function controls presented via user interface 110-1. This command will be converted to a command signal.”). For example, signal “XY1” is associated with the function “ON – OFF”; when a user selects the function “ON – OFF,” “[c]ommand signal XY1 is therefore sent to the **TV (controllable device 101-1)** causing the **TV** to turn on.” Aginsky, 8:44-45. A person of ordinary skill in the art would have recognized that the signal XY1 contains underlying **data** that commands the **TV** to turn on, and this tracks '083's definition of “command data.” Compare Aginsky, 8:38-42 (“For example, from smartphone (remote device 107-1), a user may enter a command, e.g., turn TV on, by pressing a right side button of the function controls presented via user interface 110-1. This command will be converted to a command signal.”) with '083 patent, 10:65-67 (“[C]ommand data 762

which, when transmitted using the protocol specifications of block 752, will command the appliance to perform the indicated action.”).



10b

109-1

REMOTE DEVICE MEMORY/STORAGE

115

115'

CONTROLLABLE DEVICE 101-1

FUNCTION 111-1	SIGNAL 112-1	STATUS 113-1	CONFIGURATION 114-1
ON - OFF	XY1	ON	BUTTON - RIGHT SIDE
MENU	XY2	ON	BUTTON - CENTER
VOLUME	XX1	ON	UP - RIGHT BOTTOM
		ON	DOWN - LEFT BOTTOM
CHANNEL	ZZZ	ON	BUTTON - CENTER BOTTOM
INPUT	XY3	OFF	-

Aginsky, Fig. 1B (partial). Similarly, signal AB3 is associated with the function “FAST FORWARD,” and when a user inputs a FAST FORWARD command (by voice or manually), command signal AB3 is sent to a controllable device causing it to execute a fast forward function through whatever media may be playing. To execute such a function, a person of ordinary skill in the art would have understood that signal AB3 contains underlying data necessary to execute the fast forward function.

(ii) Standard Function Identifier

112. Aginsky explains that the configuration for each function could include an “**identification marker** related to the operation of that function control.” Aginsky, 9:34-36 (“Note that the configuration for each function could further include a code

or other identification marker related to the operation of that function control.”). An **identification marker** may be identical for all controllable devices connected to the remote control. Aginsky, 9:36-39 (“By doing this, anytime that code or marker appeared, the remote would know to use the same user display symbol across all controllable devices being controlled.”). For example, **Aginsky** discloses associating an “FF” tag with a fast-forward function across controllable devices. Aginsky, 9:39-47 (“Using the fast forward signal as an example, a special FF code can be established that is associated with FF in all controllable devices. Thus, regardless of what controllable device the remote device is currently controlling, the FF display (which can be the user’s preference) will be the same. In this manner, the control application will be able to put the same FF display at the same location and/or format regardless of what actual device is being controlled at the time for a consistent user interface across multiple controllable devices.”). Therefore, a person of ordinary skill in the art would have understood that **Aginsky** broadly teaches use of a marker for managing similar functionality across codesets. *Compare* Aginsky, 9:34-47 (“Note that the configuration for each function could further include a code or other identification marker related to the operation of that function control. Using the fast forward signal as an example, a special FF code can be established that is associated with FF in all controllable devices. Thus, regardless of what controllable device the remote device is currently controlling, the FF display (which can be the

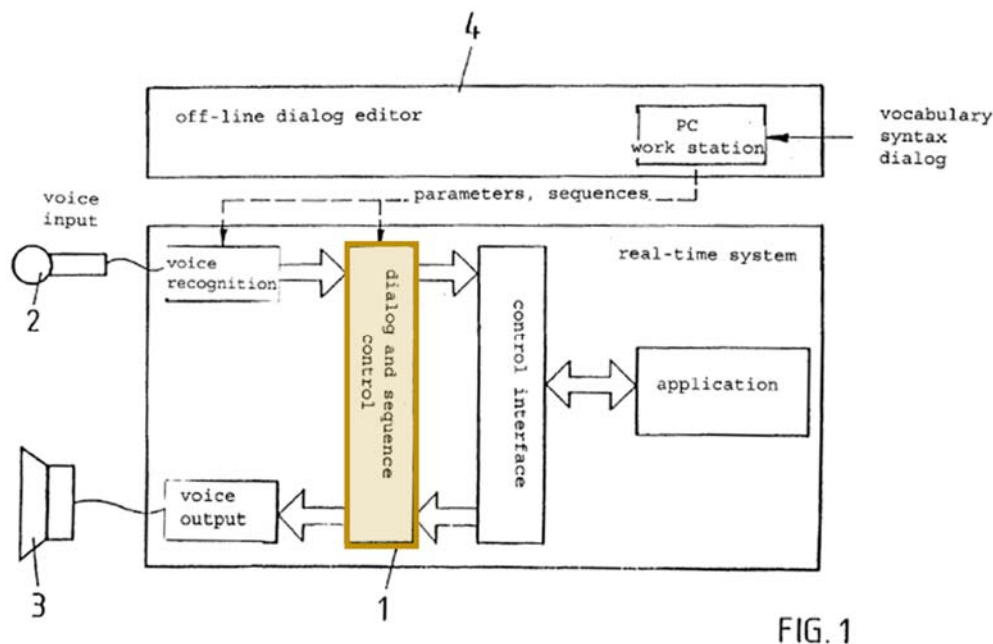
user's preference) will be the same. In this manner, the control application will be able to put the same FF display at the same location and/or format regardless of what actual device is being controlled at the time for a consistent user interface across multiple controllable devices.”) *with* '083, 10:56-62 (“Each entry may comprise a standard function ID 756, which may be a normalized tag indicative of the function or operation invoked by this command (i.e. so that within a universal remote control system the same functionality may be mapped to a key regardless of any variations in appliance manufacturer-specific nomenclature, for example as may be seen in Table 2 above).”).

B. Overview of Stammler

113. Stammler is in the same field of endeavor as **Aginsky**. **Stammler** discloses a speech dialog system for automatic control or operation of one or more devices by voice commands. *E.g.*, Stammler, *Abstract*, 1:1-20, 2:25-33, 15:19-16:26. In particular, **Stammler** discloses a speech dialog system with a “fixed syntax structure and a fixed command structure as well as by a combination of fixed vocabulary” and “freely definable vocabulary.” Stammler, 5:65-6:10 (“The here outlined system is characterized in the “on-line” operation by a fixed syntax structure and a fixed command structure as well as by a combination of fixed vocabulary (speaker-independent recognizer) and freely definable vocabulary such as names (speaker-dependent recognizer). This framework, which initially appears to be inflexible, is a

precondition for a high recognition capacity with an extensive vocabulary (at the present time up to several hundred words), e.g., for a noise-encumbered environment, for changing acoustic conditions in the passenger cell, as well as for a variety of speakers. The extensive vocabulary is used to increase the user friendliness by using synonymous words or different variations in the pronunciation.”). Such a framework “is a precondition for a high recognition capacity with an extensive vocabulary.” Stammer, 6:3-8. And this “extensive vocabulary of admissible commands” “is used to increase the user friendliness by using **synonymous words** or different variations in pronunciation.” Stammer, 2:60-65 (“A further essential advantage must be seen in the fact that the 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.”), 5:65-6:10. **Stammer** further discloses that “[p]**redetermined synonymous words** can be used,” and “[t]he same function can be realized through commands with a different number of words.” Stammer, 16:17-20 (“Predetermined synonymous words can be used; The same function can be realized through commands with a different number of words (e.g., through two word or three-word commands).....”). Moreover, since **Stammer**’s system has such a large library, it is more usefully based “on **phonetic word subunits**” such as phonemes, diphones (double phonemes), or phoneme transitions.

Stammler, 8:53-57 (“The word recognition for a speech recognition system with a larger vocabulary usefully is not based on whole words, but on phonetic word subunits. Such a word subunit is, for example, a phoneme, a diphone (double phoneme) or a phoneme transition.”). This is in accord with the prior art I discuss above. See *supra*, ¶¶71-73. Because of this extensive vocabulary, “a plurality of functions for each language can be operated.” Stammler, 6:33-35 (“[O]wing to the vocabulary of, for example, up to several hundred words, a plurality of functions for each language can be operated....”).



Stammler, Fig. 1.

C. Motivation to Apply Stammler’s Teachings to Aginsky

114. Aginsky broadly discloses “systems and methods in which a controllable device transfers to [a] remote device...a data structure identifying various functions

that can be controlled by a remote device.” Aginsky, *Abstract*. **Aginsky**’s data structure includes information that enables remote control, such as the names of functions (*i.e.*, commands) and signals related to transmission of each function, amongst others. And **Aginsky** discloses that “voice commands...can be used for one or more of the functions performed by the remote device” through a user interface, such as a microphone, “that allow[s] a user to control operation of a paired controllable device by various methods, including...voice.” Aginsky, 6:2-6, 9:60-65; *see also* Aginsky, 8:8-12. However, **Aginsky** left it to a person of ordinary skill in the art to implement a data structure to execute its disclosed voice-control, and in the same field of endeavor, **Stammler** specifically teaches data structure inputs that would allow **Aginsky**’s system and methods to advantageously implement voice control.

115. As **Stammler** teaches—and anybody working in voice recognition technology would recognize—it is advantageous for a voice command system to have a large vocabulary. Stammler, 5:65-6:10. **Stammler** teaches realizing such a large, expanded vocabulary by implementing a cost-effective system which uses “*phonetic word subunits*,” such as phonemes, to understand an “extensive vocabulary of admissible commands.” Stammler, 2:56-65 (“That fact that a reliable control or operation of devices by speech command or real-time speech dialog is possible with relatively low expenditure must be seen as the essential advantage of

the invention. A further essential advantage must be seen in the fact that the 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.”), 8:53-57 (“The word recognition for a speech recognition system with a larger vocabulary usefully is not based on whole words, but on phonetic word subunits. Such a word subunit is, for example, a phoneme, a diphone (double phoneme) or a phoneme transition.”). As such, a person of ordinary skill in the art would have been motivated to modify **Aginsky**’s data structure with the teachings of **Stammler** to include phonetic representations and synonyms as elements of **Aginsky**’s data structure to facilitate an extensive range of voice commands and map them to the correct remote command functionality. This is because **Stammler** teaches that prior speech dialog systems suffered from limited vocabularies resulting in higher user dissatisfaction and modifying **Aginsky** with **Stammler**’s teachings would better improve upon **Aginsky**’s goal of providing a more flexible and customizable universal remote programming method. As explained by **Hanson** (explained in further detail below), it was well-known to include synonyms of words in a data structure—and it would have been obvious to further include phonetic representations associated with such synonyms because using phonetic representations—such as phonemes—to help a voice recognition system recognize the human voice was well-known in the art.

Hanson, ¶¶[0017], [0021], [0023], [0033], [0037], [0040]). As explained above, the art is replete with references teaching associating phonetic representations with voice inputs/commands. *See supra*, ¶¶39-50, 71-73. In fact, the advantages of voice control were well-known, and a person of ordinary skill in the art would have understood that voice control was becoming increasingly expected in consumer devices to replace the known drawbacks suffered by awkward, user-unfriendly interfaces.

116. Modifying **Aginsky**'s data structure with voice command function in mind with the teachings of **Stammler** would have been well within the ability of a person of ordinary skill in the art given **Stammler**'s guidance, and **Aginsky**'s open data structure design that specifically contemplates a “data structure [with] any desired function, signal, and/or other structure” (Aginsky, 13:34-35)—indeed, a person of ordinary skill in the art would have had a reasonable expectation of success in so applying **Stammler**'s teachings to **Aginsky**'s flexible data structure. Applying the teachings of **Stammler** to **Aginsky** would yield the predictable result of enabling **Aginsky**'s universal remote to control the function of a variety of devices manufactured by various brands through the use of numerous different voice commands.

117. As explained herein, the claimed methods and systems would have been obvious to a person of ordinary skill in the art.

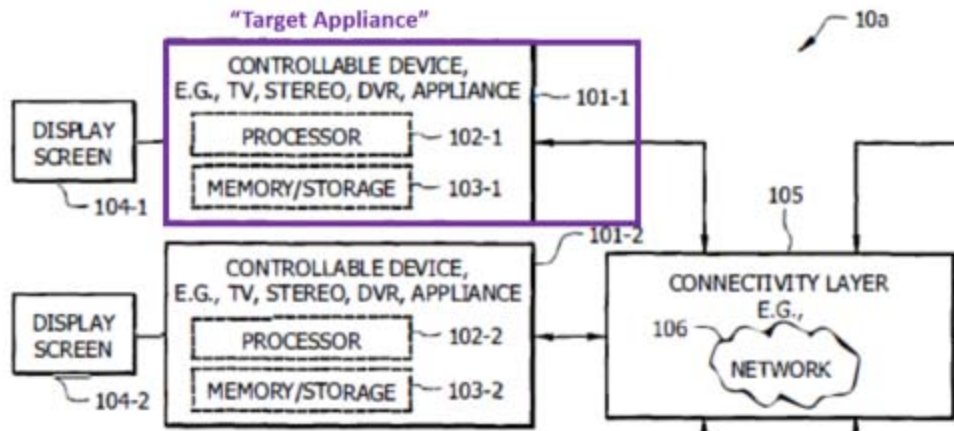
D. Claims

1. Claim 1

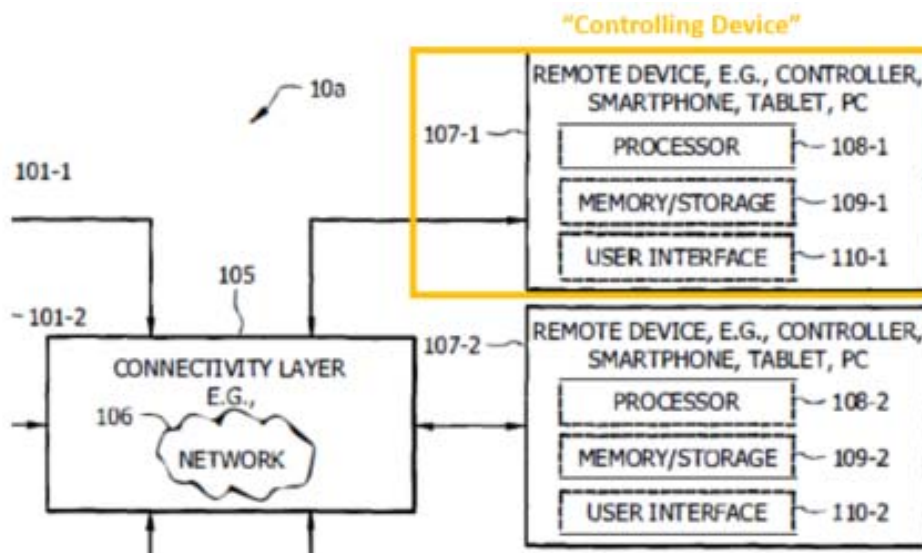
- a) **[1.pre] A method for configuring a controlling device to command functional operations of a target appliance, the method comprising:**

118. Aginsky discloses a method for configuring a controlling device (*e.g.* “a remote device”) to command functional operations of a target appliance (*e.g.*, “methods in which a controllable device transfers to the remote device...a data structure identifying various functions that can be controlled by a remote device”).

119. Aginsky discloses systems and methods in which **controllable device 101-1** is paired with **remote device 107-1** such that **remote device 107-1** may control specific operations and functions of one or more **controllable device 101-N**. Aginsky, 3:66-4:4 (“In the embodiment shown, one or more controllable devices, 101-1 to 101-N, are capable of being paired with one or more remote devices, 107-1 to 107-N, via connectivity layer 105, such that a remote device may be used to control specific operations and functions of the controllable device during a paired session.”).



Aginsky, Fig. 1A (partial).



Aginsky, Fig. 1A (partial).

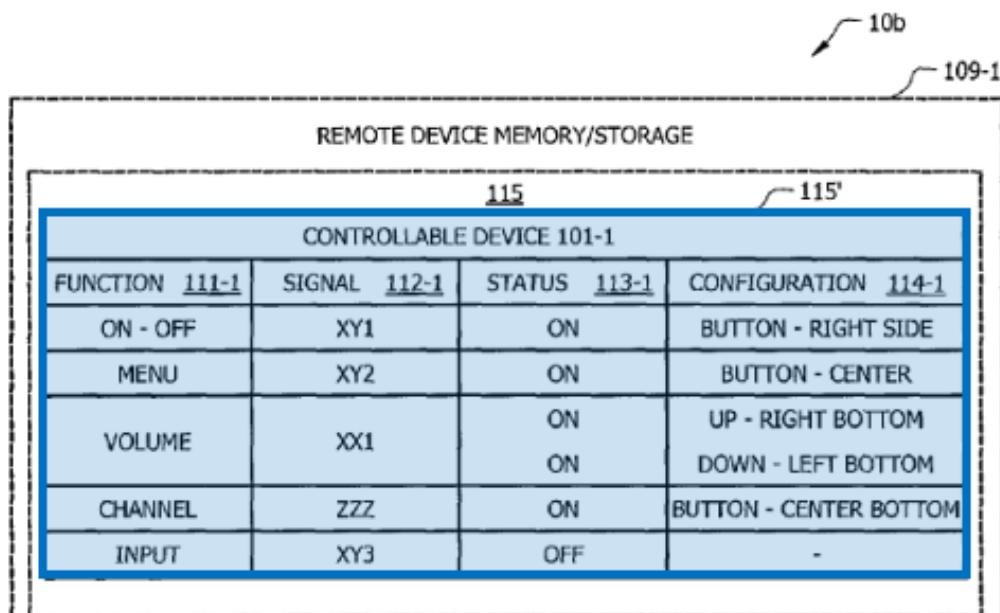
- b) [1.a.1] causing a codeset record to be provisioned to the controlling device for use in commanding functional operations of the target appliance,

120. Aginsky discloses causing a codeset record (e.g. "a data structure") to be provisioned to the controlling device for use in commanding functional operations of the target appliance (e.g. "data structures that are available for communication to

one or more remote devices” “such that a remote device may be used to control specific operations and functions of the controllable device”).

121. Aginsky discloses **controllable device 101-1** can be paired **remote device 107-1** allowing **remote device 107-1** to control specific operations and functions of **controllable device 101-1**. Aginsky, 3:66-4:4. **Controllable device 101-1** can be a TV, DVR, computer, kitchen appliance, or automobile, among other devices. Aginsky, 2:59-61 (“Controllable devices can range from TVs and DVRs to printers, computers, and cameras, or even kitchen appliances or automobiles.”), Fig. 1A. **Aginsky** also discloses that **controllable device 101-1** store “**data structures**,”¹¹ in the form of **tables 115'-116'** in memory/storage. Aginsky, 4:65-5:1 (“In the embodiment shown, controllable devices 101-1 to 101-N have stored in memory/storage 103-1 to 103-N. respectively, data structures that are available for communication to one or more remote devices 107-1 to 107-N.”).

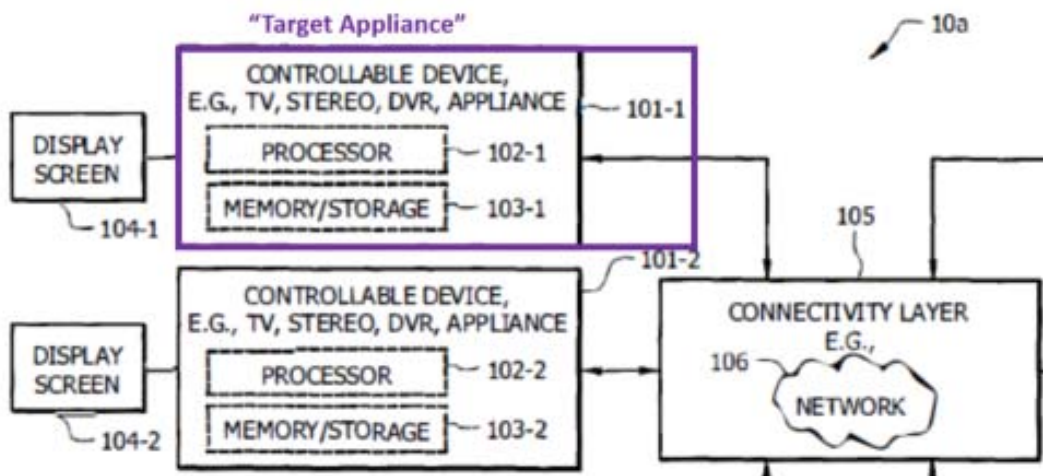
¹¹ “Data structure” is synonymous with “codeset record” by PO’s admission during prosecution. See, e.g., EX1002, 255, 282.



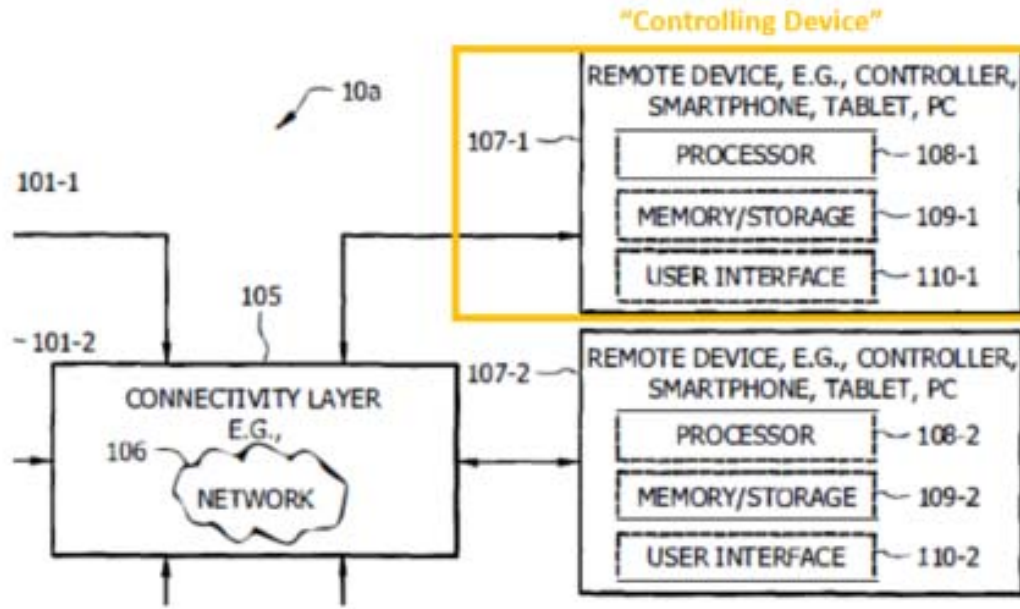
Aginsky, Fig. 1B (partial).

122. **Data structures** further may be provisioned to **remote device 107-1** in accordance with a particular process disclosed by **Aginsky**. Aginsky, 12:25-27 (“If accepted, process 304 causes process 305 to send the proper data structure to the remote device.”), Fig. 3. Specifically, **Aginsky** teaches that **controllable device 101-1** selects a **data structure** based upon the brand, model, etc. of **remote device 107-1**, and delivers the **data structures** to **remote device 107-1** through connectivity layer 105. See Aginsky, 5:18-26 (“The data structures stored in controllable devices 101-1 to 101-N may be generic or specific. A data structure may be generic so as to be compatible with more than one remote device or more than one type of remote device 107-1 to 107-N. Alternatively, data structures may be tailored to optimize their delivery to, compatibility with, or use by a specific brand,

model, or category of remote devices 107-1 to 107-N, for example, remote devices running a Google operating system or Apple operating system.”), 7:58-67 (“FIG. 1B shows an embodiment 10b of a portion of memory/storage 109-1 of remote device 107-1 that has been “programmed” with data structures of two controllable devices: controllable device 101-1 (memory portion 115 having table 115') and controllable device 101-2 (memory portion 116 having table 116'). The data structures were delivered to remote device 107-1 through connectivity layer 105.”). The data structures may be provisioned on an as-needed basis, *i.e.*, at the beginning of each new paired session between **controllable device 101-1** and **remote device 107-1**, from **controllable device 101-1** (*e.g.*, Aginsky, 2:41-44), or they can be “programmed” to **remote device 107-1** and provisioned from local memory/storage 109-1 (*e.g.*, Aginsky, 7:58-63).



Aginsky, Fig. 1A (partial).

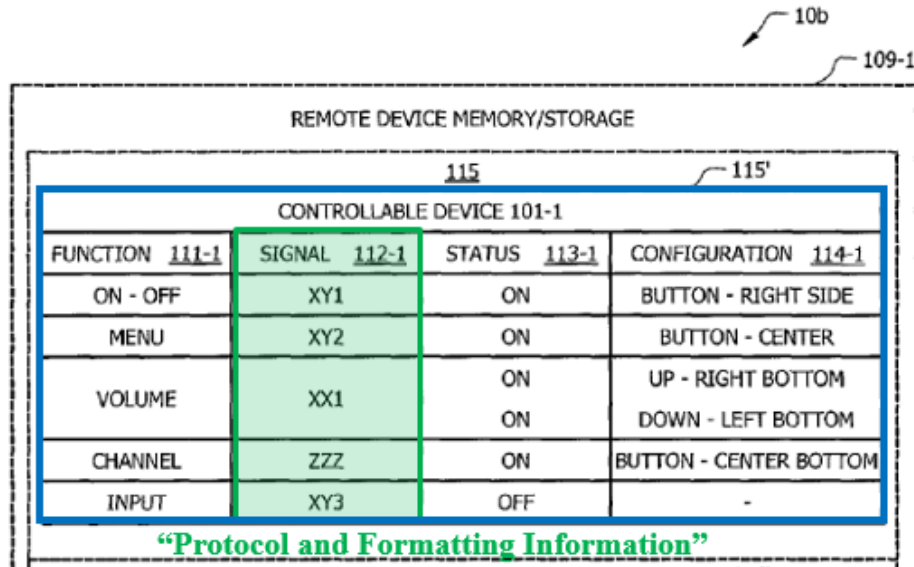


Aginsky, Fig. 1A (partial).

c) [1.a.2] the provisioned codeset record comprising protocol and formatting information

123. Aginsky discloses the provisioned codeset record comprising protocol and formatting information (e.g. “**SIGNAL** columns 112-1 and 112-2” “denote the type of signal”).

124. Aginsky teaches that “**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. Aginsky, 8:63-9:7. Aginsky further discloses that the “**SIGNAL columns 112-1 and 112-2**” of the **data structures** “denote the type of signal as well as the code or code sequence of the [command] signal.” Aginsky, 9:7-10.



Aginsky, Fig. 1B (partial). **Aginsky** additionally explains that **SIGNAL 112-1** may typically be a coded IR signal, which includes a coded (format) protocol (IR); moreover, a person of ordinary skill in the art would have recognized that Bluetooth also includes a protocol and format as defined in the ‘083 patent. Aginsky, 8:63-9:3. Accordingly, a person of ordinary skill in the art would have understood that **Aginsky’s** examples—frequency set, IR, and Bluetooth—require protocol and formatting information as defined in ‘083. ‘083, 10:47-54.

d) [1.a.3] and a plurality of individual command function entries

125. **Aginsky** discloses a plurality of individual command function entries (*e.g.* “a plurality of exemplary functions or commands” and corresponding signals, statuses, and configurations).

126. Each row in **data structures in tables 115' and 116'** represents an individual **command function entry**, and each individual **command function entry** includes

information such as function or command, signal, status, and configuration—all information related to a particular command. Aginsky, 8:21-37, Fig. 1B.

116			
CONTROLLABLE DEVICE 101-2			
FUNCTION 111-2	SIGNAL 112-2	STATUS 113-2	CONFIGURATION 114-2
ON - OFF	XX3	ON	RIGHT SIDE
VOLUME	XY5	ON	UP - DOWN - TOP
START	AB1	ON	GREEN LIGHT
STOP	AB2	ON	RED LIGHT
FAST FORWARD	AB3	ON	ARROW - RIGHT
FAST REWIND	AB4	ON	ARROW - LEFT
PAUSE	AB5	ON	BARS - BOTTOM
RECORD	XY6	ON	BUTTON RED

“Individual Command Function Entries”

“Codeset Record”

FIG. 1B

Aginsky, Fig. 1B (partial).

127. As an example, “the **data structure in table 115'** identifies a plurality of **exemplary functions or commands**...associated with a plurality of exemplary command signals...that when sent from **remote device 107-1** to **controllable device 101-1**, the function/command is carried out.” Aginsky, 8:21-37. This mirrors '083's disclosure that **individual command function entries 754** simply includes a row of information related to a command. '083, 10:47-11:3.

- e) [1.a.4] wherein each of the plurality of individual function entries within the codeset record comprises command data,

128. Aginsky discloses wherein each of the plurality of individual function entries within the codeset record comprises command data (e.g., native command data underlying “SIGNAL 112-1”).

129. “[D]ata structure in table 115’ identifies a plurality of exemplary functions or commands...associated with a plurality of exemplary command signals.” Aginsky, 8:21-30 (“In FIG. 1B, FUNCTION columns 111-1 and 111-2 and SIGNAL columns 112-1 and 112-2 contain the data structures delivered from their respective controllable devices 101-1 and 101-2. In the embodiment shown, the data structure in table 115’ identifies a plurality of exemplary functions or commands (e.g., on-off, menu, Volume, channel, input) associated with a plurality of exemplary command signals (e.g., XY1, XY2, XX1, ZZZ, XY3) that when sent from remote device 107-1 to controllable device 101-1, the function/command is carried out.”). When these command signals are sent from the **remote device** to the **controllable device**, the function/command is carried out. Aginsky, 8:21-30.

130. A user may speak or enter a command, including “FAST FORWARD,” into **remote device 107-1**. See Aginsky, 8:38-45 (“For example, from smartphone (remote device 107-1), a user may enter a command, e.g., turn TV on, by pressing a right side button of the function controls presented via user interface 110-1. This command will be converted to a command signal. Based on the data structure of the controllable device, the proper command signal for “on” is known to be XY1. Command signal XY1 is therefore sent to the TV (controllable device 101-1) causing the TV to turn on.”). **Remote device 107-1** converts this command to a command signal. Aginsky, 8:38-45. Based on the **data structure** of the **controllable device**,

the proper command signal for ‘fast forward’ is AB3. Aginsky, Fig. 1B. A person of ordinary skill in the art would have recognized that the signal AB3 must contain underlying native command data that commands **controllable device 101-1** to execute a fast forward function, and this tracks ’083’s definition of “command data.” Compare Aginsky, 8:38-42 (“For example, from smartphone (remote device 107-1), a user may enter a command, e.g., turn TV on, by pressing a right side button of the function controls presented via user interface 110-1. This command will be converted to a command signal.) with ’083, 10:65-67 (“[C]ommand data 762 which, when transmitted using the protocol specifications of block 752, will command the appliance to perform the indicated action.”). Command signal AB3 is therefore sent to the applicable **controllable device** and the underlying native command data causes the **controllable device** to fast forward. Aginsky, 8:38-42.

116			
CONTROLLABLE DEVICE 101-2			
FUNCTION 111-2	SIGNAL 112-2	STATUS 113-2	CONFIGURATION 114-2
ON - OFF	XX3	ON	RIGHT SIDE
VOLUME	XY5	ON	UP - DOWN - TOP
START	AB1	ON	GREEN LIGHT
STOP	AB2	ON	RED LIGHT
FAST FORWARD	AB3	ON	ARROW - RIGHT
FAST REWIND	AB4	ON	ARROW - LEFT
PAUSE	AB5	ON	BARS - BOTTOM
RECORD	XY6	ON	BUTTON RED

FIG. 1B

Aginsky, Fig. 1B (partial).

f) [1.a.5] a standard function identifier,

131. Aginsky discloses wherein each of the plurality of individual function entries within the codeset record comprises...a standard function identifier” (*e.g.* “each function could further include a code or other identification marker related to the operation of that function control.”).

132. Aginsky discloses that the configuration for each function could include an “**identification marker** related to the operation of that function control.” Aginsky, 9:34-36. For example, **Aginsky** discloses that for a fast-forward function, a tag such as “FF” would be associated with the fast-forward function across controllable devices. Aginsky, 9:36-47. A person of ordinary skill in the art would have understood that **Aginsky** broadly teaches use of an **identification marker** for managing similar functionality across codesets. *Compare* Aginsky, 9:34-47 with ’083, 10:56-62. Indeed, a person of ordinary skill in the art would have understood that the “FF” tag would apply to a fast forward command for a Sony television the same as it would apply to a Samsung stereo.

g) [1.a.6] data which comprises a phonetic representation of a function name corresponding the standard function identifier,

133. Aginsky as modified by Stammeler teaches 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 the standard function identifier.

134. As I explained above with respect to [1.a.5], **Aginsky** discloses that FUNCTION columns 111-1 and 111-2 of the **data structures** identify various exemplary functions. Aginsky, 8:21-37, Fig. 1B. Each function has a name, such as “FAST FORWARD” which may correspond to an **identification marker** (i.e., standard function identifier), such as “FF.” Aginsky, 8:21-62.

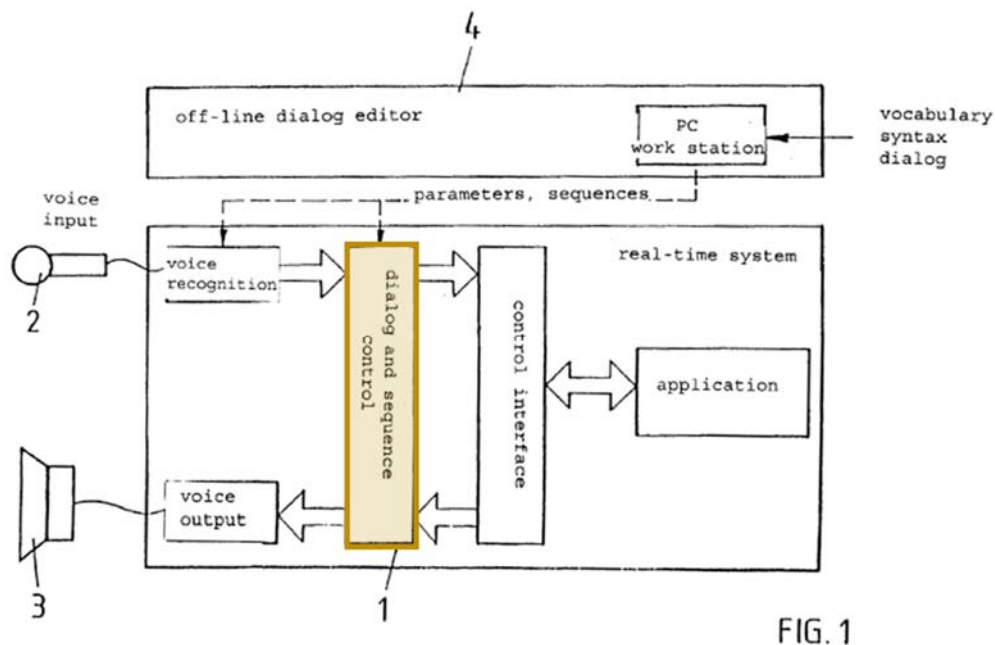
135. **Aginsky** teaches that “voice commands...can be used for one or more of the functions performed by the **remote device**.” Aginsky, 9:60-65; *see also* Aginsky, 6:2-6, 8:8-12. While **Aginsky** does not explicitly disclose that its **data tables** include information related to voice commands, **Aginsky** broadly teaches that any desirable information may be included within the **data structures**. Aginsky, 9:30-33, 13:34-36.

136. Thus, **Aginsky** at least teaches a **data structure** with voice command function in mind, and it would have been obvious to modify the **data structure** to include phonetic representations of each command such that voice command is enabled. As I explained above, it had been well-known in the art for decades to use phonetic representations, such as phonemes, to effectuate voice recognition systems. *See supra*, ¶¶39-50, 71-73. And further, modifying **Aginsky**’s **data structure** with the teachings of **Stammler** would have been well within the ability of a person of

ordinary skill in the art given **Stammler**'s guidance, and its applicability to **Aginsky**'s design. EX1006, Hanson, ¶¶[0017], [0021], [0023], [0033], [0037], [0040]).

137. As I have explained, **Stammler** teaches that “reliable control or operation of devices by speech command or real-time speech dialog is possible with relatively low expenditure must be seen as the essential advantage of the invention.” *Stammler*, 2:56-59. Importantly, **Stammler** explicitly discloses that its memory stores **phonetic representations** enabling it to recognize voice commands, and a person of ordinary skill in the art would have been motivated to apply **Stammler**'s teachings in implementing **Aginsky**'s **data structure(s)** to enable voice commands. *Stammler*, 12:19-27 (“The memory (data/program RAM 65 and ROM 66) connected to the DSP serves as data and program storage for the DSP. It furthermore includes the specific classification models and, if necessary, the reference patterns for the two speech recognizers and the fixed texts for the dialog control and the user prompting. The user-specific information (address list, data list) is filed in a FLASH memory or a battery-buffered memory.”). **Stammler** discloses using “**phonetic word subunits**” such as phonemes recognized as part of user voice commands in its speech dialog system for automatic control of one or more devices. See *Stammler*, 1:9-13 (“The invention concerns a process for automatic control of one or more devices by speech control or by real-time speech dialog, by a process for automatic

control of one or several devices by speech commands or by speech dialog in real-time operation.”), 8:53-57 (“The word recognition for a speech recognition system with a larger vocabulary usefully is not based on whole words, but on phonetic word subunits. Such a word subunit is, for example, a phoneme, a diphone (double phoneme) or a phoneme transition.”), Fig. 1.



Stammler, Fig. 1.

138. As I have explained, **Stammler** specifically teaches advantageous methods for speech recognition systems for voice-activated control of various devices, such as using **phonetic word subunits**, including phonemes, to realize speech recognition. See *supra*, §VII.B. A person of ordinary skill in the art would have been motivated to apply **Stammler**’s teachings in implementing **Aginsky**’s data

structure because doing so would allow **Aginsky** to enable its disclosed voice control over multiple devices responsive to a variety of voice command inputs. This in turn would further **Aginsky**'s goal of providing a more flexible and customizable universal remote programming method. Aginsky, 1:43-45 ("Such prior art programming methods for remotes are not sufficiently flexible nor customizable to meet the specific needs of users."), 2:15-30 ("Disclosed herein is a system and method for remote control adaptive configuration. According to one aspect of the present invention, a controllable device (controlled device) is responsible for specifying functions available for control by a remote device (controlling device), while the remote device is responsible for creating a graphical representation and applying visual effects that will be presented to a user at the remote device exercising Such control. In this way, the present disclosure provides a single highly customizable common system. A distributors, reseller, and/or manufacturer of various electronic devices, such as DVD players, automobiles, Bluetooth headsets, etc., will be able utilize the same controllable device function specification, yet visually distinguish its brand name from other solutions using the same specification."), 3:50-63 ("According to one aspect of the present invention, a controllable device (controlled device) is responsible for specifying functions (providing limited instructions) for control by a remote device (controlling device or controller), while the remote device is responsible for creating a graphical

representation and applying visual (or other sensory) effects that will be presented to a user at the remote device exercising control. In this way, the present invention provides a highly customizable system by which distributors, resellers, and manufacturers of various electronic devices will be able utilize the same controllable device instructions, yet visually distinguish its brand name from other solutions using the same instructions.”); *see supra*, §VII.C.

h) **[1.a.7] 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;**

139. Aginsky as modified by **Stammler** teaches wherein each of the plurality of individual function entries within the codeset record comprises...a plurality of data each of which comprises a phonetic representation of a unique one of a plurality of synonyms of the function name.

140. Aginsky—either by itself or in combination with **Stammler**—teaches “a **phonetic representation**” within its **data structure(s)**. *See supra* [1.a.6]. Admittedly, **Aginsky** does not expressly teach or suggest using **synonyms** of a function name in its **data structure(s)**. Yet it would have been obvious to a person of ordinary skill in the art to apply **Stammler**’s teachings of using **synonyms**, and phonetic representations thereof, in **Aginsky**’s systems and methods in order to allow a user to use alternate words or phrases to activate a particular command.

141. As discussed above, *see supra* §VII.B, **Stammler** solves deficiencies in the prior art through its “fixed syntax structure and a fixed command structure as well as by a combination of fixed vocabulary” and “freely definable vocabulary,” explaining that this framework “is a precondition for a high recognition capacity with an extensive vocabulary.” Stammler, 1:66-2:2 (“The insufficient user comfort, which expresses itself in that the vocabulary is limited to a minimum to ensure a high recognition reliability...”), 5:65-6:10 (“The here outlined system is characterized in the “on-line” operation by a fixed syntax structure and a fixed command structure as well as by a combination of fixed vocabulary (speaker-independent recognizer) and freely definable vocabulary such as names (speaker-dependent recognizer). This framework, which initially appears to be inflexible, is a precondition for a high recognition capacity with an extensive vocabulary (at the present time up to several hundred words), e.g., for a noise-encumbered environment, for changing acoustic conditions in the passenger cell, as well as for a variety of speakers. The extensive vocabulary is used to increase the user friendliness by using synonymous words or different variations in the pronunciation.”). This “extensive vocabulary of admissible commands” stored in memory “is used to increase the user friendliness by using **synonymous words** or different variations in pronunciation.” Stammler, 2:60-65 (“A further essential advantage must be seen in the fact that the 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.”), 5:65-6:10. **Stammler** further teaches that “[p]redetermined **synonymous words** can be used,” and “[t]he same function can be realized through commands with a different number of words.” Stammler, 16:17-20 (“Predetermined synonymous words can be used; The same function can be realized through commands with a different number of words (e.g., through two word or three-word commands)...”). **Stammler** teaches that such an “approach to a solution proves to be advantageous.” Stammler, 6:18-19 (“The here outlined approach to a solution proves to be advantageous....”).

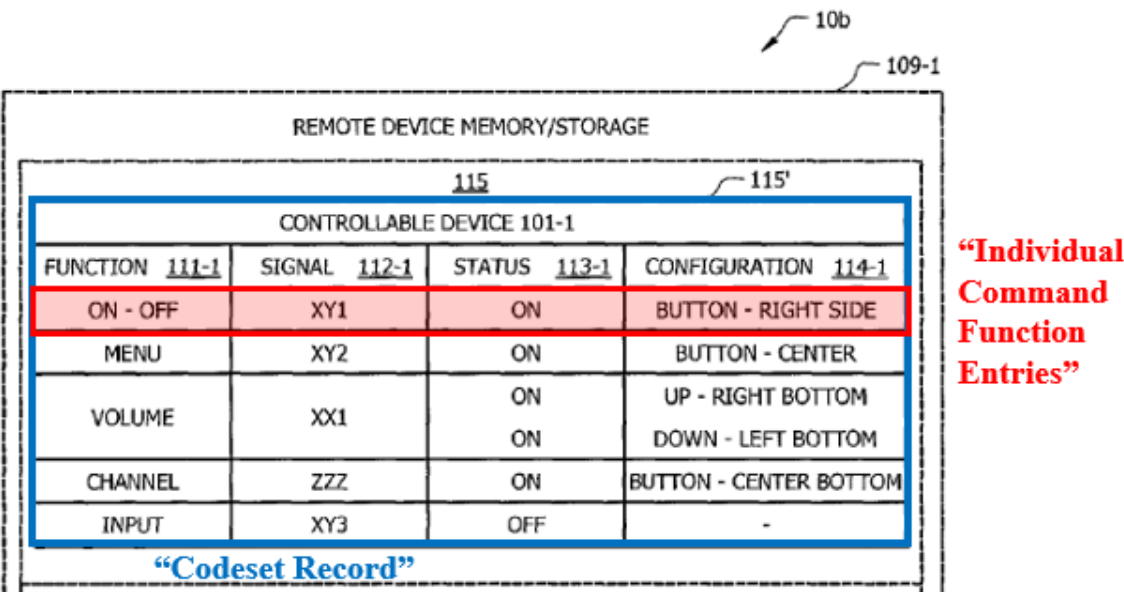
142. As explained above, a person of ordinary skill in the art would have been motivated to apply **Stammler**’s speech dialog system utilizing synonyms in implementing **Aginsky**’s data structure in order to improve command recognition accuracy and user friendliness. Stammler, 6:8-10 (“The extensive vocabulary is used to increase the user friendliness by using synonymous words or different variations in the pronunciation.”); *see supra*, §VII.C.

- i) **[1.b.1] 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,

143. Aginsky teaches causing less than all of the individual command function entries from within the provisioned codeset record (e.g. “the data structure...may include only a subset of all possible functions” or be “restricted by a protocol”) to each be matched (e.g. “a plurality of exemplary functions or commands associated with a plurality of exemplary command signals”) to one or more of a plurality of user input elements of the controlling device (e.g. “buttons, bars, and arrows, whether hard or programmable, that are physically pushed or touched by the user,” “voice commands,” or “[a]ny type of input from the user”).

144. As I explained above with respect to [1.a.3], Aginsky discloses a plurality of individual command function entries in each row of a data structure.



Aginsky, Fig. 1B.

145. Aginsky further discloses that “function controls (for inputting commands)” are illustrated in the data structure tables by way of “CONFIGURATION columns 114-1 and 114-2 of FIG. 1B.” Aginsky, 6:16-17 (“[F]unction controls (for inputting commands) are presented at a user interface (e.g., CONFIGURATION columns 114-1 and 114-2 of FIG. 1B)...”). These configuration columns represent potential means of user input, which could be “buttons, bars, and arrows, whether hard or programmable, that are physically pushed or touched by the user,” “voice commands,” or “[a]ny type of input from the user.” Aginsky, 8:38-41 (“For example, from smartphone (remote device 107-1), a user may enter a command, e.g., turn TV on, by pressing a right side button of the function controls presented via user interface 110-1.”), 9:56-65 (“Although CONFIGURATION columns 114-1 and 114-2 shown in FIG. 1B assume buttons, bars, and arrows, whether hard or programmable, that are physically pushed or touched by the user, this form of entering a command by the user need not be so limited. Any type of input from the user can be utilized. Thus, voice commands, motion commands (e.g., with the user waiving his or her finger), and/or motion commands (e.g., with the remote device itself being moved), can be used for one or more of the functions performed by the remote device, such as remote device 107-1.”). As shown in Fig. 1B, CONFIGURATION 114-1 includes entries for several functions that correlate to buttons. For example, the “ON – OFF” function may be configured such that the

user input is a “button” located on the “right side” of the remote control. Similarly, the “MENU” function may be configured such that the user input is a “button” located in the “center” of the remote control.

146. But the function “INPUT” does not have a corresponding CONFIGURATION column 114-1 entry, indicating that there is not a physically pushed or touched button (*i.e.*, “input elements of the controlling device”) related to the “INPUT” function. See Aginsky, 9:56-10:2 (“Although CONFIGURATION columns 114-1 and 114-2 shown in FIG. 1B assume buttons, bars, and arrows, whether hard or programmable, that are physically pushed or touched by the user, this form of entering a command by the user need not be so limited. Any type of input from the user can be utilized. Thus, voice commands, motion commands (*e.g.*, with the user waiving his or her finger), and/or motion commands (*e.g.*, with the remote device itself being moved), can be used for one or more of the functions performed by the remote device, such as remote device 107-1. In this manner, the input stimuli to the remote device is independent of the command signal that is actually passed from the remote device to the controllable device, with the translation being made in the remote device as will be discussed hereinafter.”). Accordingly, a person of ordinary skill in the art would have understood that the “INPUT” function is not matched to a physical user input element such as a button,

and therefore, less than all of the individual command functions are matched to a user input.

- j) **[1.b.2] 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**

147. Aginsky discloses whereupon a subsequent activation of a one of the plurality of user input elements (*e.g.* “pressing a...button”) will cause the controlling device to transmit a command communication by using the protocol and formatting information and the command data (*e.g.* “command will be converted to a command signal” and “sent to the TV”) 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 (*e.g.* “data structures” containing “a plurality of exemplary functions or commands associated with a plurality of exemplary command signals”).

148. As I explained above with respect to [1.a.2], [1.a.3], [1.a.4], and [1.b.1], Aginsky discloses that activating a user input element will cause **remote device 107-1** to transmit a command communication—*i.e.*, a command signal—by using protocol and formatting information and command data. Aginsky, 8:21-62.

Aginsky discloses that a user may use **remote device 107-1** to enter a command, such as “turn TV on,” by pressing or touching a button on the smartphone’s user interface. Aginsky, 8:38-45. Further, **Aginsky** broadly teaches user input elements may be “buttons, bars, and arrows, whether hard or programmable, that are physically pushed or touched by the user,” “voice commands,” or “[a]ny type of input from the user.” Aginsky, 9:56-65. After activating the user input, **remote device 107-1** correlates the user input to a command and converts it to the proper command signal based on the data structure and sent to **controllable device 101-1**, causing the **controllable device 101-1** to execute the command. See Aginsky, 8:38-62, 9:61-65. Further still, **Aginsky** discloses that it uses the information in **SIGNAL columns 112-1 and 112-1** (*i.e.*, “protocol and formatting information”; see [1.a.2]) and data transmitted with a SIGNAL (*i.e.*, “command data”; see [1.a.4]) related to an activated input element to transmit a command to **controllable device 101-1**. See *supra* ¶¶123-124, 128-130.

- k) **[1.c] 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.

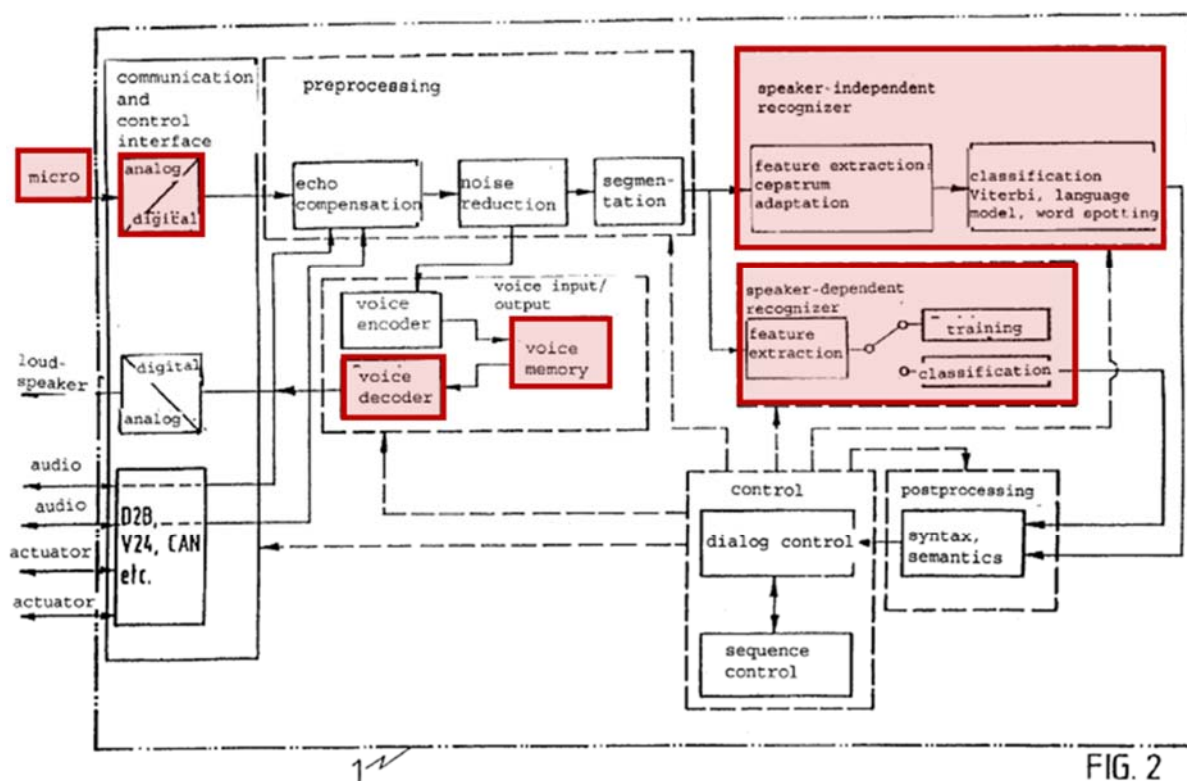
149. Aginsky as modified by **Stammler** teaches causing the controlling device to transmit a command communication by using the protocol and formatting information and the command data of a one of the one or more of the plurality of individual command function entries from within the provisioned codeset 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.

150. As I explained above with respect to [1.a.6] and [1.a.7], **Stammler** discloses a speech dialog system for automatic control of one or more devices by voice commands which utilizes **phonetic representations** and **synonyms**. See **Stammler**, 1:9-13 (“The invention concerns a process for automatic control of one or more devices by speech control or by real-time speech dialog, by a process for automatic control of one or several devices by speech commands or by speech dialog in real-time operation.”), 2:25-33 (“The solution to the above object according to the invention is reflected with respect to the process, by a process for automatic control of one or several devices by speech commands or by speech dialog in real-time operation. The entered speech commands are recognized by a speaker independent compound-word speech recognizer and a speaker-dependent additional speech recognizer and are classified according to their recognition probability.”), 5:65-6:10 (“The here outlined system is characterized in the “on-line” operation by a fixed

syntax structure and a fixed command structure as well as by a combination of fixed vocabulary (speaker-independent recognizer) and freely definable vocabulary such as names (speaker-dependent recognizer). This framework, which initially appears to be inflexible, is a precondition for a high recognition capacity with an extensive vocabulary (at the present time up to several hundred words), e.g., for a noise-encumbered environment, for changing acoustic conditions in the passenger cell, as well as for a variety of speakers. The extensive vocabulary is used to increase the user friendliness by using synonymous words or different variations in the pronunciation.”), 8:53-57 (“The word recognition for a speech recognition system with a larger vocabulary usefully is not based on whole words, but on phonetic word subunits. Such a word subunit is, for example, a phoneme, a diphone (double phoneme) or a phoneme transition.”), 15:19-16:26.

151. Stammer describes how its system includes a microphone (“micro,” below) that receives voice commands that are converted into digital signals (via an analog/digital, or A/D, converter) with underlying speech data (*i.e.*, “voice data”). Stammer, 3:56-58 (“The SDS 1 in FIG. 1 is shown in detail in FIG. 2. A microphone (not shown) is connected to an analog/digital converter 11....”), 11:49-58 (“Via a connected A/D converter 61 and a D/A converter 62: the microphone signal and, if necessary, the speaker signals are digitized and transmitted to the DSP for further processing, the digitized speech data for the speech output/dialog control are

converted back into an analog signal, are amplified and transmitted to a suitable playback medium (e.g., a speaker).”). The speech data are then transmitted to a “speech recognizer” (i.e., “speech recognition engine”). See, e.g., Stammler, 2:26-54, 11:44-58, 15:15-16:25, Figs. 1-2, cl. 1. This allows **Stammler**’s disclosed system to correlate and recognize speech commands. Stammler, 2:29-33 (“The entered speech commands are recognized by a speaker independent compound-word speech recognizer and a speaker-dependent additional speech recognizer and are classified according to their recognition probability.”).



Stammler, Fig. 2.

2. **Claim 2: The method as recited in claim 1, wherein the controlling device comprises a microphone for receiving voice input used in creating the voice data.**

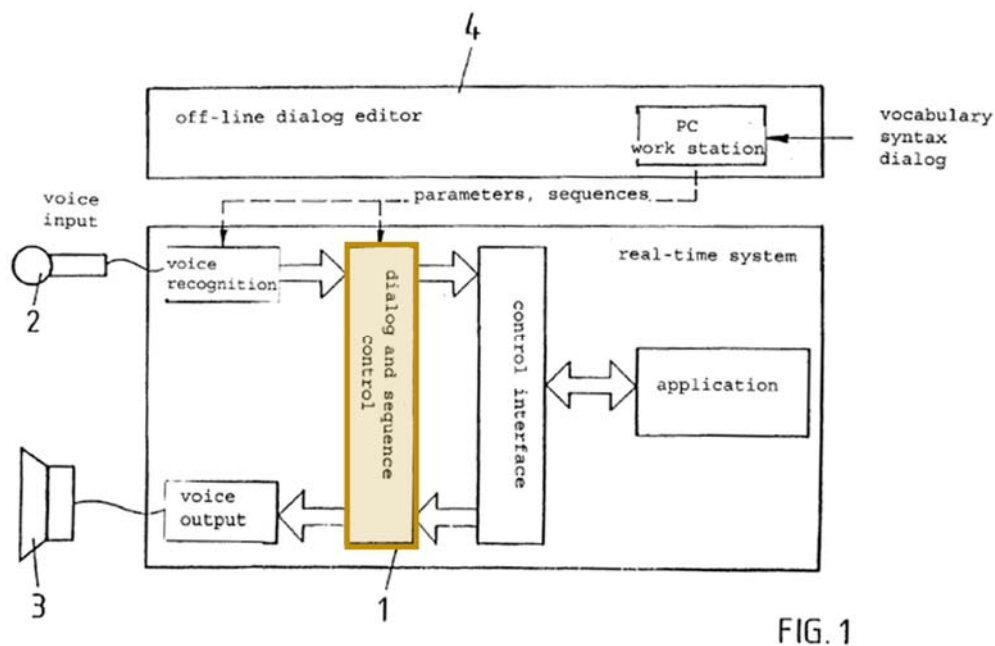
152. **Aginsky** as modified by **Stammler** teaches wherein the controlling device comprises a microphone for receiving voice input used in creating the voice data (e.g. “microphone,” “two speech recognizers,” and “a postprocessing unit...for the syntactical-grammatical and semantical processing of the recognizer output signals” and “speech data”).

153. **Remote device 107-1** receives voice input, such as “voice commands”. **Aginsky**, 9:60-65 (“Any type of input from the user can be utilized. Thus, voice commands, motion commands (e.g., with the user waiving his or her finger), and/or motion commands (e.g., with the remote device itself being moved), can be used for one or more of the functions performed by the remote device, such as remote device 107-1.”). **Aginsky** does not explicitly disclose how **remote device 107-1** receives voice input or creating voice data. A person of ordinary skill in the art would have understood that a voice-controlled device such as **Aginsky**’s would have implemented a microphone to receive voice input that may be used to create voice data. Indeed, the art is replete with references disclosing remote controls with microphones. *See supra*, ¶¶51-56. Moreover, a person of ordinary skill in the art would have of course recognized that certain embodiments of **remote device 107-**

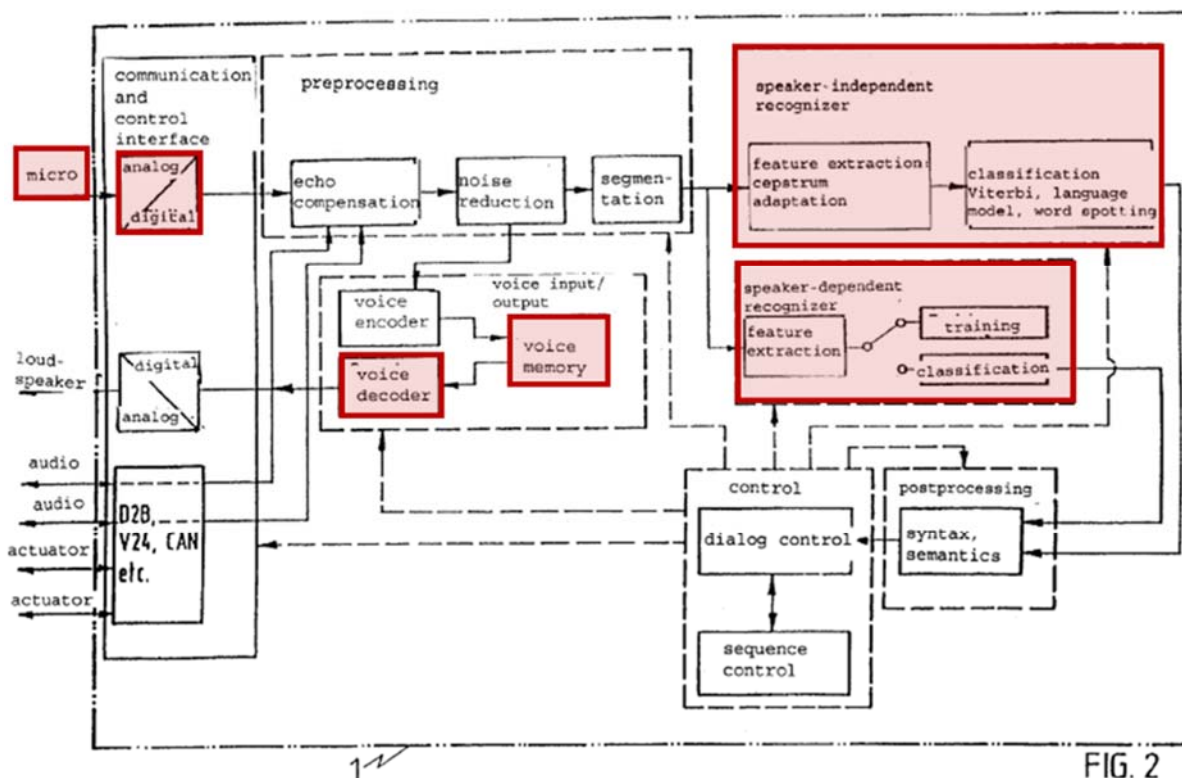
1—including the embodiment wherein remote device 107-1 may be a cell phone—already includes a microphone.

154. To the extent argued that **Aginsky** does not teach a “microphone” or “creating the voice data,” a person of ordinary skill in the art would have been motivated to apply **Stammler**’s teachings to **Aginsky**’s systems and methods.

155. As I explained above with respect to [1.c], **Stammler** discloses using “voice data.” **Stammler** also discloses a speech dialog system for automatic control of one or more devices by voice commands. Stammler, 1:9-13, 2:25-33, 15:19-16:26. As part of that system, **Stammler** discloses a microphone for receiving speech input, which is then processed as voice data. See Stammler, 3:36-4:9, 6:40-49, 7:25-11:2, Figs. 1-2.



Stammler, Fig. 1.



Stammler, Fig. 2.

156. Stammler teaches that a microphone is connected to a system comprising various components including a speaker-independent compound word speech recognizer and a speaker-dependent speech recognizer, which are in turn connected on the output side to a postprocessing unit for the syntactical-grammatical and semantical processing of the recognizer output signals. Stammler, 3:56-4:1 (“The SDS 1 in FIG. 1 is shown in detail in FIG. 2. A microphone (not shown) is connected to an analog/digital converter 11, which is connected via devices for the echo compensation 12, the noise reduction 13 and the segmentation 14 to a speaker-

independent compound word speech recognizers and to a speaker-dependent speech recognizer 16. The two speech recognizers 15 and 16 are connected on the output side to a postprocessing unit 17 for the syntactical-grammatical and semantical processing of the recognizer output signals. This unit 17, in turn, is connected to the dialog control 18 and the sequencing control 19, which itself forms the control for the SDS and the devices to be controlled by the SDS.”), 15:19-25 (“Used is a process for the automatic control and/or operation of one or several devices for each speech command or each speech dialog in the real-time operation, in which processes for the speech output, speech signal preprocessing and speech recognition, syntactical-grammatical postprocessing as well as dialog control, sequence control, and interface control are used.”), Fig. 1, Fig. 2 (microphone denoted by “micro”).

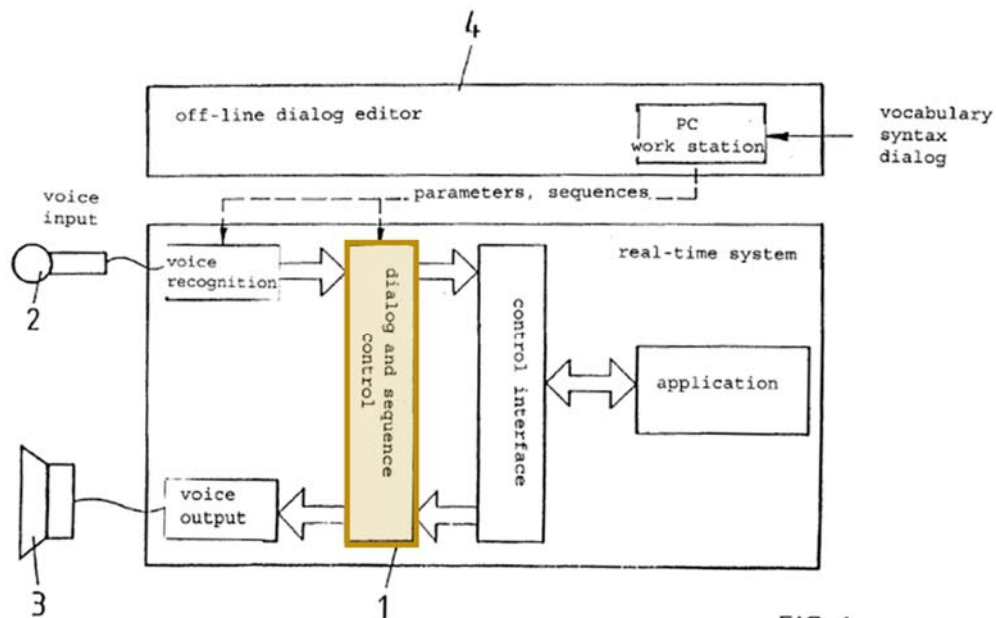
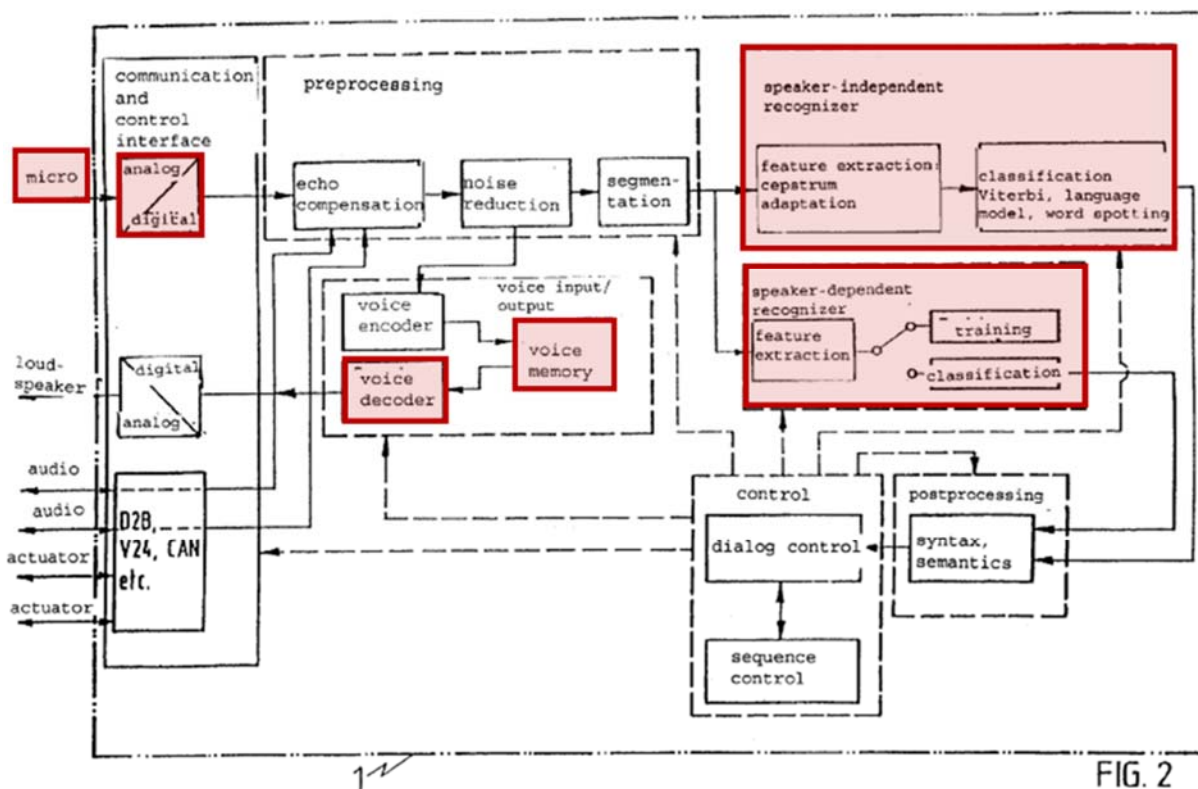


FIG. 1

Stammler, Fig. 1.



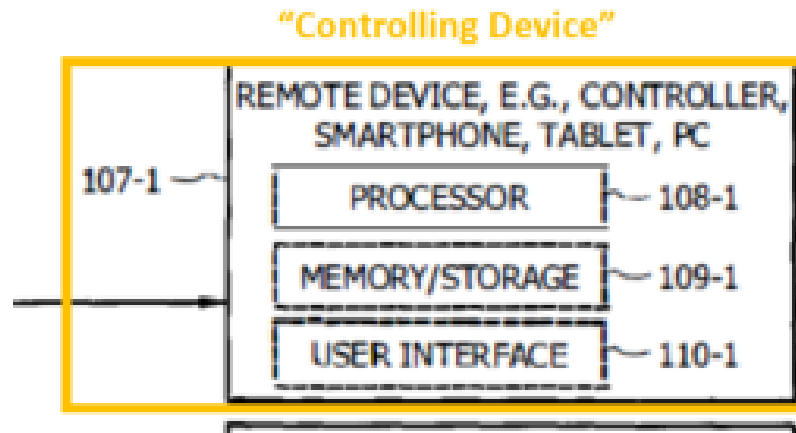
Stammler, Fig. 2.

3. **Claim 3: The method as recited in claim 1, wherein the controlling device comprises a processing device and instructions for providing the speech recognition engine.**

157. **Aginsky** as modified by **Stammler** teaches wherein the controlling device comprises a processing device and instructions for providing the speech recognition engine.

158. **Remote devices 107-1** “include[s] a processor 108-1 [and] memory/storage 109-1.” **Aginsky**, 5:46-51 (“FIG. 1A also illustrates remote devices 107-1 to 107-N. These may be, for example, a smart clicker, smartphone, tablet computer,

personal computer, or any other programmable processor-based device. Such remote devices include a processor 108-1 to 108-N, memory/storage 109-1 to 109-N, and user interface 110-1 to 110-N.”).



Aginsky, Fig. 1A (partial).

159. Remote devices 107-1’s processors may include circuitry and other components “as is well-known in the art for executing various logical operations...of controllable devices.” Aginsky, 4:12-38. Moreover, Aginsky discloses that “[o]ther instructions can also be sent to remote device 107-1 to assist in controlling controllable device 101-1.” Aginsky, 11:22-23. Thus, a person of ordinary skill in the art would have understood that processor 108-1 teaches a “processing device,” that operates in accordance with local instructions, or instructions provided via memory/storage 109-1 stores instructions as is well-known in the art. Aginsky, 5:51-6:2 (“Processors 108-1 to 108-N may include circuitry and/or other components (e.g., wireless transmitter, wireless receiver, multiplexors, demultiplexors, etc.) as is

well-known in the art for executing various logical operations (i.e., logic, code, software, applications, firmware) of remote devices 107-1 to 107-N (e.g., sending command signals to controllable devices, allowing a user to establish an ID and password, sniffing for controllable devices, verifying compatibility with a controllable device, disconnecting from a controllable device, accepting and parsing data structures of a paired controllable device, managing and allocating system resources, selecting data transmission channels, connecting to a data transmission network, and more as discussed further below). Memory/storage 109-1 to 109-N may include a variety of types of tangible mediums for storing such logic, code, software, applications, and/or firmware, including, for example, a hard drive media, optical media, RAM, EPROM, EEPROM, cartridge media, flash memory, ROM, and/or memory stick.”), 11:22-28 (“Other instructions can also be sent to remote device 107-1 to assist in controlling controllable device 101-1. This feature can be helpful, for example, when the controllable device does not have a display screen, or is not within visible range of the user operating remote device 107-1. The feedback can be simply an acknowledgment of the received command signal.”).

160. While **Aginsky** does not expressly require “instructions for providing the speech recognition engine,” it would have been obvious to a person of ordinary skill in the art that such instructions are taught to realize **Aginsky**’s voice command capabilities. And as I explained above with respect to [1.c] and [2], it would have

been obvious to apply **Stammler**'s teachings of recognizing speech through a speech recognizer in implementing **Aginsky**'s voice-controlled **remote device 107-1**, and it would have been obvious to a person of ordinary skill in the art to provide instructions to the processor executing the instructions (*i.e.*, **Stammler**'s controller in conjunction with the speech engine), or **Stammler**'s speech engine alone, to enable such speech recognition. It would have been a matter of implementation whether a person of ordinary skill in the art would have a stand-alone speech processor, or circuitry that operates in conjunction with a system processor—and **Stammler** broadly teaches design flexibility on control processing. Stammler, 7:1-10 (“It is possible with the aid of the SDS to operate functions within the computer, of which the SDS is an integral component, as well as to operate external devices. In addition to a PCMCIA (Personal Computer Memory Card International Association Standard) interface, the SDS, for example, also has interfaces that are accessible to external devices. These include, for example, a V.24 interface, (German serial interface standard corresponding to U.S. Standard RS232) an optical data control bus, a CAN (Controller Area Network) interface, etc.”), 12:10-18 (“In addition to communicating with a desktop or portable computer, this interface 64 also functions to supply voltage to the SDS. Several of the above-listed functions can be combined here. In addition to the electrical qualities, this interface can also determine the mechanical dimensions of the SDS. These can be selected, for

example, such that the SDS can be plugged into a PCMCIA port of a desktop or portable computer.”), 20:21-56.

4. **Claim 4: The method as recited in claim 1, wherein the speech recognition engine is executed on a computing device remote from the controlling device.**

161. Aginsky as modified by **Stammler** discloses wherein the speech recognition engine is executed on a computing device remote from the controlling device.

162. Aginsky does not expressly disclose a speech recognition engine executed on a computing device remote from **remote devices 107-1**. However, a person of ordinary skill in the art would have been motivated to apply **Stammler’s** teachings to **Aginsky’s** systems and methods.

163. Stammler broadly teaches that the speech dialog system may function on a device external to **remote devices 107-1**. Stammler, 7:1-10 (“It is possible with the aid of the SDS to operate functions within the computer, of which the SDS is an integral component, as well as to operate external devices. In addition to a PCMCIA (Personal Computer Memory Card International Association Standard) interface, the SDS, for example, also has interfaces that are accessible to external devices. These include, for example, a V.24 interface, (German serial interface standard corresponding to U.S. Standard RS232)an optical data control bus, a CAN (Controller Area Network) interface, etc.”), 12:10-18 (“In addition to communicating with a desktop or portable computer, this interface 64 also functions

to supply voltage to the SDS. Several of the above-listed functions can be combined here. In addition to the electrical qualities, this interface can also determine the mechanical dimensions of the SDS. These can be selected, for example, such that the SDS can be plugged into a PCMCIA port of a desktop or portable computer.”), 20:21-56. Accordingly, a person of ordinary skill in the art would have understood that **Stammler’s** speech dialog system could be executed on a computing device remote from **remote devices 107-1**.

164. To the extent argued otherwise, executing speech recognition on a computing device remote from **remote devices 107-1** would have been obvious to a person of ordinary skill in the art to utilize the well-known practice of using a remote or server-based speech recognition engine. Specifically, a person of ordinary skill in the art would have been motivated to incorporate this well-known technique to achieve **Stammler’s** goal of increasing user satisfaction by attaining more accurate and reliable speech recognition at the “lowest possible expenditure.” *Stammler*, 2:18-65.

165. Moreover, a person of ordinary skill in the art would have been further motivated to utilize the more powerful processing capabilities of larger computers and servers as a way to increase speech recognition accuracy without using excessive power, space, and other resources that would otherwise be required for comparable speech recognition performance of smaller controlling devices. And this could be

of particular importance in implementing systems that utilize a large, expansive vocabulary, such as **Stammler**'s.

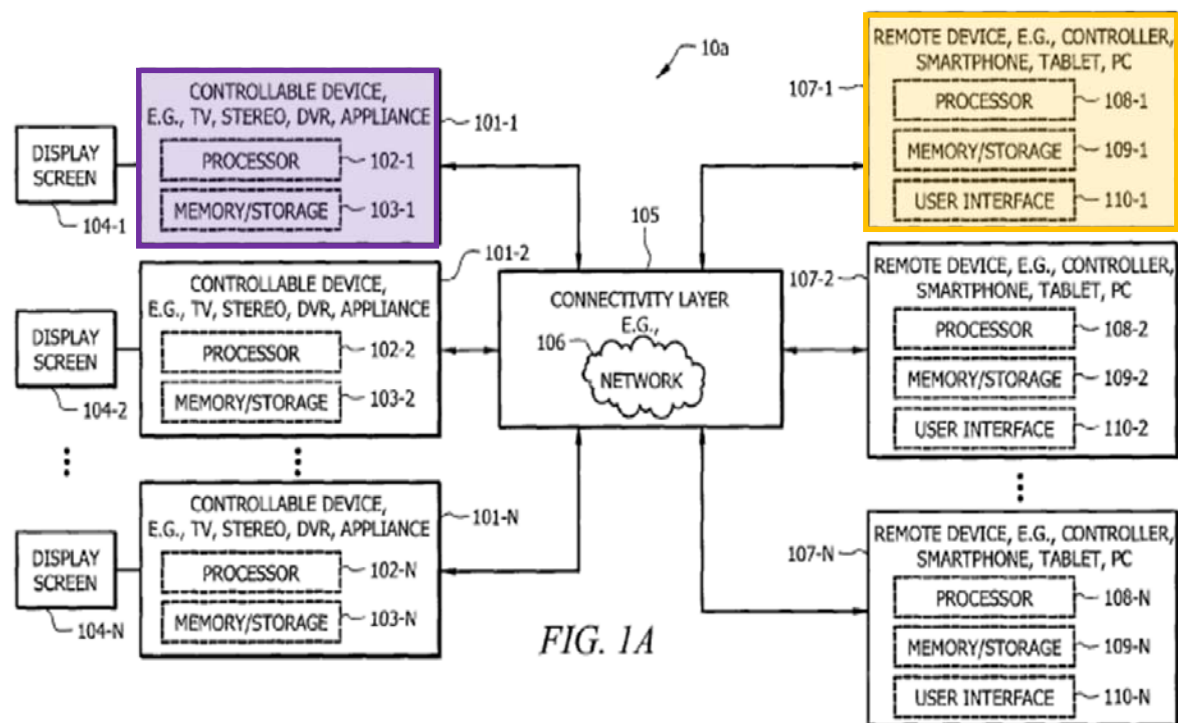
5. **Claim 5: The method as recited in claim 1, wherein codeset is provisioned to the controlling device by being downloaded thereto.**

166. **Aginsky** as modified by **Stammler** teaches wherein codeset is provisioned to the controlling device by being downloaded thereto (*e.g.* “a controllable device transfers to the remote device...a data structure identifying various functions that can be controlled by a remote device”).

167. As **Aginsky** discloses, downloading “control instructions” was well-known in the art. *See* Aginsky, 1:61-66 (“Since the electronic devices to be controlled typically have unique signal control instructions, the smart device must be programmed in the manner described above, or alternatively, a set of control instructions must be download. Such control instructions may be downloaded from a common store or website compatible with the smart device.”). A person of ordinary skill in the art would understand “control instructions” to be synonymous with “codesets” or “data structures,” particularly in view of **Aginsky**'s disclosure that the control instructions relate to signals particular to a **controllable device**. Aginsky, 1:61-66.

168. Further, **Aginsky** discloses “systems and methods in which a **controllable device** transfers to the **remote device**...a **data structure** identifying various

functions that can be controlled by a **remote device**.” Aginsky, *Abstract*. “The **data structures** [are] delivered to **remote device 107-1** through connectivity layer 105.” Aginsky, 7:63-64; Fig. 1A. After delivery, the data structures are “programmed” into memory/storage 109-1. Aginsky, 7:58-60. A person of ordinary skill in the art would have understood that such a transfer and programming would constitute “downloading” the codeset.



Aginsky, Fig. 1A.

169. Finally, '083 itself admits that this limitation was well-known. '083, 5:42-59 (“It is known to offer an app for download and installation into memory 312 which app may serve to allow use of the smart phone to transmit commands suitable for operation of entertainment and other appliances. ...[A library of codesets] may be

resident on the smart device itself, *either downloaded as part of or in conjunction with the app...*”).

6. **Claim 6: The method as recited in claim 1, wherein the method comprises receiving at the speech recognition engine voice data for mapping each of the less than all of the individual command function entries from within the provisioned codeset record to the one or more of the plurality of user input elements of the controlling device.**

170. **Aginsky** as modified by **Stammler** teaches receiving at the speech recognition engine voice data for mapping each of the less than all of the individual command function entries from within the provisioned codeset record to the one or more of the plurality of user input elements of the controlling device.

171. **Aginsky** as modified by **Stammler** disclose this limitation, as I explained above with respect to [1.b.1] and [1.c].

7. **Claim 8: The method as recited in claim 1, comprising receiving at a speech recognition engine voice data indicative of at least a brand of the target appliance whereupon the speech recognition engine uses 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.**

172. **Aginsky** as modified by **Stammler** teaches receiving at a speech recognition engine voice data indicative of at least a brand of the target appliance whereupon the speech recognition engine uses 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.

173. As I explained above with respect to [1.c], **Aginsky** teaches using voice commands to control devices, and **Stammler** provides the implementation details of receiving a voice command via a microphone, digitizing the voice command, and transmitting a digital signal containing voice data to a speech recognition engine.

174. **Aginsky's** **remote device 107-1** may control one or more **controllable devices 101-1** in the same home entertainment environment. **Aginsky**, 3:64-4:4 (“FIG. 1A shows one embodiment of a system, such as embodiment 10a, that utilizes the concepts discussed herein. In the embodiment shown, one or more controllable devices, 101-1 to 101-N, are capable of being paired with one or more remote devices, 107-1 to 107-N, via connectivity layer 105, such that a remote device may be used to control specific operations and functions of the controllable device during a paired session.”), Fig. 1A. Indeed, otherwise, **remote device 107-1** would have to simply guess which of the connected devices the user wants to control. As **Aginsky** discloses, one well-known way to identify a controllable device is by brand and model. **Aginsky**, 1:26-31 (“One known method of programming a remote device requires a user to select a button having a defined function and then select from a menu or list of codes related to the brand of electronic device to be controlled. Once the selection is made, the button will control a corresponding function of the

electronic device.”). It therefore would have been obvious to a person of ordinary skill in the art 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**.

175. As **Aginsky** explains, each **controllable device 101-1** may contain multiple **data structures** (*i.e.*, “a library” of data structures) specialized for “a specific brand, model, or category of **remote devices 107-1 to 107-N**.” *Aginsky*, 5:22-42; *see also* [1.a.1]. Given the existence of voice controls on the remote device, the most straightforward form of selection would be done via voice control.

176. Alternatively, **Aginsky** discloses that multiple **data structures** for different **controllable devices 101-1** (*i.e.*, “a library” of data structures) may be transmitted, “programmed” to **remote device 107-1**, and stored in memory 109-1. *Aginsky*, 7:58-63 (“FIG. 1B shows an embodiment 10b of a portion of memory/storage 109-1 of remote device 107-1 that has been “programmed” with data structures of two controllable devices: controllable device 101-1 (memory portion 115 having table 115') and controllable device 101-2 (memory portion 116 having table 116').”). Where **remote device 107-1** is “programmed” with a library of the applicable **data structures**, it would have been obvious to a person of ordinary skill in the art to use

a brand identification to identify the appropriate data structure entry within memory 109-1 that is able to execute the desired command upon the desired device.

8. **Claim 9: The method as recited in claim 8, wherein the controlling device comprises a memory having stored therein the library of codeset records.**

177. **Aginsky** as modified by **Stammler** teaches wherein the controlling device comprises a memory having stored therein the library of codeset records.

178. As I explained above with respect to [8], **Aginsky** teaches **remote device 107-1's** memory stores multiple **data structures**.

9. **Claim 10: The method as recited in claim 8, wherein the library of codeset records is stored remotely from the controlling device and the codeset is provisioned to the controlling device from the library of codeset records by being downloaded thereto.**

179. **Aginsky** as modified by **Stammler** teaches the library of codeset records is stored remotely from the controlling device and the codeset is provisioned to the controlling device from the library of codeset records by being downloaded thereto.

180. As I explained above with respect to [8], **Aginsky** discloses that **controllable device 101-1** provisions data structures to **remote device 107-1** on an as-needed basis. And as I explained above with respect to [5], **Aginsky** discloses downloading the data structure to **remote device 107-1**.

10. Claim 12

- a) **[12.pre]: A system for configuring a controlling device to command functional operations of a target appliance, the system comprising:**

181. To the extent the preamble is limiting, **Aginsky** discloses a system for configuring a controlling device (*e.g.* “a remote device”) to command functional operations of a target appliance (*e.g.*, “systems and methods in which a controllable device transfers to the remote device...a data structure identifying various functions that can be controlled by a remote device”).

182. See my discussion above regarding [1.pre].

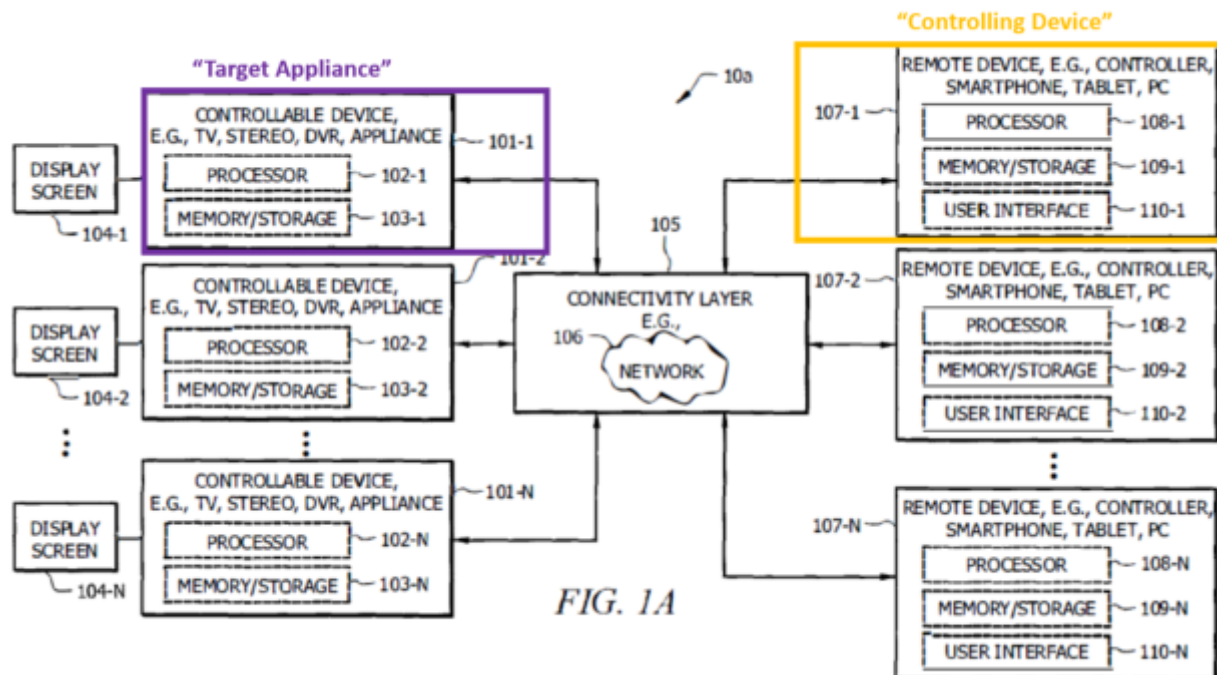
- b) **[12.a.1]: a processing device having associated instructions stored on a non-transient readable media which instructions, when executed by the processing device, cause a codeset record to be provisioned to the controlling device for use in commanding functional operations of the target appliance**

183. **Aginsky** discloses a processing device having associated instructions stored on a non-transient readable media which instructions, when executed by the processing device (*e.g.* “any one or combination of various types of processor-controlled programmable electronic devices”).

184. As explained above in relation to [1.a] through [1.c], **Aginsky** discloses that **controllable device 101-1** provisions a codeset record to **remote device 107-1**, and that such instructions are used to command the operation of **controllable device 101-1**. **Controllable device 101-1** “may be any one or combination of various types

of processor-controlled programmable electronic devices.” Aginsky, 4:12-38 (“Controllable devices 101-1 to 101-N may be any one or combination of various types of processor-controlled programmable electronic devices, including, for example, set-top boxes, cable boxes, televisions, digital video recorders, cameras, printers, small and large appliances, and vehicles. Each controllable device 101-1 to 101-N has a processor 102-1 to 102-N, respectively, memory/storage 103-1 to 103-N, respectively, and optionally, a display screen (or other user interface) 104-1 to 104-N, respectively. Processors 102-1 to 102-N may include circuitry and/or other components (e.g., wireless transmitter, wireless receiver, multiplexors, demultiplexors, etc.) as is well-known in the art for executing various logical operations (i.e., based on computer logic, code, software, applications, firmware, etc.) of controllable devices 101-1 to 101-N (e.g., delivering a data structure of a controllable device to a remote device, sending feedback to a remote device, accepting and parsing command signals from a remote device, manipulating a display in accordance with received command signals, executing authorization/hand-shake routines, managing and allocating system resources, selecting data transmission channels, connecting to a data transmission network, and more as discussed further below). Memory/storage 103-1 to 103-N may include a variety of types of tangible mediums for storing such logic, code, software, applications, and/or firmware, including, for example, hard drive media, optical

media, RAM, EPROM, EEPROM, cartridge media, flash memory, ROM, and/or memory stick.”). **Controllable device 101-1** further includes processor 102-1 and memory/storage 103-1. Aginsky, 4:12-38. Processors execute various logical operations of **controllable devices** and are well-known to operate on an instruction set. Aginsky, 4:12-38.



Aginsky, Fig. 1A.

- c) [12.a.2]: wherein the provisioned codeset record comprises protocol and formatting information

185. Aginsky discloses the provisioned codeset record comprising protocol and formatting information (e.g. “SIGNAL columns 112-1 and 112-2” “denote the type of signal”).

186. See my discussion above regarding [1.a.2].

d) [12.a.3]: and a plurality of individual command function entries

187. **Aginsky** discloses a plurality of individual command function entries (*e.g.* “a plurality of exemplary functions or commands” and corresponding signals, statuses, and configurations).

188. See my discussion above regarding [1.a.3].

e) [12.a.4]: wherein each of the plurality of individual function entries within the codeset record comprises command data,

189. **Aginsky** discloses wherein each of the plurality of individual function entries within the codeset record comprises command data (*e.g.*, native command data underlying “SIGNAL 112-1”).

190. See my discussion above regarding [1.a.4].

f) [12.a.5]: a standard function identifier,

191. **Aginsky** discloses wherein each of the plurality of individual function entries within the codeset record comprises...a standard function identifier” (*e.g.* “each function could further include a code or other identification marker related to the operation of that function control.”).

192. See my discussion above regarding [1.a.5].

- g) **[12.a.6]: data which comprises a phonetic representation of a function name corresponding to the standard function identifier,**

193. **Aginsky** as modified by **Stammler** teaches 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 the standard function identifier.

194. See my discussion above regarding [1.a.6].

- h) **[12.a.7]: 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;**

195. **Aginsky** as modified by **Stammler** teaches wherein each of the plurality of individual function entries within the codeset record comprises...a plurality of data each of which comprises a phonetic representation of a unique one of a plurality of synonyms of the function name.

196. See my discussion above regarding [1.a.7].

- i) **[12.b.1]: 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**

197. **Aginsky** teaches causing less than all of the individual command function entries from within the provisioned codeset record (*e.g.* “the data structure...may include only a subset of all possible functions” or be “restricted by a protocol”) to each be matched (*e.g.* “a plurality of exemplary functions or commands associated

with a plurality of exemplary command signals”) to one or more of a plurality of user input elements of the controlling device (*e.g.* “buttons, bars, and arrows, whether hard or programmable, that are physically pushed or touched by the user,” “voice commands,” or “[a]ny type of input from the user”).

198. See my discussion above regarding [1.b.1].

- j) **[12.b.2]: 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,**

199. Aginsky discloses whereupon a subsequent activation of a one of the plurality of user input elements (*e.g.* “pressing a...button”) will cause the controlling device to transmit a command communication by using the protocol and formatting information and the command data (*e.g.* “command will be converted to a command signal” and “sent to the TV”) 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 (*e.g.* “data structures” containing “a plurality of exemplary functions or commands associated with a plurality of exemplary command signals”).

200. See my discussion above regarding [1.b.2].

- k) **[12.c]: 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.**

201. Aginsky as modified by **Stammler** teaches 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.

202. See my discussion above regarding [1.c].

11. **Claim 13: The system as recited in claim 12, wherein the instructions are downloaded to the controlling device in a downloadable app.**

203. Aginsky as modified by **Stammler** discloses wherein the instructions are downloaded to the controlling device in a downloadable app (e.g. “the user of the remote device...will download from a third party (typically an ‘app store’) a control application that is designed to control controllable devices”).

204. Aginsky discloses transferring the **data structure** to “a remote control application (“app”).” *Aginsky, Abstract* (“The present disclosure is directed to

systems and methods in which a controllable device transfers to the 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 a remote device, together with the identity of the signal type that will achieve the desired operation.”), 2:31-36, 7:36-57.

205. “In some situations, the user of the remote device...will download from a third party (typically an ‘app store’) a control application that is designed to control controllable devices. The downloaded control application, typically in code format, is stored in a memory...on **remote device 107-1** and runs on a processor...also contained on remote device. Downloading control applications from an app store is now well-known in the art...” Aginsky, 7:36-57.

206. Such applications or “apps” were well-known by this time. And even ’083 admits that “[i]t is known to offer an app for download and installation into memory 312 which app may serve to allow use of the smart phone to transmit commands suitable for operation of entertainment and other appliances.” ’083, 5:42-45.

12. Claim 14: The system as recited in claim 13, wherein the controlling device comprises one of a smart phone or a tablet computing device.

207. **Aginsky** as modified by **Stammler** discloses wherein the controlling device comprises one of a smart phone or a tablet computing device (*e.g.* “remote devices”

may be “a smart clicker, smartphone, tablet computer, personal computer, or any other programmable processor-based device”).

208. Remote device 107-1 “may be, for example, a...smartphone [or] tablet computer.” Aginsky, 5:46-49 (“FIG. 1A also illustrates remote devices 107-1 to 107-N. These may be, for example, a smart clicker, smartphone, tablet computer, personal computer, or any other programmable processor-based device.”).

13. Claim 15: The system as recited in claim 12, wherein the controlling device comprises a memory having stored therein a library of codeset records including the provisioned codeset record.

209. Aginsky as modified by **Stammler** teaches the controlling device comprises a memory having stored therein a library of codeset records including the provisioned codeset record.

210. See my discussion above regarding [9].

14. Claim 16: The system as recited in claim 12, wherein a library of codeset records is stored remotely from the controlling device and the codeset is provisioned to the controlling device from the library of codeset records by being downloaded thereto.

211. Aginsky as modified by **Stammler** teaches a library of codeset records is stored remotely from the controlling device and the codeset is provisioned to the controlling device from the library of codeset records by being downloaded thereto.

212. See my discussion above regarding [5] and [10].

15. **Claim 17: The system as recited in claim 12, wherein the processing device comprises one or more computing devices located remotely from the controlling device.**

213. **Aginsky** as modified by **Stammler** teaches the processing device comprises one or more computing devices located remotely from the controlling device.

214. As I explained above with respect to [4], it would have been obvious to execute a speech recognition engine on a computing device remotely located from **remote devices 107-1**.

16. **Claim 18: The system as recited in claim 12, wherein the instructions use voice data received by the speech recognition engine to map each of the less than all of the command function entries from within the provisioned codeset record to the one or more of the plurality of user input elements of the controlling device.**

215. **Aginsky** as modified by **Stammler** teaches the instructions use voice data received by the speech recognition engine to map each of the less than all of the command function entries from within the provisioned codeset record to the one or more of the plurality of user input elements of the controlling device.

216. See my discussion above regarding [1.c] and [6].

E. Claim Charts

217. I have reviewed, had input to, and endorse, the claim charts of the accompanying Petition showing that each element of claims 1-6, 8-10, and 12-18 are rendered obvious by **Aginsky** in view of **Stammler**.

VIII. GROUND 2: CLAIMS 7, 11, AND 19 ARE RENDERED OBVIOUS BY AGINSKY IN VIEW OF STAMMLER IN FURTHER VIEW OF DRESTI

218. It is my opinion that Claims 7, 11, and 19 are rendered obvious by Aginsky in view of Stammler in further view of Dresti.

A. Overview of Dresti and Motivation to Apply Its Teachings to Aginsky as Modified by Stammler

219. **Dresti** discloses a universal remote control application resident on a hand-held electronic device. **Dresti**, ¶[0002] (“This invention 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.”).

Dresti discloses providing a remote control with a large dataset that includes regional-specific settings—including language particular to various regions, such as at least continent or country. **Dresti**, ¶[0321] (“The remote control application may be shipped with a world-wide IR code database and may be used in many international locations. The remote control application may thus support localization, for both language as well as key layout variations to support regional settings. With reference to FIGS. 23a through 23d, the room setup wizard input requirement at step 2 may be expanded from that shown in FIG. 16c to include a drop-down list 230 from which various regions may be selected. Based on this input, the behavior of the remote control application may be adjusted to more closely match the region in which it is being used. For example, the order in which IR device codes

are presented to the user for testing in the drop-down menu 1430 (FIG. 14.f) during device setup may be varied from region to region in order to place the most likely (i.e., most popular in that country or region) codes at the top of the list. Furthermore, even within the same IR code set, functionality and key assignments may also vary by region and may be automatically adjusted based upon the region selected.”). A user may select a desired region, and the settings of the remote may be adjusted to best suit that region. Dresti, ¶[0321].

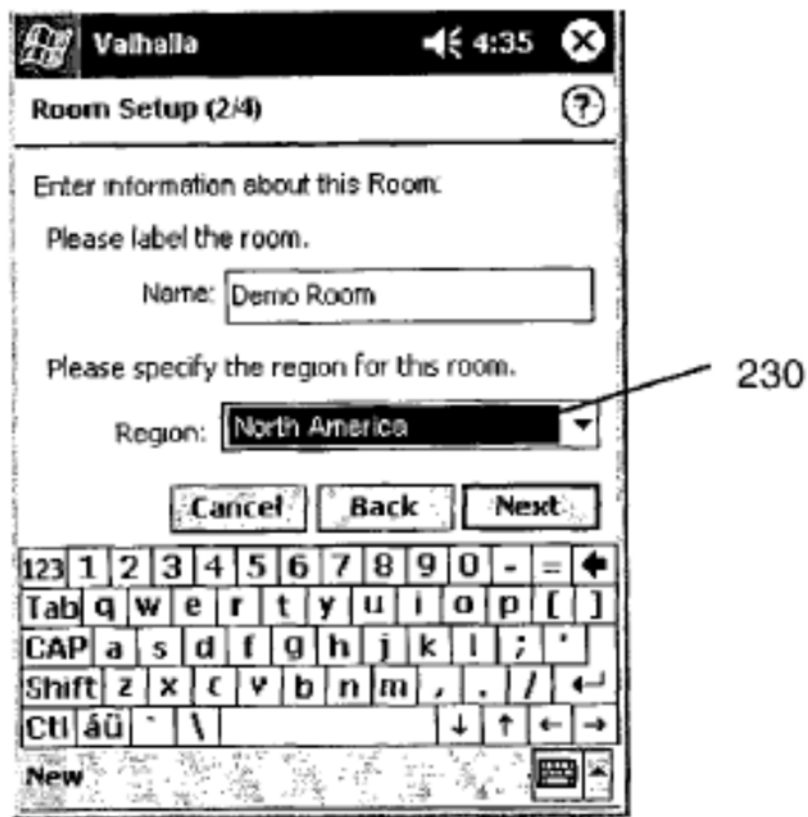


FIGURE 23a

Dresti, Fig. 23a.

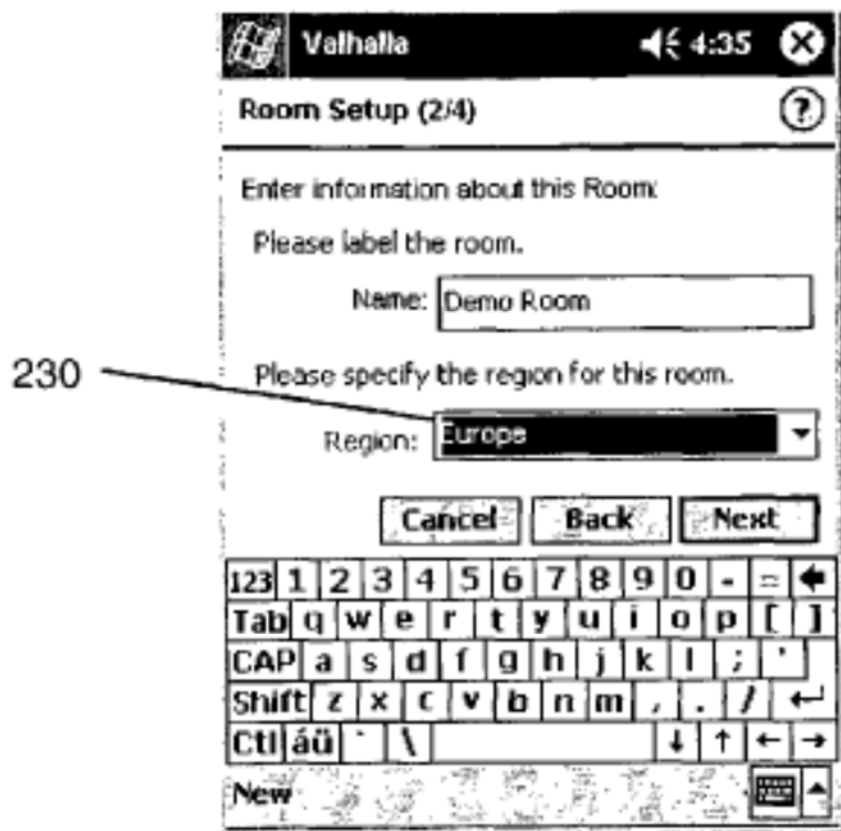


FIGURE 23b

Dresti, Fig. 23b.

220. Dresti also discloses that it was difficult to program remote controls across different international markets, where local usage differed—in particular, different languages and dialects. See Dresti, ¶¶[0002] (“This invention 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.”), [0003] (“Universal remote controls for controlling the operation of multiple, diverse home appliances are well known. In this regard, universal remote controls perform

a valuable function by consolidating three, four, five, and more remote controls into one device. However, as more remotely controllable appliances enter the homes of consumers and the number of remotely controllable operations increase, the user interface of the universal remote control becomes increasingly more complex. This complexity arises from the need to provide more and more keys which are used to initiate the transmission of the control codes that control the increasing number of operations of the increasing number of home appliances. Disadvantageously, as the user interface of the universal remote control becomes more cluttered, the usability of the universal remote control diminishes. Accordingly, a need exists for a universal remote control having an improved user interface that simplifies the operation of the universal remote control and, as such, the remote operation of consumer appliances.”), [0322] (“By way of further illustration, control page 4 of the same television brand is shown in FIG. 23c as it appears with the region set to “North America,” and in FIG. 23d as it appears with the region set to “Europe.” By way of background explanation, in Europe some television broadcasts include a feature known as “Teletext” in which textual information such as news briefs, weather forecasts, etc. is encoded in the vertical blanking interval of the television signal. Many European market television sets thus may include the capability to decode and display this information under user control. Accordingly, with the region set to “Europe” the remote control application displays soft keys for the functions required

to cause control 232 and navigate 234 signals to be transmitted to influence the Teletext data display. Further, as can be seen by comparing keys 232 in FIG. 23c versus 23d, manufacturers may offer different features in different markets which are invoked by similar control functions-in this instance “Picture in Picture” for the North American market versus Teletext for the European market.”). Implementing **Dresti**’s teachings would advantageously further **Aginsky**’s goals of providing (1) programming methods for remotes that are more flexible and customizable to meet users’ needs, (2) customizable remote controls that allow “distributors, resellers, and manufacturers” to distribute remote controls across different environments, and (3) smaller data structures that would only need phonetic data for languages dominant in the geographic region, and **Stammler**’s goals of increasing user convenience by providing reliable control of devices “at the lowest possible expenditure.” Aginsky, 1:15-2:15, 3:58-61, 2:41-56; Stammler, 2:18-25. For example, **Stammler**’s disclosure that “a plurality of functions for each language can be operated,” Stammler, 6:33-35, would enhance **Aginsky**’s disclosure of using a Sony TV, Aginsky, 1:25-42, simplifying operation of the Sony TV in all locations where sold, such as in North America and Japan. And because such remotes could be sold in various regions across the globe, Sony would not need to incur the expense to customize particular products for particular regions.

221. A person of ordinary skill in the art also would have had a reasonable expectation of success in applying **Dresti**'s teachings in implementing **Aginsky**'s systems and methods as modified by **Stammler**. **Aginsky** suggests the use of voice commands to command functions of its universal remote control system and **Stammler** teaches that multiple languages could be used to carry out voice commands, but leaves it to a person of ordinary skill in the art to simply determine which language would apply. Using location data as taught by **Dresti** was a known way of selecting the correct language by using the dominant language of the selected location. Implementing **Dresti**'s teaching of selecting a codeset based upon location data would enable the predictable result of allowing **Aginsky**'s systems and methods as modified by **Stammler**'s teachings to better select an appropriate language.

222. **Dresti** is in the same field of endeavor as '083—remote control of various devices—and is therefore analogous art to '083.

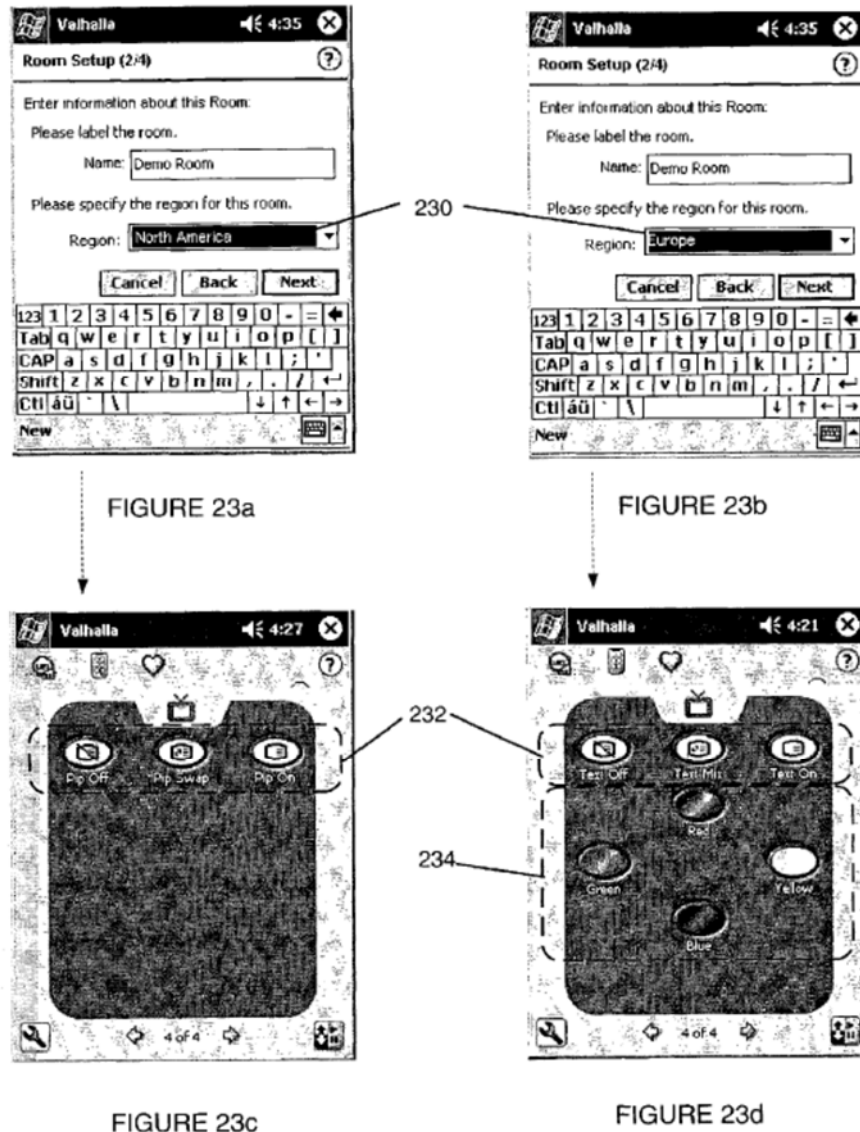
B. Claims

1. **Claim 7: The method as recited in claim 1, comprising using at least location data to identify the codeset record that is caused to be provisioned to the controlling device.**

223. **Aginsky** and **Stammler** as modified by **Dresti** discloses using at least location data to identify the codeset record that is caused to be provisioned to the controlling device.

224. Stammer discloses that “a plurality of functions for each language can be operated.” Stammer, 6:33-35 (“[O]wing to the vocabulary of, for example, up to several hundred words, a plurality of functions for each language can be operated....”). While neither **Aginsky** nor **Stammer** explicitly disclose using location data to identify the codeset record, a person of ordinary skill in the art would have been motivated to apply **Dresti’s** teachings to **Aginsky** and **Stammer**.

225. Dresti discloses a universal remote control application resident on a hand-held electronic device. Dresti, ¶[0002]. **Dresti** further teaches a universal remote provisioned with particular code sets after a user selects an appropriate region (*i.e.*, indicates the “location data”). Dresti, ¶[0321].



Dresti, Figs. 23a-23d.

226. **Dresti** teaches the general proposition that it was advantageous and well-known for location data to be used when selecting universal remote control codesets. It would have been obvious to a person of ordinary skill in the art to implement **Aginsky**'s methods and systems as modified by **Stammler** to thus include location data—either as a threshold selection on its own graphical user interface, or

implemented as a component of the brand selection process. Aginsky, 1:15-2:15; Stammler, 2:18-25; *see also supra* §VIII.A.

2. **Claim 11: The method as recited in claim 8, wherein location data is additionally utilized in the process of identifying the codeset record that is caused to be provisioned to the controlling device.**

227. **Aginsky** and **Stammler** as modified by **Dresti** discloses location data is additionally utilized in the process of identifying the codeset record that is caused to be provisioned to the controlling device.

228. See my discussion above regarding [7] and [8].

3. **Claim 19: The system as recited in claim 12, wherein the instructions additionally use at least location data to identify codeset that is provisioned to the controlling device.**

229. **Aginsky** and **Stammler** as modified by **Dresti** discloses the instructions additionally use at least location data to identify codeset that is provisioned to the controlling device.

230. See my discussion above regarding [7] and [11].

C. Claim Chart

231. I have reviewed, had input to, and endorse, the claim charts of the accompanying Petition showing that each element of claims 7, 11, and 19 are rendered obvious by Aginsky in view of Stammler and further in view of Dresti.

IX. GROUND 3: CLAIMS 1-6, 8-10, AND 12-18 ARE RENDERED OBVIOUS BY AGINSKY IN VIEW OF HANSON

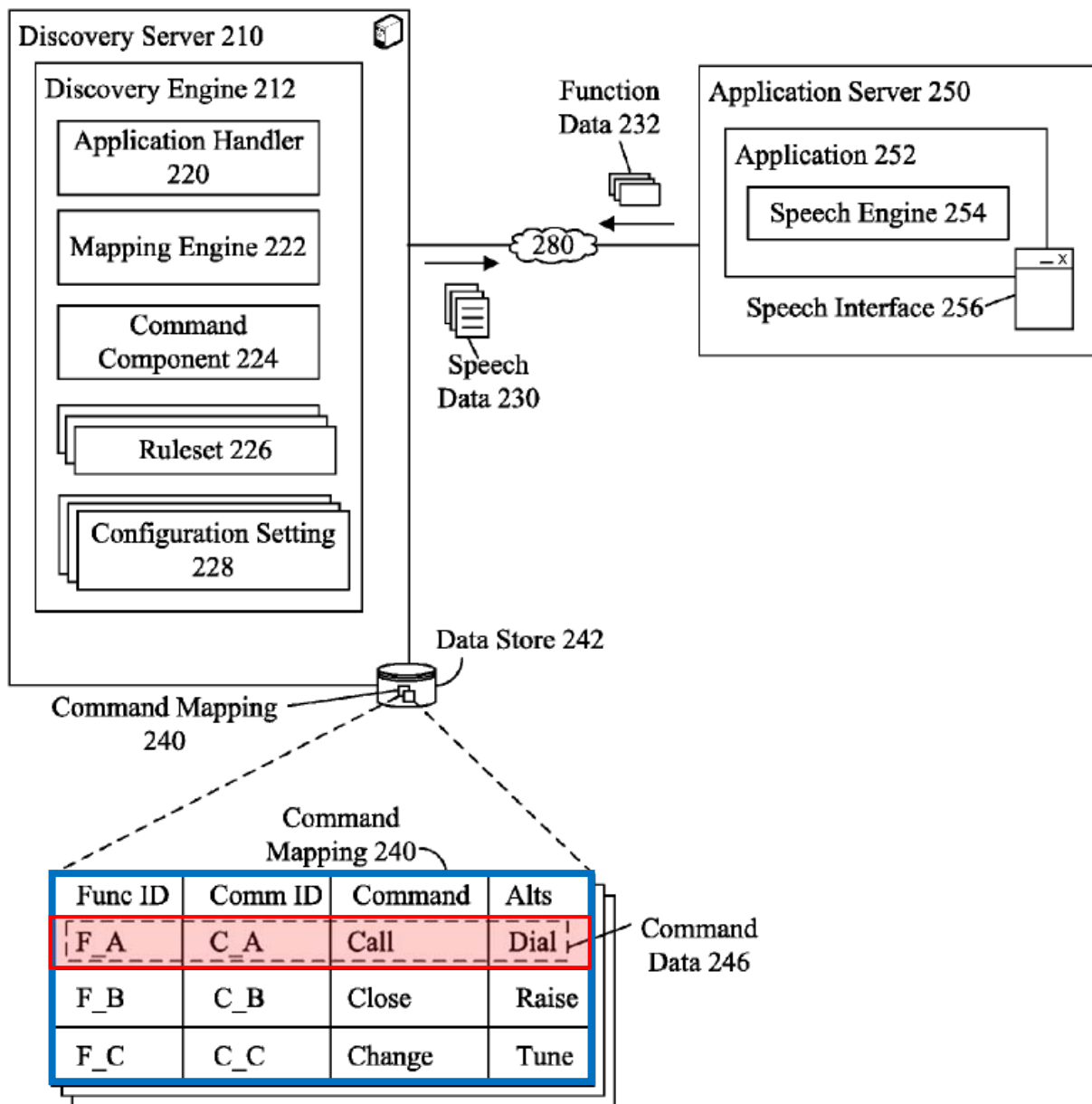
232. It is my opinion that Claims 1-6, 8-10, and 12-18 are rendered obvious by Aginsky in view of Hanson.

A. Overview of Hanson and Motivation to Apply Its Teachings to Aginsky

233. **Hanson** discloses “automated speech command discovery” within a speech-enabled computing system—*i.e.*, a voice-control system. When a user of **Hanson**’s system utters a command such as “Lock doors” (see Hanson, ¶[0017]), a microphone receives the command and transmits it as voice data to a speech engine for processing. Hanson, ¶[0017] (“FIG. 1 is a flowchart illustrating a method 100 for permitting automated speech command discovery via manual event to command mapping in accordance with an embodiment of the inventive arrangements disclosed herein. In method 100, a manual event can be linked to a speech command to permit rapid and automated speech command discovery associated with a speech-enabled computing system. As used herein, a manual event can be a system operation which can be performed without the use of a speech command. Speech command can be a spoken entity permitting the execution of a system operation. Speech command can include, but is not limited to, a word, a phrase, and the like. For example, a user can speak a command to lock a door by uttering “Lock doors”. It should be appreciated that the speech command is presented proximate to a human agent interacting with

the computing system and vice-versa.”), [0019] (“Speech interface can include...a microphone”), [0040] (“Speech engine 254 can be a hardware/software speech processing component within application 252. Speech engine 254 can include one or more speech processing algorithms including, but not limited to, phonetic algorithms, keyword spotting algorithms, large-vocabulary, continuous speech recognition algorithms, and the like. Speech engine 254 functionality can include, but is not limited to, speech recognition, text-to-speech, speech-to-text, speech synthesis, speech enhancement, and the like.”). While **Hanson** may teach discovery of voice commands upon manual action of a control by a user, **Hanson** of course discloses a system that utilizes and recognizes voice commands—indeed, a person of ordinary skill in the art would have recognized that the entire point of Hanson’s “command discovery” is to teach the user appropriate voice command inputs. Moreover, **Hanson** discloses a speech engine that applies algorithms, such as phonetic algorithms, to recognize speech commands, and “automatically trigger the execution of [a] function.” Hanson, ¶¶[0021] (“In step 110, an event can be mapped to a function within the computing system. Function can be mapped to the event using a command mapping. Command mapping can link a system function to a speech command which can automatically trigger the execution of the function. Command mapping can include, but is not limited to, a system component identifier, a function identifier, command identifier, a command, an alternative command, and

the like. Command mapping can be manually and/or automatically generated. In one instance, command mapping can be generated during runtime. In the instance, user customizable phrases can be present within the command mapping. That is, the disclosure can adapt to user customizations.”), [0040]. A person of ordinary skill in the art would have understood that the speech engine processes speech commands by utilizing **command mapping 240** and **command data 246**. Hanson, ¶¶[0021] (“Command mapping can link a system function to a speech command which can automatically trigger the execution of the function.”), [0033] (disclosing that command mapping 240 is transmitted to application 252), [0040].



Hanson, Fig. 2.

234. Importantly, **command mapping 240** is a “data set” that includes an “arbitrary quantity of **commands**, **synonyms**, and/or **alternative commands for a function**.” Hanson, ¶[0037] (“Command mapping 240 can be a data set permitting

associating of a manual event with a speech command within an application 252. It should be appreciated that mapping 240 is not limited to exemplary data set presented herein. In one embodiment, mapping 240 can be dynamically altered during runtime. Mapping 240 can support arbitrary quantity of commands, synonyms, and/or alternative commands for a function. In one embodiment, mapping 240 can be dynamically generated from an existing speech recognition software development kit (SDK). It should be understood that mapping 240 can exist for each application and/or function set.”); *see also* Hanson, ¶[0023] (“The alternative command data can be identified utilizing command mapping and/or an alternative command resource (e.g., synonym list).”). As shown in Figure 2 above, **command mapping 240** includes rows of **command data 246**, in which “a function associated with identifier F_A can be linked to a ‘Call’ command and an alternative command ‘Dial’.” Hanson, ¶[0033] (“Command component 224 can be a hardware/software component for identifying and/or conveying a relevant speech command responsive to a manual event occurring within the system 200. Component 224 can utilize command mapping 240 to transmit an appropriate speech command to application 252. A function identifier obtained from an application request (e.g., function data 232) can be mapped to a command data. For example, in command data 246, a function associated with identifier F A can be linked to a “Call” command and an alternative command “Dial.”). As **Hanson** discloses that speech commands

may be processed by phonetic algorithms and that command mapping 240 “is not limited to exemplary data set” described (Hanson, ¶[0037]), it would have been obvious to a person of ordinary skill in the art to include in **command mapping 240** a **phonetic representation** each speech command, such as a phoneme. *E.g.*, Stammer, 8:53-57 (“The word recognition for a speech recognition system with a larger vocabulary usefully is not based on whole words, but on phonetic word subunits. Such a word subunit is, for example, a phoneme, a diphone (double phoneme) or a phoneme transition.”); *see supra*, ¶¶39-50, 71-73.

235. As discussed above, **Aginsky** broadly discloses systems and methods of controlling multiple devices with a universal remote control, but leaves it to a person of ordinary skill in the art to implement a data structure that allows a person of ordinary skill in the art to use known speech recognition techniques. *See supra*, §VII.A. In the same field of endeavor, **Hanson** discloses a voice control system that uses a variety of information to identify and map voice commands to particular functions and “automatically trigger the execution of [a] function” upon reception of a voice command. Hanson, ¶¶[0017], [0021], [0033], [0037], [0040]. **Hanson** explains that voice control system users often use synonymous terms to try to execute a command. Hanson, ¶[0002] (“Applications which utilize a speech interface operate via speech recognition to identify a speech (e.g., spoken) command. Spoken commands must utilize one or more correct phrases in order to

actuate a function provided by the application. For example, to close an vehicle window within a speech enabled automobile, phrases such as “Raise the window” or “Roll-up the window” can be equivalent, resulting in the closing of the window.”).

A person of ordinary skill in the art would have been motivated and found it obvious to modify **Aginsky**’s methods and system to provide **Hanson**’s synonymous command teachings in a dataset. **Aginsky** broadly teaches voice control, but leaves it to a person of ordinary skill in the art on how to implement such control and to include the requisite information within its dataset. **Hanson** teaches that it would be desirable to include in a dataset a variety of command data, including command synonyms, and that voice commands may be process by a speech engine implementing phonetic algorithms. A person of ordinary skill in the art would have been motivated to apply **Hanson**’s teachings in implementing **Aginsky**’s device because doing so would predictably result in improved voice control systems and methods that may execute a command in response to a variety of synonymous commands. Moreover, applying **Hanson**’s teachings of phonetic algorithms to process voice commands (and therefore phonetic representation algorithm inputs) and synonyms in implementing **Aginsky**’s methods and systems would be the mere application of a known technique (implementing a data set with phonetic representations and synonyms) to **Aginsky**’s disclosed data set.

236. **Aginsky** explains a data structure with voice command function in mind, and modifying that structure with the teachings of **Hanson** would have been well within the ability of a person of ordinary skill in the art given **Hanson**'s explanation of the clear benefits, and its applicability to **Aginsky**'s design—indeed, a person of ordinary skill in the art would have had a reasonable expectation of success in so applying **Hanson**'s teachings to **Aginsky**'s data structure. Applying the teachings of **Hanson** to **Aginsky** would yield the predictable result of enabling **Aginsky**'s universal remote to control the function of a variety of devices manufactured by various brands through the use of numerous different voice commands.

B. Claims

1. Claim 1

- a) **[1.pre] A method for configuring a controlling device to command functional operations of a target appliance, the method comprising:**

237. To the extent the preamble is limiting, **Aginsky** discloses a method for configuring a controlling device (*e.g.* “a remote device”) to command functional operations of a target appliance (*e.g.*, “methods in which a controllable device transfers to the remote device...a data structure identifying various functions that can be controlled by a remote device”).

238. See my discussion above regarding [1.pre]. *See supra*, ¶¶118-119.

b) [1.a.1] causing a codeset record to be provisioned to the controlling device for use in commanding functional operations of the target appliance,

239. **Aginsky** discloses causing a codeset record (*e.g.* “a data structure”) to be provisioned to the controlling device for use in commanding functional operations of the target appliance (*e.g.* “data structures that are available for communication to one or more remote devices” “such that a remote device may be used to control specific operations and functions of the controllable device”).

240. See my discussion above regarding [1.a.1]. *See supra*, ¶¶120-122.

c) [1.a.2] the provisioned codeset record comprising protocol and formatting information

241. **Aginsky** discloses the provisioned codeset record comprising protocol and formatting information (*e.g.* “SIGNAL columns 112-1 and 112-2” “denote the type of signal”).

242. See my discussion above regarding [1.a.2]. *See supra*, ¶¶123-124.

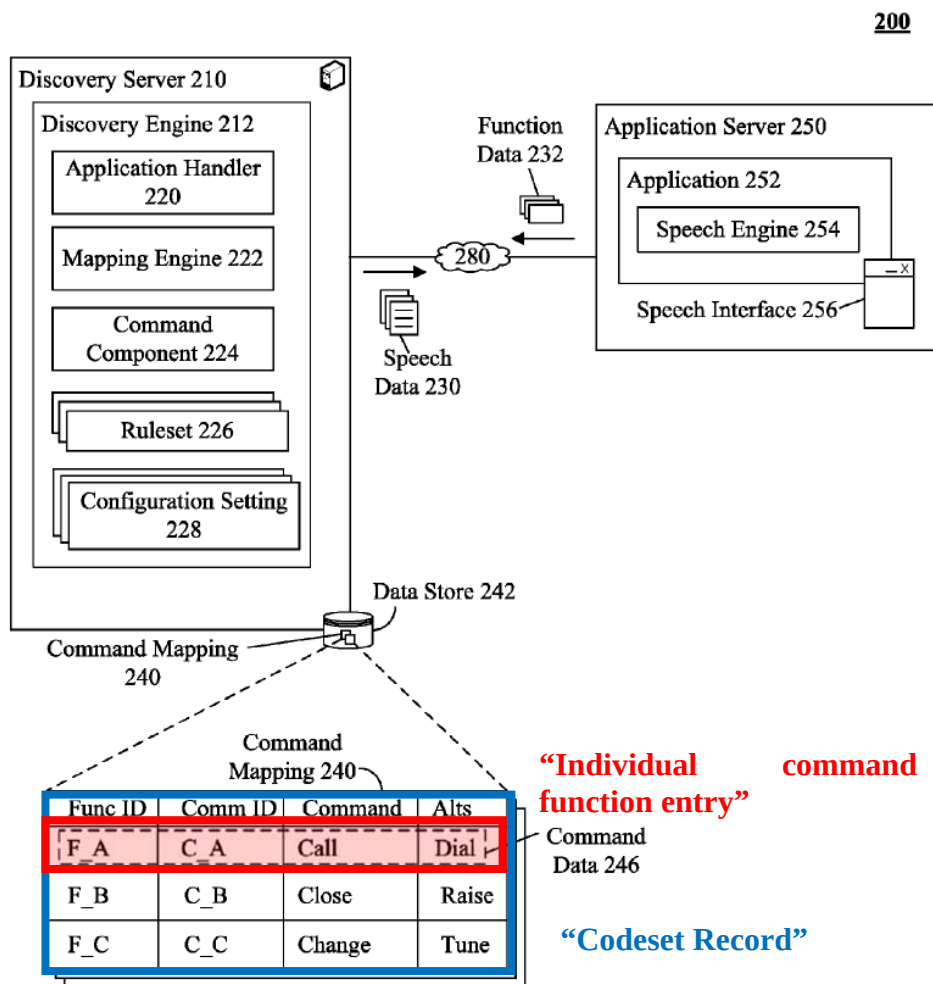
d) [1.a.3] and a plurality of individual command function entries

243. **Aginsky** discloses a plurality of individual command function entries (*e.g.* “a plurality of exemplary functions or commands” and corresponding signals, statuses, and configurations).

244. See my discussion above regarding [1.a.3]. *See supra*, ¶¶125-127.

245. To the extent argued that **Aginsky** does not disclose a plurality of individual command function entries as part of a codeset record, **Hanson** discloses “**Command**

Mapping 240,” where each row (“**command data 246**”) of that mapping represents an individual command function entry.



Hanson, Fig. 2.

246. A person of ordinary skill in the art would have recognized that **command mapping 240** teaches a codeset record, as it “contain[s] command code data, function labels, etc.” Compare ’083, 9:55-67 (“With reference to FIG. 7a, the structure of an exemplary appliance command code database for use in conjunction with the methods of FIGS. 5 and 6 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 command code data, function labels, etc., which are applicable to that specific brand and model of appliance. It will be appreciated that since multiple models of a manufacturer's appliance may share the same OEM remote control design and/or command code set, there may not be a one-to-one correspondence between model number records 704 and codeset records 706.”), Fig. 7b with Hanson, ¶[0037] (“Command mapping 240 can be a data set permitting associating of a manual event with a speech command within an application 252. It should be appreciated that mapping 240 is not limited to exemplary data set presented herein. In one embodiment, mapping 240 can be dynamically altered during runtime. Mapping 240 can support arbitrary quantity of commands, synonyms, and/or alternative commands for a function. In one embodiment, mapping 240 can be dynamically generated from an existing speech recognition software development kit (SDK). It should be understood that mapping 240 can exist for each application and/or function set.”), Fig. 2. Further, a person of ordinary skill in the art would have recognized **command data 246** more broadly teaches individual command function entries as disclosed by '083. Hanson, Fig. 2. In fact, '083's command data is a part of an individual command function entry. '083, 10:47-67 (“With reference to FIG. 7b, each code set record 706 may comprise a unique codeset identity number, 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, including for example items such as carrier frequency, bit encoding, data frame size and structure, appliance address, parity or CRC requirements, etc. Following block 752 may be a series of individual command function entries 754. Each entry may comprise a standard function ID 756, which may be a normalized tag indicative of the function or operation invoked by this command (i.e. so that within a universal remote control system the same functionality may be mapped to a key regardless of any variations in appliance manufacturer-specific nomenclature, for example as may be seen in Table 2 above); a function name 758 corresponding to the name by which that function is commonly referenced by this appliance's manufacturer together with its phonetic representation 760; and command data 762 which, when transmitted using the protocol specifications of block 752, will command the appliance to perform the indicated action.”), Fig. 7b.

247. As I previously explained, it would have been obvious to implement **Hanson**’s teachings of using synonyms for commands to enable recognition of numerous phrases related to the same command in implementing **Aginsky**’s systems and methods. *See supra*, §IX.A.

- e) **[1.a.4] wherein each of the plurality of individual function entries within the codeset record comprises command data,**

248. **Aginsky** discloses wherein each of the plurality of individual function entries within the codeset record comprises command data (*e.g.*, native command data underlying “SIGNAL 112-1”).

249. See my discussion above regarding [1.a.4]. *See supra*, ¶¶128-130.

250. To the extent argued that **Aginsky** does not disclose command data, **Hanson** expressly discloses “command data” that “can be a speech command registered within the speech component.” Hanson, ¶¶[0004] (“The command data can be associated with a command identifier, a command, and an alternative command. The command data can be a speech command registered within the speech component.”), [0026] (“**Command data 246** can include a speech command associated with the manual event.”), [0033] (“A function identifier obtained from an application request (*e.g.*, function data 232) can be mapped to a command data. For example, in command data 246, a function associated with identifier F A can be linked to a “Call” command and an alternative command “Dial.”). A person of ordinary skill in the art would have understood that such command data would command a controllable appliance to perform the function related to that command data.

f) [1.a.5] a standard function identifier,

251. **Aginsky** discloses wherein each of the plurality of individual function entries within the codeset record comprises...a standard function identifier” (e.g. “each function could further include a code or other identification marker related to the operation of that function control.”).

252. See my discussion above regarding [1.a.5]. See *supra*, ¶¶131-132.

253. To the extent argued that **Aginsky** does not disclose a **standard function identifier**, **Hanson** expressly discloses a “function identifier,” denoted as “Func ID” in Command Mapping 240 of Fig. 2 that is indicative of a particular command. Hanson, *Abstract*, ¶¶[0004]-[0005], [0021], [0028], [0033], [0039], Fig. 2.

Command Mapping 240

Func ID	Comm ID	Command	Alts
F_A	C_A	Call	Dial
F_B	C_B	Close	Raise
F_C	C_C	Change	Tune

Command Data 246

Hanson, Fig. 2 (partial).

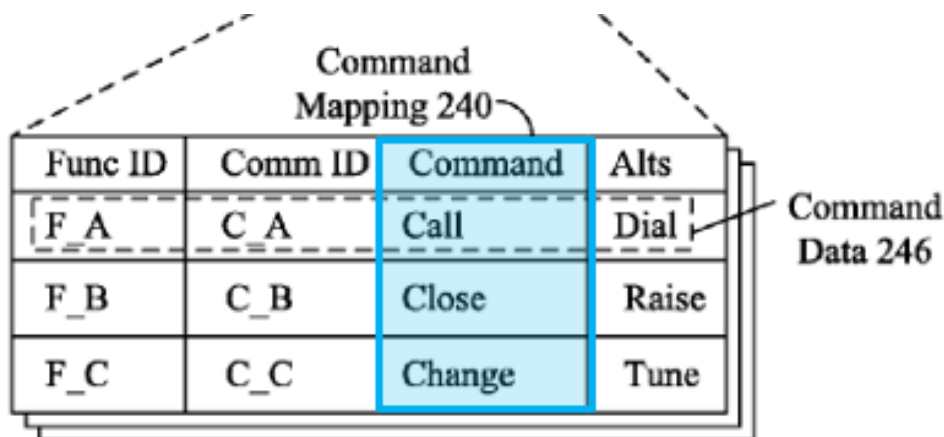
g) [1.a.6] data which comprises a phonetic representation of a function name corresponding the standard function identifier,

254. **Aginsky** as modified by **Hanson** teaches 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 the standard function identifier.

255. See my discussion above regarding [1.a.6]. *See supra*, ¶¶133-138.

256. To the extent argued that **Aginsky**'s voice commands do not disclose phonetic representations, **Hanson** discloses "speech data 230," "Command Mapping 240," and "speech engine 254" process speech through "**phonetic algorithms**." *E.g.*, Hanson, ¶¶[0026], [0040], Fig. 2. A person of ordinary skill in the art would have understood that "phonetic algorithms" index and recognize words according to **phonetic representations**, such as phonemes. Hanson, ¶[0040]. Such phonetic algorithms, and inputs thereto such as phonemes, were well-known in the art. *See supra*, ¶¶39-50, 71-73. A person of ordinary skill in the art would have been motivated to apply **Hanson**'s teachings in implementing **Aginsky**'s systems and methods to achieve the predictable result of using phonetic representations to process voice commands.



The diagram shows a table titled "Command Mapping 240" with four columns: "Func ID", "Comm ID", "Command", and "Alts". The "Command" column is highlighted in blue. To the right of the table is a stack of three identical tables, with the top one labeled "Command Data 246". A dashed line connects the "Command" column of the main table to the "Command" column of the stack.

Func ID	Comm ID	Command	Alts
F_A	C_A	Call	Dial
F_B	C_B	Close	Raise
F_C	C_C	Change	Tune

Hanson, Fig. 2 (partial).

- h) [1.a.7] 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;

257. **Aginsky** as modified by **Hanson** teaches wherein each of the plurality of individual function entries within the codeset record comprises...a plurality of data each of which comprises a phonetic representation of a unique one of a plurality of synonyms of the function name.

258. See my discussion above regarding [1.a.6]. See *supra*, ¶¶139-142.

259. While **Aginsky** does not explicitly disclose or teach the use of synonyms of a function name, **Hanson** discloses “[m]apping 240 can support arbitrary quantity of commands, **synonyms, and/or alternative commands** for a function.” Hanson, ¶[0037]. These synonyms are denoted by the “**Alts**” column of **Command Mapping 240**:

Command Mapping 240			
Func ID	Comm ID	Command	Alts
F_A	C_A	Call	Dial
F_B	C_B	Close	Raise
F_C	C_C	Change	Tune

Command Data 246

Hanson, Fig. 2 (partial). **Hanson** further explicitly discloses that “**Alts**” includes **synonyms** of the Command. Hanson, ¶[0023]. For example, as shown above in Figure 2, “a function associated with identifier F_A can be linked to a ‘Call’

command and an alternative command ‘Dial’.” Hanson, ¶¶0033]. **Hanson** discloses that implementing such synonyms reduces “troublesome...scenarios” in which the voice control system is unable to recognize a command. Hanson, ¶¶0002], ¶¶0003]. Thus, a person of ordinary skill in the art would have been motivated to apply these teachings of **Hanson** to implement a more user-friendly, voice-controlled **Aginsky** system.

- i) **[1.b.1] 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,**

260. **Aginsky** teaches causing less than all of the individual command function entries from within the provisioned codeset record (*e.g.* “the data structure...may include only a subset of all possible functions” or be “restricted by a protocol”) to each be matched (*e.g.* “a plurality of exemplary functions or commands associated with a plurality of exemplary command signals”) to one or more of a plurality of user input elements of the controlling device (*e.g.* “buttons, bars, and arrows, whether hard or programmable, that are physically pushed or touched by the user,” “voice commands,” or “[a]ny type of input from the user”).

261. See my discussion above regarding [1.b.1]. See *supra*, ¶¶143-146.

- j) **[1.b.2] 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

262. **Aginsky** discloses whereupon a subsequent activation of a one of the plurality of user input elements (*e.g.* “pressing a...button”) will cause the controlling device to transmit a command communication by using the protocol and formatting information and the command data (*e.g.* “command will be converted to a command signal” and “sent to the TV”) 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 (*e.g.* “data structures” containing “a plurality of exemplary functions or commands associated with a plurality of exemplary command signals”).

263. See my discussion above regarding [1.b.2]. See *supra*, ¶¶147-148.

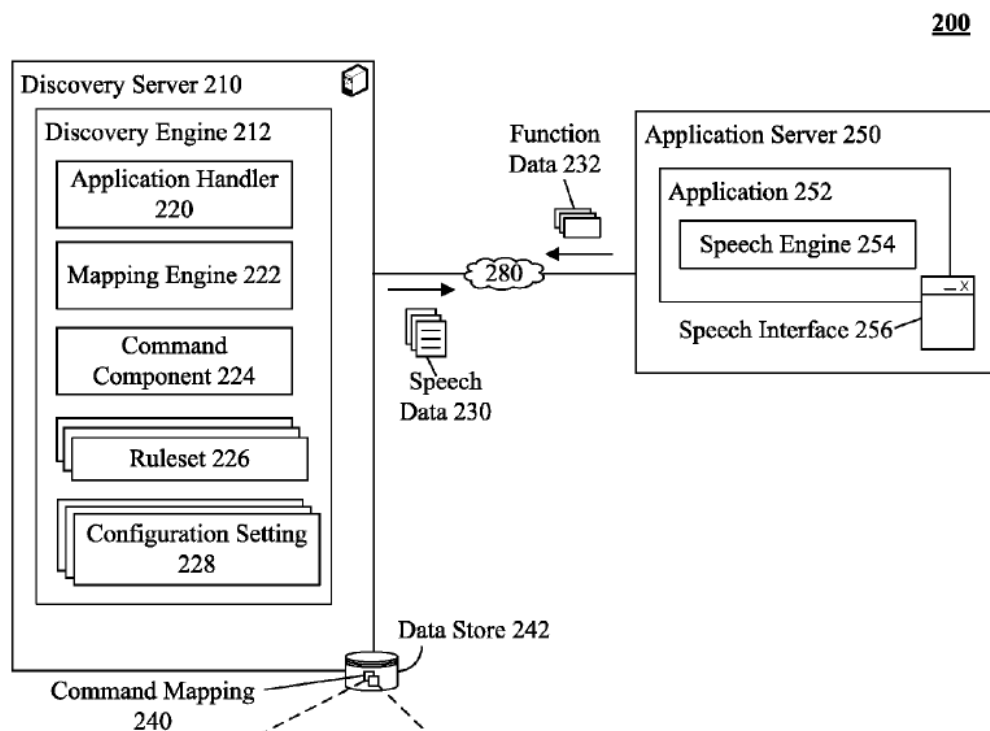
- k) **[1.c] causing the controlling device to transmit a command communication by using the protocol and formatting information and the command data of a one of the one or more of the plurality of individual command function entries from within the provisioned codeset record having a phonetic representation of the function name or a synonym of the function name which corresponds to voice data provided to a speech recognition engine.**

264. **Aginsky** as modified by **Hanson** teaches 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.

265. See my discussion above regarding [1.a.6], [1.a.7], and [1.c]. See *supra*, ¶¶149-151, 254-259.

266. To the extent argued **Aginsky** does not explicitly disclose “a speech recognition engine,” **Hanson** discloses voice data (*e.g.* “speech data 230”) provided to a speech recognition engine (*e.g.* “speech engine 254”).



Hanson, Fig. 2 (partial). **Hanson** discloses speech engine 254 includes speech processing algorithms—such as phonetic algorithms—to recognize a user’s voice

commands, such as “Lock doors.” Hanson, ¶¶[0017], [0021], [0040]. **Hanson** further discloses that “Speech data 230” can include “linguistic analysis information, wave form data, and the like,” which a person of ordinary skill in the art would have understood to include voice data. Hanson, ¶[0029] (“Speech data 230 can be one or more entities for identifying a speech command linked to an application function triggered by a manual event. Data 230 can include, but is not limited to, function information, speech synthesis information, and the like. Speech synthesis information can include, but is not limited to, linguistic analysis information, wave form data, and the like.”).

2. **Claim 2: The method as recited in claim 1, wherein the controlling device comprises a microphone for receiving voice input used in creating the voice data.**

267. **Aginsky** as modified by **Hanson** teaches wherein the controlling device comprises a microphone for receiving voice input used in creating the voice data.

268. See my discussion above regarding [2]. *See supra*, ¶¶152-156.

269. To the extent argued that **Aginsky** does not teach a microphone for receiving voice input used in creating the voice data, **Hanson** discloses a microphone. **Hanson**’s “speech-enabled computing system can include one or more computing devices capable of speech recognition.” Hanson, ¶[0024]. **Hanson** further teaches using speech commands to control system operations, such as “Lock doors.” Hanson, ¶¶[0017], [0021]. And **Hanson** discloses a microphone on the speech

interface of the speech-enabled system that receives voice input used in creating voice data (e.g. “speech data”). See Hanson, ¶¶[0019], [0026], Fig. 2.

3. **Claim 3: The method as recited in claim 1, wherein the controlling device comprises a processing device and instructions for providing the speech recognition engine.**

270. **Aginsky** as modified by **Hanson** teaches the controlling device comprises a processing device and instructions for providing the speech recognition engine.

271. See my discussion above regarding [3]. See *supra*, ¶¶157-160.

272. While **Aginsky** does not expressly teach or suggest “instructions for providing the speech recognition engine,” it would have been obvious to a person of ordinary skill in the art to apply **Hanson**’s teachings of recognizing speech and providing instructions to execute such speech recognition. Hanson, ¶[0043] (“The flowchart and block diagrams in the FIGS. 1-2 illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products according to various embodiments of the present invention. In this regard, each block in the flowchart or block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be

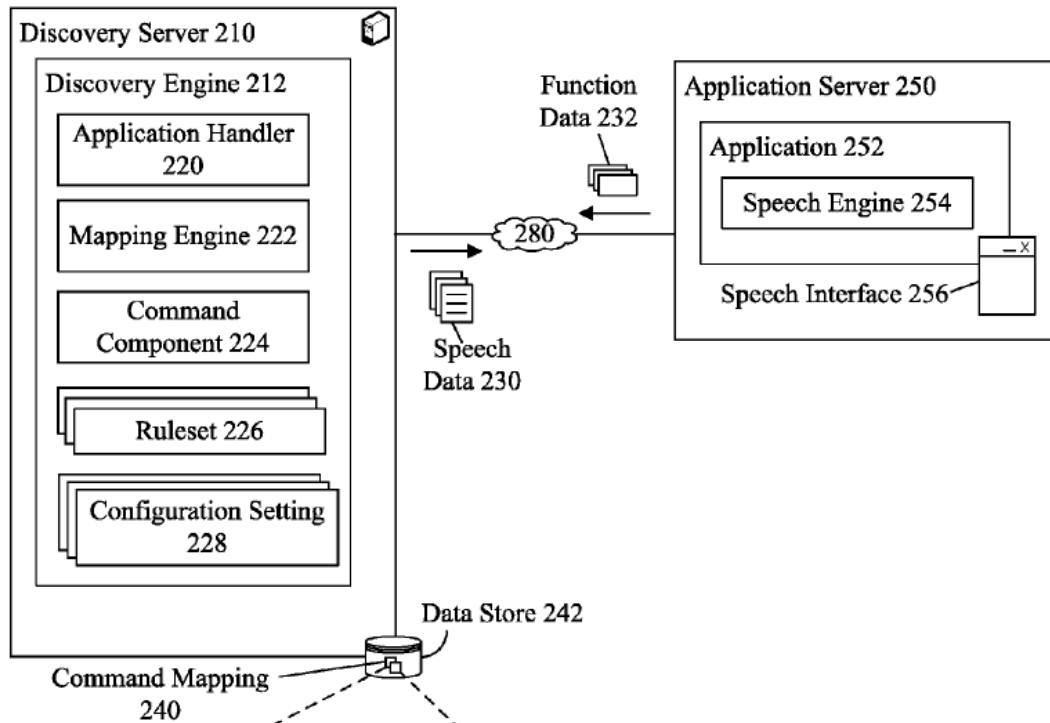
executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flow chart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.”).

4. **Claim 4: The method as recited in claim 1, wherein the speech recognition engine is executed on a computing device remote from the controlling device.**

273. **Aginsky** as modified by **Hanson** teaches the speech recognition engine is executed on a computing device remote from the controlling device.

274. See my discussion above regarding [4]. *See supra*, ¶¶161-165.

275. **Hanson** explicitly discloses that speech engine 254 is located on application server 250:



Hanson, Fig. 2, ¶[0038] (“Application server 250 can be a hardware/software component for executing an application 252. Application server 250 can include, but is not limited to, application 252, application settings (not shown), and the like. Server 250 functionality can include, but is not limited to, speech recognition, communications functionality, brokering, and the like. In one instance, server 250 can be an IBM WEBSPPHERE middleware. In one instance, server 250 can be a software service executing application 252 (e.g., application thread).”). Indeed, application server 250 includes functionality including “speech recognition,” and a person of ordinary skill in the art would have recognized that application server

250 is remote from the device receiving the voice commands because application server 250 only communicates via network 280. Hanson, ¶[0026].

5. **Claim 5: The method as recited in claim 1, wherein codeset is provisioned to the controlling device by being downloaded thereto.**

276. **Aginsky** as modified by **Hanson** teaches wherein codeset is provisioned to the controlling device by being downloaded thereto (*e.g.* “a controllable device transfers to the remote device...a data structure identifying various functions that can be controlled by a remote device”).

277. See my discussion above regarding [5]. *See supra*, ¶¶166-169.

6. **Claim 6: The method as recited in claim 1, wherein the method comprises receiving at the speech recognition engine voice data for mapping each of the less than all of the individual command function entries from within the provisioned codeset record to the one or more of the plurality of user input elements of the controlling device.**

278. **Aginsky** as modified by **Hanson** teaches receiving at the speech recognition engine voice data for mapping each of the less than all of the individual command function entries from within the provisioned codeset record to the one or more of the plurality of user input elements of the controlling device.

279. See my discussion above regarding [1.b.1] and [1.c]. *See supra*, ¶¶143-146, 149-151, 260-261, 264-266.

7. **Claim 8: The method as recited in claim 1, comprising receiving at a speech recognition engine voice data indicative of at least a brand of the target appliance**

whereupon the speech recognition engine uses 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.

280. Aginsky as modified by **Hanson** teaches receiving at a speech recognition engine voice data indicative of at least a brand of the target appliance whereupon the speech recognition engine uses 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.

281. See my discussion above regarding [8]. *See supra*, ¶¶172-176.

- 8. Claim 9: The method as recited in claim 8, wherein the controlling device comprises a memory having stored therein the library of codeset records.**

282. Aginsky as modified by **Hanson** teaches wherein the controlling device comprises a memory having stored therein the library of codeset records.

283. See my discussion above regarding [9]. *See supra*, ¶¶177-178.

- 9. Claim 10: The method as recited in claim 8, wherein the library of codeset records is stored remotely from the controlling device and the codeset is provisioned to the controlling device from the library of codeset records by being downloaded thereto.**

284. Aginsky as modified by **Hanson** teaches the library of codeset records is stored remotely from the controlling device and the codeset is provisioned to the controlling device from the library of codeset records by being downloaded thereto.

285. See my discussion above regarding [5], [8], and [10]. *See supra*, ¶¶166-169, 172-176, 179-180, 276-277, 280-281.

10. **Claim 12**

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

286. To the extent the preamble is limiting, **Aginsky** discloses a system for configuring a controlling device (*e.g.* “a remote device”) to command functional operations of a target appliance (*e.g.*, “systems and methods in which a controllable device transfers to the remote device...a data structure identifying various functions that can be controlled by a remote device”).

287. See my discussion above regarding [1.pre]. *See supra*, ¶¶118-119, 237-238.

b) **[12.a.1]: 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**

288. **Aginsky** discloses a processing device having associated instructions stored on a non-transient readable media which instructions, when executed by the processing device (*e.g.* “any one or combination of various types of processor-controlled programmable electronic devices”).

289. See my discussion above regarding [1.a.1]. *See supra*, ¶¶120-122, 239-240.

290. To the extent argued that **Aginsky** does not disclose such instructions stored on a non-transient readable media, **Hanson** explicitly discloses such instructions. **Hanson** discloses “computer program instructions” that “create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.” Hanson, ¶[0014] (“These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine. Such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.”); see Hanson ¶¶[0011]-[0016]. And, as stated above, a person of ordinary skill in the art would have been motivated to apply the teachings of **Hanson** in order to achieve the predictable result of a user friendly, voice-controlled system.

c) [12.a.2]: wherein the provisioned codeset record comprises protocol and formatting information

291. **Aginsky** discloses the provisioned codeset record comprising protocol and formatting information (e.g. “SIGNAL columns 112-1 and 112-2” “denote the type of signal”).

292. See my discussion above regarding [1.a.2]. See *supra*, ¶¶123-124, 241-242.

d) [12.a.3]: and a plurality of individual command function entries

293. **Aginsky** discloses a plurality of individual command function entries (*e.g.* “a plurality of exemplary functions or commands” and corresponding signals, statuses, and configurations).

294. See my discussion above regarding [1.a.3]. *See supra*, ¶¶125-127, 243-247.

e) [12.a.4]: wherein each of the plurality of individual function entries within the codeset record comprises command data,

295. **Aginsky** discloses wherein each of the plurality of individual function entries within the codeset record comprises command data (*e.g.*, native command data underlying “SIGNAL 112-1”).

296. See my discussion above regarding [1.a.4]. *See supra*, ¶¶128-130, 248-250.

f) [12.a.5]: a standard function identifier,

297. **Aginsky** discloses wherein each of the plurality of individual function entries within the codeset record comprises...a standard function identifier” (*e.g.* “each function could further include a code or other identification marker related to the operation of that function control.”).

298. See my discussion above regarding [1.a.5]. *See supra*, ¶¶131-132, 251-253.

- g) **[12.a.6]: data which comprises a phonetic representation of a function name corresponding to the standard function identifier,**

299. Aginsky as modified by **Hanson** teaches 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 the standard function identifier.

300. See my discussion above regarding [1.a.6]. *See supra*, ¶¶133-138, 254-256.

- h) **[12.a.7]: 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;**

301. Aginsky as modified by **Hanson** teaches wherein each of the plurality of individual function entries within the codeset record comprises...a plurality of data each of which comprises a phonetic representation of a unique one of a plurality of synonyms of the function name.

302. See my discussion above regarding [1.a.6]. *See supra*, ¶¶139-142, 257-259.

- i) **[12.b.1]: 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**

303. Aginsky teaches causing less than all of the individual command function entries from within the provisioned codeset record (*e.g.* “the data structure...may include only a subset of all possible functions” or be “restricted by a protocol”) to each be matched (*e.g.* “a plurality of exemplary functions or commands associated

with a plurality of exemplary command signals”) to one or more of a plurality of user input elements of the controlling device (*e.g.* “buttons, bars, and arrows, whether hard or programmable, that are physically pushed or touched by the user,” “voice commands,” or “[a]ny type of input from the user”).

304. See my discussion above regarding [1.b.1]. See *supra*, ¶¶143-146, 260-261.

- j) **[12.b.2]: 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,**

305. Aginsky discloses whereupon a subsequent activation of a one of the plurality of user input elements (*e.g.* “pressing a...button”) will cause the controlling device to transmit a command communication by using the protocol and formatting information and the command data (*e.g.* “command will be converted to a command signal” and “sent to the TV”) 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 (*e.g.* “data structures” containing “a plurality of exemplary functions or commands associated with a plurality of exemplary command signals”).

306. See my discussion above regarding [1.b.2]. See *supra*, ¶¶147-148, 262-263.

- k) **[12.c]: 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.**

307. Aginsky as modified by **Hanson** teaches 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.

308. See my discussion above regarding [1.a.6], [1.a.7], and [1.c]. *See supra*, ¶¶149-151, 254-259, 264-266.

11. **Claim 13: The system as recited in claim 12, wherein the instructions are downloaded to the controlling device in a downloadable app.**

309. Aginsky as modified by Hanson discloses wherein the instructions are downloaded to the controlling device in a downloadable app (*e.g.* “the user of the remote device...will download from a third party (typically an ‘app store’) a control application that is designed to control controllable devices”).

310. See my discussion above regarding [13]. *See supra*, ¶¶203-206.

12. **Claim 14: The system as recited in claim 13, wherein the controlling device comprises one of a smart phone or a tablet computing device.**

311. **Aginsky** as modified by **Hanson** discloses wherein the controlling device comprises one of a smart phone or a tablet computing device (*e.g.* “remote devices” may be “a smart clicker, smartphone, tablet computer, personal computer, or any other programmable processor-based device”).

312. See my discussion above regarding [14]. *See supra*, ¶¶207-208.

13. **Claim 15: The system as recited in claim 12, wherein the controlling device comprises a memory having stored therein a library of codeset records including the provisioned codeset record.**

313. **Aginsky** as modified by **Hanson** teaches the controlling device comprises a memory having stored therein a library of codeset records including the provisioned codeset record.

314. See my discussion above regarding [15]. *See supra*, ¶¶209-210.

14. **Claim 16: The system as recited in claim 12, wherein a library of codeset records is stored remotely from the controlling device and the codeset is provisioned to the controlling device from the library of codeset records by being downloaded thereto.**

315. **Aginsky** as modified by **Hanson** teaches a library of codeset records is stored remotely from the controlling device and the codeset is provisioned to the controlling device from the library of codeset records by being downloaded thereto.

316. See my discussion above regarding [5] and [10]. *See supra*, ¶¶166-169, 179-180, 276-277, 284-285.

15. **Claim 17: The system as recited in claim 12, wherein the processing device comprises one or more computing devices located remotely from the controlling device.**

317. **Aginsky** as modified by **Hanson** teaches the processing device comprises one or more computing devices located remotely from the controlling device.

318. See my discussion above regarding [17]. *See supra*, ¶¶213-214.

16. **Claim 18: The system as recited in claim 12, wherein the instructions use voice data received by the speech recognition engine to map each of the less than all of the command function entries from within the provisioned codeset record to the one or more of the plurality of user input elements of the controlling device.**

319. **Aginsky** as modified by **Hanson** teaches the instructions use voice data received by the speech recognition engine to map each of the less than all of the command function entries from within the provisioned codeset record to the one or more of the plurality of user input elements of the controlling device.

320. See my discussion above regarding [1.b.1], [1.c], and [6]. *See supra*, ¶¶143-146, 149-151, 260-261, 264-266, 278-279.

D. Claim Charts

321. I have reviewed, had input to, and endorse, the claim charts of the accompanying Petition showing that each element of claims 1-6, 8-10, and 12-18 are rendered obvious by Aginsky in view of Hanson.

X. GROUND 4: CLAIMS 7, 11, AND 19 ARE RENDERED OBVIOUS BY AGINSKY IN VIEW OF HANSON IN FURTHER VIEW OF DRESTI

322. It is my opinion that Claims 7, 11, and 19 are rendered obvious by Aginsky in view of Hanson in further view of Dresti.

323. For the same reasons as those stated above in §VIII, a person of ordinary skill in the art would have been motivated to apply Dresti's teachings of using location data to identify the codeset record in implementing **Aginsky's** systems and methods as modified by **Hanson's** teachings.

XI. AGINSKY IS ENTITLED TO ITS PROVISIONAL FILING DATE

324. I have been informed that a prior art patent may be entitled to the filing date of a provisional patent application for purposes of determining the date by which it became prior art if the provisional patent application's disclosure provides support for at least one claim of the subsequently issued patent in compliance with 35 U.S.C. §112.

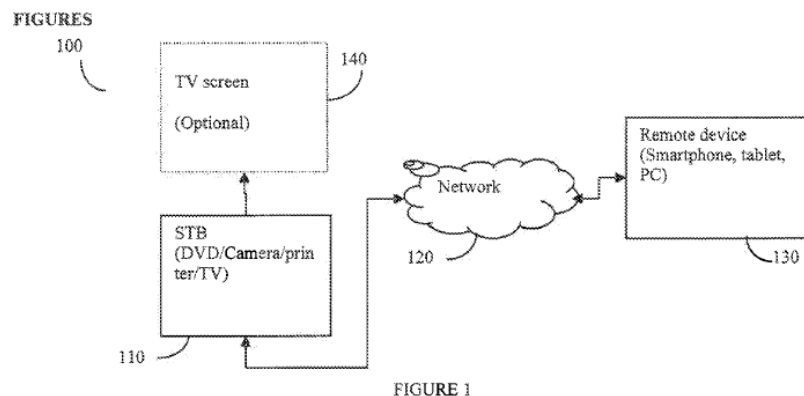
325. Aginsky claims priority to provisional application No. 61/422,537 ("Aginsky Provisional," EX1008). It is my opinion that Aginsky Provisional provides support for at least claim 1 of Aginsky.

A. Aginsky Claim 1

1. [1.pre] A method of controlling an electronic device remotely, said method comprising:

326. **Aginsky Provisional** discloses a method of controlling an electronic device remotely (e.g., “portable connected devices” “remotely control various consumer electronics”).

327. **Aginsky Provisional**, titled “An adaptive method of configuring Remote control IP application,” discloses “there is a need for a flexible and adaptable mechanism to *remotely control various consumer electronics* from *portable connected devices*.” Aginsky Provisional, 4.



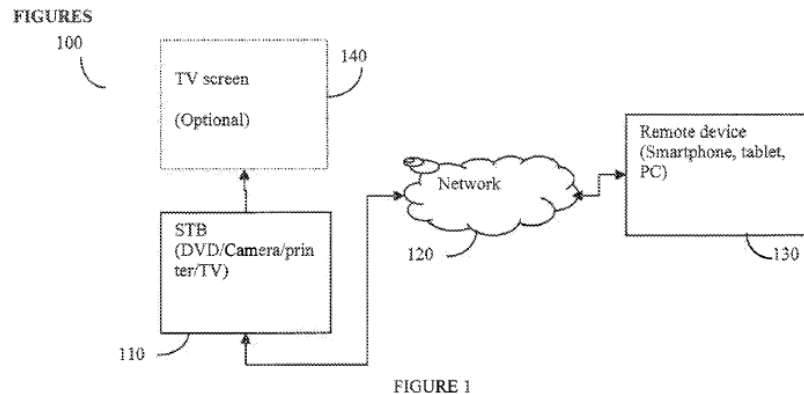
Aginsky Provisional, Fig. 1.

2. [1.a] determining that a controllable device and a controlling device are in proximity to each other;

328. **Aginsky Provisional** discloses determining that a controllable device (e.g., “controlled device 110”) and a controlling device (e.g., “controlling device 130”)

are in proximity to each other (e.g., “controlling device 130...identif[ies] a sniffable device such as controlled device 110”).

329. Aginsky Provisional discloses a system comprising controllable device 110, network 120, and controlling device 130. Aginsky Provisional, 5.



Aginsky Provisional, Fig. 1.

330. Network 120, which may be implemented as a local area network (“LAN”), establishes a communication channel between controlled device 110 and controlling device 130. Aginsky Provisional, 5. As Aginsky Provisional discloses, during a registration period, the controlled device 110 may be “sniffed” by controlling device 130. Aginsky Provisional, 6. Once controlling device 130 identifies a sniffable device, “it initiates a handshake initialization 213, sent over the network 120 to the controlled device 110.” Aginsky Provisional, 6. For controlling device 130 and controlled device 110 to be connected over the same LAN network, they must be determined to be in proximity of each other, as LAN networks require devices to be

within a close, geographic proximity. *E.g.*, EX1038,¹² 3 (“By definition, a *local area network (LAN)* is limited to a specific area, usually an office, and cannot extent beyond the boundaries of a single building.” (emphasis in original)).

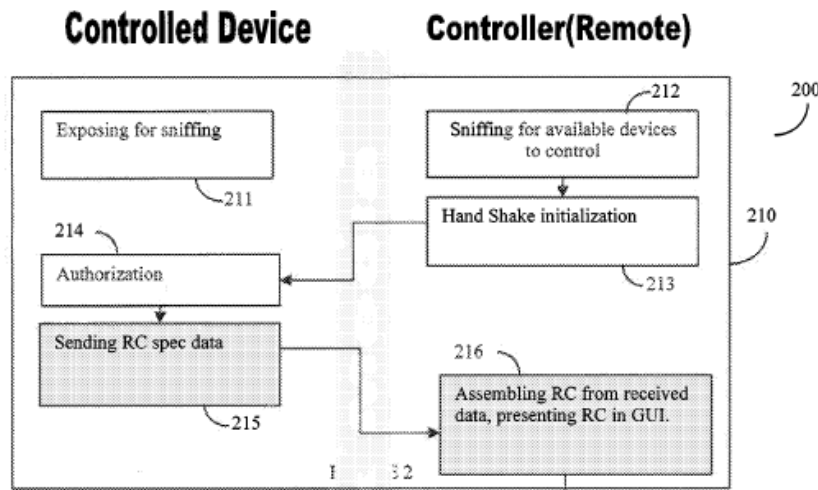
3. [1.b] establishing pairing compatibility between said controllable device and said controlling device determined to be in proximity to each other, wherein said establishing said pairing compatibility comprises determining an identity of said controlling device;

331. Aginsky Provisional discloses establishing pairing compatibility (*e.g.*, “establishing a communication channel” between “controlled device 110” and “controlling device 130”) between said controllable device and said controlling device determined to be in proximity to each other, wherein said establishing said pairing compatibility comprises determining an identity of said controlling device.

332. Aginsky Provisional discloses “establishing a communication channel” between controlled device 110 and controlling device 130. Aginsky Provisional, 5-6. Specifically, “sniffing capabilities” of the controlled device 110 are exposed 211 to potential controlling devices, such as controlling device 130. Aginsky Provisional, 6. Controlling device 130 then sniffs 212 and identifies devices with exposed sniffing capabilities. Aginsky Provisional, 6. After identifying a sniffable

¹² I understand that EX1038 was publicly accessible at least as early as June 25, 2007. Hoffman Declaration at ¶¶72-79.

device, handshake initialization 213 begins. Aginsky Provisional, 6; *compare id. with* Aginsky, 10:51-11:6. During handshake 213, controllable device 110 determines the identity of controlling device 130 by performing authorization 214 and sending the RC specification data 215 to the controlling device 130.



Aginsky Provisional, Fig. 2 (partial). This is what **Aginsky** Figure 2 discloses.

4. [1.c] selecting, by said controllable device, a data structure that is compatible with said identity and associated with a recognized user recognized by said controllable device; and

333. Aginsky Provisional discloses selecting, by said controllable device, a data structure (*e.g.*, “a predefined data structure”) that is compatible with said identity and associated with a recognized user (*e.g.*, recognized by said controllable device).

334. Aginsky Provisional discloses that RC specification data 215 is selected only after controlled device 110 identified and authorized controlling device 130. Aginsky Provisional, 6. Controllable device 110 then provides “a predefined data structure”—*i.e.*, RC specification data 215—to controlling device 130. Aginsky

Provisional, 4, 6. **Aginsky Provisional** further discloses that RC specification data 215 may be customized for a particular customer or user. Aginsky Provisional, 5 (“A unique feature that Zoran will be able to have each customer define independently for each RC requirement and for each model of product.”); see Aginsky, 5:38-42 (“[O]ne or more *data structures may be associated with a particular user*, e.g., either *by virtue of his or her use or ownership of a particular remote device*, protocols established by a user, or use of a particular ID/password or other credential indicating compatibility.”).

5. [1.d] delivering, from said controllable device of said established pairing to said controlling device of said established pairing, said data structure compatible with said identity of said controlling device and associated with said recognized user, wherein said data structure allows said recognized user to control, with said controlling device, specific functions of said controllable device, where the specific functions are specific to said user,

335. Aginsky Provisional discloses delivering, from said controllable device of said established pairing to said controlling device of said established pairing, said data structure compatible with said identity of said controlling device and associated with said recognized user (e.g., “controlled device 110” “sends the RC specification data 215 to the controlling device 130”), wherein said data structure allows said recognized user to control, with said controlling device, specific functions of said controllable device, where the specific functions are specific to

said user (e.g., “commands from the controlling device 130 are sent over the network 120 to the controlled device 110 and executed thereon”).

336. Aginsky Provisional discloses that controlled device 110 “sends the RC specification data 215 to the controlling device 130.” Aginsky Provisional, 6; see also Aginsky Provisional, 4-5. Specification data 215 is specific to RC functions that may be executed by a user of controlling device 130. Aginsky Provisional, 5-6. Once specification data 215 is installed on controlling device 130, controlling device 130 may send commands “over the network 120 to the controlled device 110.” Aginsky Provisional, 6.

337. Furthermore, **Aginsky Provisional** discloses specific functions are specific to each user because “each customer define independently for each RC requirement and for each model of product.” Aginsky Provisional, 5.

6. [1.e] wherein said accepted data structure is stored, at least temporarily, at said controlling device, so as to be usable by said controlling device for sending command signals to said controllable device for a period of time without accepting any further data structures from said controllable device.

338. Aginsky Provisional discloses that once controlling device 130 receives specification data 215, it “assemble[s]” and “install[s]” the data. Aginsky Provisional, 6. “[I]ninstall[ed]” data must be stored on controlling device 130. And **Aginsky Provisional** discloses using stored specification data 215 over a period of time until a “session [is] ended,” as shown in Figure 4:

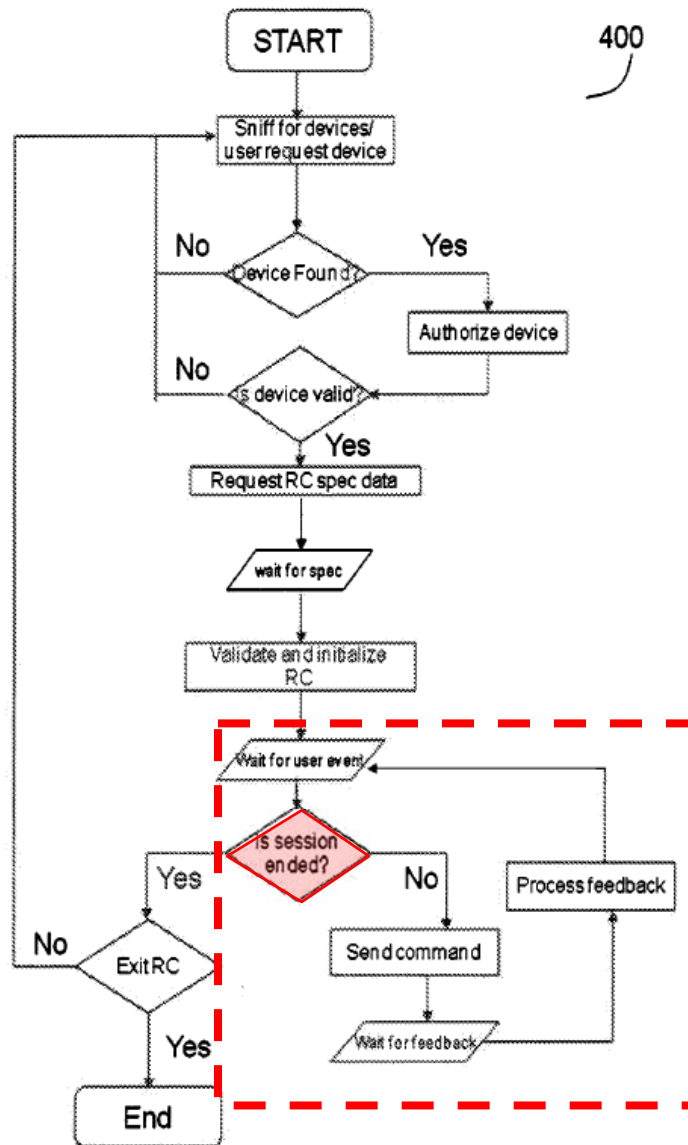


FIGURE 4

339. Aginsky Provisional, Fig. 4. A session remains open until controlling device 130 shuts down 223 “to cease operation as a controlling device 130 of the controlled device 110.” Aginsky Provisional, 6; *see also* Fig. 2.

B. Claim Chart

340. I have reviewed, had input to, and endorse, the claim charts of the accompanying EX1009 showing that each element of Aginsky claim 1 is disclosed in Aginsky Provisional.

XII. SECONDARY CONSIDERATIONS

341. I am not aware of any evidence of secondary considerations or objective factors of non-obviousness, and it is my opinion that the Challenged Claims of the '083 patent are obvious over the prior art. To the extent Patent Owner presents in this proceeding evidence of objective factors that it argues support a finding of non-obviousness, I reserve the right to address any such evidence and/or arguments that Patent Owner may raise in this regard. I am also unaware of any copying of the alleged invention of the '083 patent. Thus, I am not aware of any secondary considerations supporting the nonobviousness of the '083 patent.

XIII. CONCLUSION

342. As explained above, the Challenged Claims of the '083 patent are rendered obvious by the combinations set forth therein, and the Challenged Claims are unpatentable under 35 U.S.C. § 103.

343. In signing this declaration, I understand that the declaration will be filed as evidence in a review proceeding before the Patent Trial and Appeal Board of the U.S. Patent and Trademark Office. I acknowledge that I may be subject to cross

examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will appear for cross examination within the United States during the time allotted for cross examination.

344. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code and that such willful false statements may jeopardize the results of these proceedings.

Executed on: July 19, 2022



Bruce McNair

APPENDIX

A

Bruce McNair

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Holmdel, NJ 07733
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1-732-264-5244

Career Summary	• Fifty years engineering research, design, development, systems engineering experience in communications systems (including extensive background in wireless communications and system/network security) • Twenty four years as a well-rated member of one of world's most highly respected R&D organizations, recognized for breadth, depth and practicality of expertise • Extensive experience teaching technical short courses for premiere educational programs over a fourteen year period • Full time university educator for fifteen years with experience teaching a broad set of courses focusing on practical engineering approach • On-line university educator for eighteen years teaching well-attended graduate courses in wireless and security technologies
Research interests	• High speed wireless data networking • System/network security • Geolocation technology • Real-time digital signal processing • Software-Defined Radio technology • Broadband Powerline (BPL) technology
Present Organizations	• Stevens Institute of Technology, • Novidesic Communications, LLC
Job Titles	• Distinguished Service Professor of Electrical and Computer Engineering • Founder, Chief Technology Officer
Education	• M.E., E.E., Stevens Institute of Technology, 1974 • B.E. (with Honor), Stevens Institute of Technology, 1971 • Completed qualifiers and course work for PhD in Computer Science at Stevens

Relevant Experience

January 2003 – present – on-line teaching professor – Electrical and Computer Engineering, Stevens Institute of Technology, Hoboken, NJ;
Teach several well-enrolled on-line graduate courses in wireless security, information systems security and physical design of wireless communications systems.

August 2002 – December 2017 (retired) – Distinguished Service Professor of Electrical and Computer Engineering, Program Director, Computer Engineering graduate program, Stevens Institute of Technology, Hoboken, NJ;

Design and manage the Senior Design Project, a two-semester program that forms a substantial portion of the senior year in the engineering program. This project comprises a large fraction of the seniors' efforts and serves to provide real-world engineering design experiences for the student. Teach a large number of well-enrolled graduate and undergraduate core and elective courses. Conduct research in wireless systems, geolocation services, and broadband powerline (BPL) systems, particularly security needs and solutions. Member of Stevens Intellectual Property Review Board, Stevens Honor Board Advisory Council, Stevens' Schaeffer School of Engineering and Science Promotion and Tenure Committee, and the Senior Design Coordinator Committee.

February 2002 – present – CTO, Novidesic Communications, LLC, Holmdel, NJ;

Founded a technical consulting company, providing expert witness support and testimony, telecommunications, wireless networking, security, software, computing, product evaluation, proof-of-concept prototyping, and web site design guidance to individuals and small businesses. Clients include health care facilities, patent attorneys, major telecommunications providers, venture capitalists, major component manufacturing company, start-up hardware and concept development companies. Supported technology needs of small local business leading to Phase I and Phase II SBIR funding in the area of RFID with patented technology. Provide IP portfolio evaluation. Expert witness in patent litigation with experience testifying at deposition and trial as well as preparing USPTO IPR declarations.

August 2011 – February 2012 – Part-time consultant, Lockheed-Martin, Moorestown, NJ;

Support development of advanced radar systems and interactions with other wireless systems.

2010 – 2015 (part-time, on an as-needed basis) – Senior Systems Engineer consultant, AT&T Government Solutions, Columbia, MD;

Support AT&T's projects with the US Government customers on defense and intelligence-related systems, drawing on previous knowledge and experience in signal processing, wireless systems, telephone and computer networks, and secure system design.

**Relevant
Experience**
(continued)

May 1994 to February 2002 (retired) -- Wireless Systems Research Department, AT&T Bell Labs/ AT&T Labs - Research, Holmdel/Red Bank/Middletown, NJ

Member of Technical Staff/Research Staff Member/Principal Technical Staff Member/Technology Consultant; Investigating high-speed, high-mobility wireless data communications systems for untethered access to high speed global networks. Proposed and investigated IEEE 802.11(a & b) physical and MAC layer extensions to outdoor, high mobility environment. Efforts involved system architecture, system control, real-time DSP programming in C, high-speed hardware design, RF design, analog, RF interfacing, Matlab/SIMULINK simulation and experimental investigations. Responsible for complete design, implementation and characterization of a multiple TMS320C40-based 384 kb/s OFDM transmission system and definition/design of advanced signal processing platforms. Recent research extended results to 5-40 Mb/s with TMS320C62/FPGA-based platform and incorporated 802.11a and DVB-T technology. Previous research involved speech quality/data rate enhancements to IS-136, the North American TDMA cellular standard.

November 1987 to April 1994 -- Security and System Reliability Architecture Group, AT&T Bell Labs, Holmdel, NJ

Technical Manager; Created, staffed, and led a group of security, systems reliability and fraud control experts to assess security/quality of products, services, operations systems, communications networks, operating systems, and work centers and to recommend, specify, and prototype cost effective improvements. Created corporate process to build security into the development process. Transformed small (2 person) corporate-funded activity into well-staffed (multi million dollar), successful business unit supported program. Served as security technologies subject matter expert for AT&T Corporate Security and other (AT&T and outside) organizations

May 1982 to October 1987 -- various AT&T Bell Labs organizations, MTS - Supervisor; System Design, Exploratory Development, Applied Research, and Final Product Development of secure voice terminals, modems, speech recognition and speaker verification systems, security chips, encryption devices, and network management systems

June 1978 to April 1982 -- various AT&T Bell Labs organizations, Member of Technical Staff, System design, digital hardware design and simulation of wide area (X.25) data communications networks and high-speed data transmission techniques for voiceband modems. Led \$1M IR&D secure voice terminal initiative, ultimately resulting in promotion to MTS-Supervisor and laying groundwork for AT&T's breakthrough success in NSA's STU-3 program.

Relevant Experience (continued)	June 1971 to February 1973, January 1974 to June 1978 -- U.S Army Communications R&D Command, Fort Monmouth, NJ. GS-7, 9, 11 & 12 Electronic Engineer (GS-0855) Development of tactical military radio communications equipment, specializing in modulation, data transmission, communications security and electronic warfare (frequency hopping and direct sequence spread spectrum) for the SINCGARS VHF-FM radio system. March 1973 to December 1973 -- ITT Defense Communications Division, Nutley, NJ. Junior Member of Technical Staff; Designed, developed and tested software and digital hardware for portable satellite terminals for use by White House and the world's first hardware implementation of a 2400 bps Linear Predictive Coder (LPC) secure speech transmission system.
Patents, Presentations and Publications	Twenty six U.S. patents and nineteen international patents granted (several pending) in areas such as data transmission, cryptographic techniques, speech processing, video processing, security systems, user authentication, fraud control, synchronization, dynamic channel assignment, localization techniques, hazardous voltage detection, RFID, biomedical applications, vibration energy harvesting, solar energy harvesting for portable devices, etc. Presented numerous well-rated short courses in Digital Communications, Digital Telephony, Digital Signal Processing, and Wireless Communications, & Security. Course sponsors included: Bell Labs In-hours Continuing Education Program, George Washington University, University of Maryland, UCLA Extension, Johns Hopkins University – Organizational Effectiveness Institute, Berlin (Germany) Continuing Engineering Education Program, Monmouth University, and the Fort Monmouth Education Center. Several papers presented at IEEE Vehicular Technology and other Conferences and published in AT&T Technical Journal, IEEE Transactions on Wireless Communications, and IEEE Communications Magazine on various topics in wireless systems and security.
Skills	System/network architecture, communications system design, digital hardware design, RF design, signal processing, real-time DSP programming, software design and coding, proof-of-concept prototyping, designing and conducting laboratory research experiments, OFDM, TDMA/IS-136, FPGA, encryption, computer network security, threat assessment, data communications protocols, computer architecture, digital and analog video systems, system & link-level simulation, UNIX/Linux, Windows, C/C++, Matlab/Simulink, MathCad, PASCAL, Algol, SNOBOL, Verilog, VHDL, FORTRAN. Recruitment, development and management of highly effective technical staff. Highly effective technical presentations and training sessions to any level audience. Well-developed technical writing skills. Preparation, deposition, and testifying regarding expert report for patent infringement/non-infringement/validity/invalidity and other litigation matters. Assist in claim construction and prior art research for patent litigation.

**Other
information**

U.S Citizen. Held Top Secret - Sensitive Compartmented Information (TS/SCI) clearance with full scope polygraph until October 2015.

Selected as one of twenty-six finalists among 490 entrants in the 2014 Bell Labs Prize competition for proposal "High-precision, low-cost, low-power indoor geolocation techniques."

Stevens Institute of Technology, Henry Morton Distinguished Teaching Professor, 2013-2014.

Named to New Jersey Inventors Hall of Fame, Inventor of the Year (2012) for "Patented/Innovative Research and Entrepreneurial Leadership Related to: Groundbreaking modem development and next generation wireless data communications systems"

Mentored two AT&T Labs Fellowship Program (ALFP) participants, three students in the MentorNet program, 5 Bell Labs Early Career Advisory Program (ECAP) participants, numerous summer students (graduate and undergraduate), several new employees, and all of the staff in groups I have managed.

Advised a significant fraction of ECE Senior Design groups, numerous graduate students; participation in thesis committees of several Stevens PhD students in various departments, including Physics, Computer Science, Mechanical Engineering, and ECE. Consult with non-ECE students on ECE aspects of their Senior Design projects

Mentor summer students at Stevens in NSF-funded Research Experience for Undergraduates (co-PI).

Stevens Institute of Technology, Schaefer School of Engineering, Undergraduate Teaching Award, December 2006.

Life Senior Member, Institute of Electrical and Electronic Engineers - Member of Communications, Signal Processing, Computer and Education Societies

Member, American Society for Engineering Education

Secretary, IEEE Communications Society Communications Security Committee

Identified by Rutberg & Co. Investment Bankers (San Francisco) as member of a group of 213 "Top Wireless Influencers: 2002"

Member of the Council of Communications Advisors

Amateur radio operator licensed since 1963, Amateur Extra Class since 1970

**Contact
Information**

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US Patents

- "Liquid Crystal Display using the photovoltaic behavior of LED backlights as a source of electrical energy." US Patent #10,310,326, June 4, 2019.
- "Method and apparatus for locating and distinguishing blood vessel." US Patent #8,764,663, July 1, 2014.
- "Secure IP access protocol framework and supporting network architecture," US Patent #8,046,577, October 25, 2011.
- "Method for Estimating Time and Frequency Offset in OFDM Systems," US Patent #7,990,839, August 2, 2011.
- "Simulcasting OFDM system having mobile station location identification," US Patent 7,962,162, June 14, 2011.
- "RFID Devices for Verification of Correctness, Reliability, Functionality and Security," US Patent 7,712,674, May 11, 2010.
- "Dynamic Channel Assignment," US Patent 7,457,259, November 25, 2008.
- "RFIDs Embedded into Semiconductors," US Patent 7,348,887, March 25, 2008.
- "Method for Estimating Time and Frequency Offset in OFDM Systems," US Patent #7,310,302, December 18, 2007.
- "Mobile Device Having Network Interface Selection," US Patent #7,180,876, February 20, 2007.
- "Dynamic Channel Assignment," US Patent #6,954,465, October 11, 2005.
- "Method for Estimating Time and Frequency Offset in OFDM Systems," US Patent #6,891,792, May 10, 2005.
- "Security System Providing Lockout for Invalid Access Attempts," US Patent #5,559,505, September 24, 1996.
- "Telecommunications Fraud Detection Scheme," US Patent #5,504,810, April 2, 1996.
- "Authenticator Card and System," US Patent #5,450,491, September 12, 1995.
- "Secure Telecommunications," US Patent #5,392,357, February 21, 1995.
- "Data Message Storage and Pickup Service," US Patent #5,392,336, February 21, 1995.
- "System and Method for Granting Access to a Resource," US Patent #5,375,244, December 20, 1994.
- "Secure Teleconferencing," US Patent #5,353,351, October 4, 1994.
- "Method and Apparatus for Processor Based Encryption," US Patent #5,278,905, January 11, 1994.
- "Centralized Security Control System," US Patent # 5,276,444, January 4, 1994.
- "Technique for Voice Based Security System," US Patent #5,265,191, November 23, 1993.

**US Patents
(continued)**

- "Video Scrambling System", US Patent # 5,206,906, April 27, 1993.
- "Cryptographic Transmission System," US Patent #4,642,424, February 10, 1987.
- "Processing of Encrypted Voice Signals," US Patent #4,608,455, August 26, 1986.
- "Control of Coefficient Drift for Fractionally Spaced Equalizers," US Patent #4,376,308, March 8, 1983

Several other published and unpublished US patents pending

**International
Patents**

- "Voltage-controlled apparatus for battery-powered electronic devices," EP Patent #0568237 B1, January 23, 2002.
- "A Dynamic Channel Assignment," EP Patent #1,137,299, September 26, 2001.
- "Data Message Storage and Pickup Service," EP Patent #0626776 B1, April 7, 1999.
- "Data Message Storage and Pickup," Canadian Patent #CA-2119227A1, February 24, 1998.
- "Centralized Security Control System," Canadian Patent #CA-2078077, January 27, 1998.
- "Improved centralized security control system and method," EP Patent #0534679, August 12, 1997.
- "Authenticator Card with Changing Bar Code Pattern," EP Patent #0,715,789, June 12, 1996.
- "Technique for voice-based security systems," Canadian Patent #CA-2072172, April 30, 1996.
- "Method and apparatus for user identification and verification of data packets in a wireless communications network," EP Patent #0,689,316, December 27, 1995.
- "Central Difference Control System," Japanese Patent #1995-131526, May 19, 1995.
- "Authenticator Card with Changing Bar Code Pattern," WO Patent #1995/006371, March 2, 1995.
- "Method for safety system of voice base and device therefore," Japanese Patent #1995-049696, February 21, 1995.
- "Data message storage and pick up service, EP Patent #0,626,776, November 30, 1994.
- "Method for safety system of voice base and device therefore," Japanese Patent #1995-049696, February 21, 1995.
- "Data message storage and pick up service, EP Patent #0,626,776, November 30, 1994.
- "Apparatus for battery type electronic device," Japanese Patent #1994-138983, May 20, 1994.
- "Method and system for making communication via exchange network available, method for providing," Japanese Patent #1994-085811, March 25, 1994.

**International
Patent
(continued)**

- Voltage-controlled apparatus for battery-powered electronic devices," EP Patent #0,568,237, November 3, 1993
- "Security node in switched telecommunication network", EP Patent #0,553,553, August 4, 1993.
- "Improved centralized security control system and method," EP Patent 0,534,679, March 31, 1993.
- "An improved technique for voice-based security systems," EP Patent #0,533,396, March 24, 1993.
- "Cryptographic Transmission System," Canadian Patent #CA-1223932, July 7, 1987.

Several other published and non-published applications pending.

**Journal
Publications**

- Leung, K., Clark, M.V., McNair, B., Kostic, Z., Cimini, L.J., Winters, J.H., "Outdoor IEEE 802.11 Cellular Networks: Radio and MAC Design and Their Performance", *IEEE Transactions on Vehicular Technology*, Vol. 56, No. 5, pp. 2673-2684, September 2007.
- Chuang, J., Cimini, L., Li, G., Lin, L., McNair, B., Sollenberger, N., Suzuki, M., Zhao, H., "High Speed wireless data access based on combining EDGE with wideband OFDM," *IEEE Communication Magazine*, November, 1999.
- D'Angelo, D.M., McNair, B., Wilkes, J.E., "Security in Electronic Messaging Systems," *AT&T Technical Journal*, Volume 73, Number 3, 1994.

**Research
awards**

- "Standalone/Networked Compact, Low Power, Image-fused Multi-Spectrum Sensor System for Target Acquisition, Tracking and Fire Control," ARDEC, \$2365000, co-PI with Victor Lawrence, Hong Man. AY2008-2009
- NSF: "REU Site: Integrated Software Radio and Radio Frequency Test Bed for Wireless Research in Dynamic Spectrum Access"; \$296,754; NSF; Co-PI with Yu-Dong Yao. AY2004-2005
- AT&T Labs-Research Equipment donation of \$900k DSP systems and wireless test equipment. AY2003-2004
- AT&T Labs-Research - \$60k grant for "Investigation of Broadband Powerline technology" AY2003-2004

**Masters
theses
supervised**

- Xiongwei Xu, "The synchronization of IEEE 802.11A System", May 2014.
- Abdurazak Fathalla, "Security of Cloud Computing," May 2011.
- Tejas Marathe, "Comprehensive Performance Criteria for Wi-Fi Location Systems," December 2008.

**Masters
theses
supervised
(continued)**

- Milin Patel, "Network Performance Enhancement using QoS, TCP Optimization, Application Acceleration and Dynamic Resource Allocation Techniques," January 2008.
- Leo Gerard Raj, "Security in 4G Wireless Systems," May 2005.

**PhD
committees**

- Chao Tian, "Realization of Pure AM/FM Modulation via Combined Optical and Electrical Injection of Carriers in DFB Laser," Stevens Institute of Technology, Physics Department, March 2015.
- Tao Yang, "All-optical frequency modulation of quantum cascade laser and its application on infrared spectroscopy," Stevens Institute of Technology, Physics Department, May 2014.
- Fangming He, "Physical Security in Wireless Communications," Stevens Institute of Technology, Electrical and Computer Engineering Department, May, 2012.
- Vinod Challa, "Vibration Energy Harvesting for Low Power and Wireless Applications," Stevens Institute of Technology, Mechanical Engineering Department, May, 2011.
- Brian Borowski, "Application of Channel Estimation to Underwater Acoustic Communication," Stevens Institute of Technology, Computer Science Department, June, 2010.
- Gang Chen, "All-Optical Modulation of Quantum Structure/Devices," Stevens Institute of Technology, Physics Department, May 2010.

**Conference
Papers**

- He, F., Man, H., Kivanc, D., McNair, B., "EPSON: Enhanced Physical Security in OFDM Networks," *Proc. ICC 2009*, Dresden, Germany, June 2009.
- Patel, S.; Cimini Jr, L.J.; McNair, B., "Comparison of frequency offset estimation techniques for burst OFDM," *Proc. IEEE Vehicular Technology Conference VTC2002*, Birmingham, AL, May, 2002.
- Cimini, L., Leung, K., McNair, B., Winters, J. "Outdoor IEEE 802.11b Cellular Networks: MAC Protocol Design and Performance," *Proc. ICC 2002*, New York, NY, April 2002
- Clark, M., Leung, K., McNair, B., Kostic, Z., "Outdoor IEEE 802.11b Cellular Networks: Radio Link Performance", *Proc. ICC 2002*, New York, NY, April 2002.
- McNair, B., "Software Radio – the Commercial Perspective," *Proc. IEEE Sarnoff Symposium*, Princeton, NJ, March 2002.
- Zou, H., Daneshmand, B., McNair, B., "An Integrated OFDM Receiver for High-Speed Mobile Data Communications," *Proc. IEEE Globecom 2001*, San Antonio, TX, Oct. 2001.
- McNair, B., "Future Directions for Wireless Communications," *Supercomm2001*, Atlanta, GA, June, 2001

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- Cimini, L., McNair, B, "OFDM for High Data Rate, High-Mobility, Wide-Area Wireless Communications," *Proc. IEEE Sarnoff Symposium*, Princeton, NJ, March, 2001.
- Cimini, L., McNair, B, Sollenberger, N., "Implementation of an Experimental 384 kb/s Radio Link for High-Speed Internet Access," *Proc. IEEE Vehicular Technology Conference VTC2000*, Boston, MA, September, 2000.
- Cimini, L., McNair, B, Sollenberger, N., "Performance of an Experimental 384 kb/s 1900 MHz Radio Link In a Wide-Area High-Mobility Environment," *Proc. IEEE Vehicular Technology Conference VTC2000*, Boston, MA, September, 2000.
- Takamura, K.; Kunihiro, T.; Yamaura, T.; Fujita, E.; Anderson, G.; Chibane, C.; Feinberg, P.; Sollenberger, N.; McNair, B.; Mielcarek, E., "Field trial results of a band hopping OFDM system," *Proc. IEEE Vehicular Technology Conference VTC99-Fall*, 1999. Amsterdam, the Netherlands, September 1999.
- McNair, B., Cimini, L., Sollenberger, N., "A Robust Timing and Frequency Offset Estimation Scheme for Orthogonal Frequency Division Multiplexing (OFDM) Systems," *Proc. IEEE Vehicular Technology Conference, VTC99*, Houston, TX, May 1999.
- McNair, B., Gupta, S., Kostic, Z., Sollenberger, N., "Experimental Results for Extensions to the IS-136 TDM Standard Based on Higher Level Modulation, Coherent Detection, and Equal Gain Antenna Combining," *Proc. IEEE Vehicular Technology Conference, VTC99*, Houston, TX, May 1999.
- Kostic, Z., McNair, B., Sollenberger N., "Experimental Performance Results of an Indoor Wireless Extension of IS-136 Based on $\pi/8$ D8PSK, Coded Modulation, and Antenna Diversity," *Proc. IEEE Vehicular Technology Conference, VTC98*, Ottawa, Canada, May 1998.
- McNair, B., "The Effectiveness of Preselection Diversity for Indoor Wireless Systems," *Proc. Int. Conf. on Universal Personal Communications*, San Diego, CA, Oct. 1997.

Invited talks

- "Adventures in On-Line Education," Tsinghua University Webinar: Showcasing Online Course Designs, Online Teaching Guidance Expert Group, International Center for Engineering Educations (ICEE) – The United Nations Educational, Scientific and Cultural Organization (UNESCO), April 27, 2020.
- "Providing Structure, Motivation and Process in Security Education," Stevens/NIKSUN Workshop on Innovations in Cyber Security Research, Education and Training, Hoboken, NJ, March 2015
- "Wireless Security Panel," IEEE/AFCEA Fort Monmouth Annual Information Technology Forum and Expo, April 2005.

**Invited talks
(continued)**

- “Of What Use is Wireless Multimedia Without Security,” “What’s Next in Multimedia Panel,” 14th Annual Wireless and Optical Communications Conference, April 2005.
- “Is Wireless Security an Oxymoron?” IEEE Princeton/Central NJ Communications and Consumer Electronics and Computer Science Chapters, December, 2003.

**Other
Publications**

- McNair, B., “Automatic Repeater Offsets,” *73 Magazine*, November 1978, pp. 82-86.
- McNair, B, Williman, G., “Digital Keyboard Entry System,” *Ham Radio*, Volume 11, Number 9, September, 1978, pp. 92-97.
- McNair, B., “A Digital Display for Amateur Radio Communications Equipment,” *Ham Radio*, Volume 9, Number 9, September 1976, pp. 16-25.
- MIL-STD-188-114, “Electrical Characteristics of Digital Interface Circuits,” Department of Defense Interface Standard, 24 March 1976
- Graduate:
 - EE/CpE-517 - Digital and Computer Systems Architecture (on-campus)
 - EE/TM/NIS-584 – Wireless System Security (on-campus and on-line)
 - EE-585/PEP-685/MT-685 – Physical Design of Wireless Communications (on-campus and on-line)
 - NiS/CpE-691 – Information Systems Security (on-campus and on-line)
 - EE/CpE-810A - Special Topics in EE/CpE - Digital and Computer Systems Architecture (on-campus)
- Undergraduate (on-campus):
 - E-232 – Design IV
 - BME-322 – Biomedical Design VI
 - EE/CpE-322 – ECE Design VI
 - EE/CpE-345 – Modeling and Simulation
 - CpE-358/CS-381 – Switching Theory and Logical Design
 - EE-359 – Electronic Circuits
 - EE/CpE-423; EE/CpE-424 – Senior Design
 - CpE-450 – Real-time Embedded Systems

Short Courses

- "Electronics and Computers," preparation course for Fundamentals of Engineering/Professional Engineering license
Stevens Institute of Technology
- "Digital Signal Processing - Principles, Architecture, and System Applications"
 - *Organizational Effectiveness Institute (originally Johns Hopkins University's continuing education program),*
- "Wireless Digital Communications Systems: Components, Specifications, Test and Evaluation"
 - *Organizational Effectiveness Institute*
- "Security in Digital Communications Networks"
 - *Bell Labs Architecture Area Adopt a University Program: Grambling State University*
 - *Monmouth University*
- "Digital Telephony"
 - *Monmouth University*
 - *Fort Monmouth Education Center*
 - *Berlin (F.R.G.) Continuing Engineering Education Program*
- "Digital Communications & Applications"
 - *University of Maryland*
 - *Fort Monmouth Education Center*
 - *UCLA Extension University*
- "Digital Communications," presented with Allen Gersho, N.S. Jayant and David Falconer.
 - *George Washington University*
- "Data Communications for the System Designer"
 - *Bell Labs In-Hours Continuing Education Program*

**Expert
witness,
patent
consulting
experience**

- Authentication technology
- Bluetooth, WiFi, ZigBee, and other local/personal area wireless networking
- Cellular systems
- Communications networking
- Digital clock control for power management in SoCs
- Digital Rights Management
- Digital Subscriber Loop (DSL) technology
- Electronic technology
- Embedded systems
- Geolocation technology
- Industrial process control software
- Localization services
- Messaging systems
- Multifactor Authentication
- Peer-to-peer and client-server networks
- Secure voice communications
- Signal processing
- Smart cards and magnetic stripe cards for payment systems
- Software/firmware code analysis (C, VHDL)
- Software trade secrets
- Television and television tuner technology
- Trusted systems
- User and system authentication technology
- Video messaging
- Video scrambling and pay-per-view systems
- Voice processing and voice response systems
- Wireless communications and networking – particularly PHY and MAC layers

**Law firms
supported**

- Avant Law, Overland Park, KS (Hissan Anis)
- Baker & McKenzie, Dallas, TX (William McSpadden)
- Bradley, Birmingham, AL (Paul Sykes, Benn Wilson, Jake Gipson)
- Bragalone-Conroy, Dallas, TX (Nick Kliewer, Daniel Olejko, Stephanie Wood)
- Cantor-Colburn, Hartford, CT (Steve Coyle)
- Carella-Byrne (Donald Ecklund)
- Clark-Hill, Pittsburgh, PA, (J. Alexander Hershey)
- Desmarais, New York, NY (Kerri-Ann Leembeck)
- DLA Piper, Austin, TX, San Francisco, CA and San Diego, CA (Brian Erickson, Gerald Sekimura, Kevin Hamilton)
- Fox Rothschild, Lawrenceville, NJ (Gerard Norton)
- Gibbons-Deldeo, Newark, NJ (Michael Cukor, Sheila McShane, Vin McGeary, Erich Falke, Chris Strate)
- Greenberg-Taurig, McLean, VA (Andrew Sommer)
- Hogan-Lovells, Denver, CO (Matt Rozier, Aaron Oakley, Lucky Vidmar)
- Jones-Day, New York, NY (Tom Gianetti)
- Latimer, LLP, Oakhurst, NJ (Brian Latimer)
- Merchant-Gould, Atlanta, GA (George Jenson)
- Morrison-Foerster, San Diego, CA (Christian Andreau-von Eaw)
- Oblon Spivak, Arlington, VA (Robert Mattson, Scott McKeown)
- Orrick, Herrington and Sutcliffe, Silicon Valley (Jason Angell)
- Quattlebaum, Grooms, Tull & Burrow, Little Rock, AR (Steve Quattlebaum)
- Quinn-Emanuel, New York, NY (Marc Kaplan)
- Ropes & Gray, Washington, DC, (Scott McKeown, Victor Cheung)
- Sabety & Associates (Ted Sabety)
- Sidley Austin, Chicago, IL, Washington, D.C. (Doug Lewis, Rick Cederoth, Mike Franzinger)
- Steptoe & Johnson, Washington, D.C. (Kate Cappaert, Brian Johnson)
- Carr & Waddoups, Salt Lake City, UT (Trent Waddoups)
- Unified Patents, Washington, DC (Michelle Callaghan, Ashraf Fawzy, Jung Hahm, Roshan Mansinghani, Jessica Marks, Jordan Rossen, David Seastrunck)
- Wilson, Sonsini, Goodrich & Rosati, Palo Alto, CA, Seattle, WA (Matthew Argenti, Quincy Lu)
- White Case, Washington, DC, New York, NY (David Tennant, Grace Wang)
- Wisser and Weinstein, West Hartford, CT (Kerry Wisser)
- Woodcock and Washburn, Philadelphia, PA (Michael Bonella)

Case	Technology	Supporting	Law firm	Attorney	Expert report/ declaration	Deposed	Testified
Avocent Redmond Corp., formerly known as Apex, Inc. v. Raritan Computer, Inc. ; Case 1:01-cv-04435-PKC, United States District Court, Southern District of New York.	Keyboard-video-monitor (KVM) switching systems - patent dispute	Defendant	Gibbons-Deldeo, Newark, NJ	Sheila McShane Vincent McGeary	Apr 3, 2005	Apr 5, 2005	No
Marvell International, Ltd. v. Agere Systems, Arbitration No. 50 133 T 00392 06, American Arbitration Association, International Centre for Dispute Resolution, NY, NY	Physical level of WiFi network implementation - licensing issue	Plaintiff	Orrick-Herrington, Silicon Valley, CA	Jason Angell Jan Ellard	Mar 16, 2007	Mar 24, 2007	Mar 27, 2007
Cellularvision Technology & Telecommunications, L.P. v. Alltel Corporation , et. al., Case no. 07-CV-00444-JMM, United States District Court, Eastern District of Arkansas, Western Division.	video messaging in cellular/wireless networks - patent dispute	Defendant	Baker-McKenzie, Dallas, TX; Quattlebaum-Grooms, Little Rock, AR	Bill McSpadden Steve Quattlebaum	June 6, 2008	June 19, 2008	No
American Patent Development Corporation, LLC v. Movielink, LLC, Civil Action 07-605-JJF, United States District Court, District of Delaware.	Network distribution of movies and video content; digital rights management - patent dispute	Plaintiff	Sabety & Associates, New York, NY	Ted Sabety	Dec 12, 2008 Apr 17, 2009	Feb 13, 2009 May 1, 2009	No
Yangaroo, Inc. v. Destiny Media Technologies, Inc. , et. al., Case 1:09-cv-00462-WCG, United States District Court, Eastern Division of Wisconsin, Green Bay Division	Network distribution of music; digital rights management - patent dispute	Defendant	Sabety & Associates, New York, NY	Ted Sabety	Jan 15, 2010	Jan 29, 2010	No
Inncom International, Inc. v. Control4 Corporation, Case 3:09-cv-00649, United States District Court, District of Connecticut	Intelligent HVAC and room security system - patent dispute	Plaintiff	Cantor-Colburn, Hartford, CT	Bill Cass, Steve Coyle	Mar 10, 2010	No	No
Wes-Garde Components Group, Inc. v. Carling Technologies, Inc, Case HHDCV09 5028121S	Electrical power switching and control systems - licensing issue	Plaintiff	Weinstein & Wisser, West Hartford, CT	Kerry Wisser	Jan 28, 2011	Sept 16, 2011	No
Motorola vs. Microsoft , ITC Investigation 337-TA-752 - "Regarding Certain Gaming and Entertainment Systems"	Wireless networks - patent dispute	Respondent	Sidley Austin, Chicago, IL	Douglas Lewis Richard Cederoth Michael Franzinger	July 1, 2011 July 15, 2011	July 29, 2011	Jan 12, 2012
Avocent Redmond Corp. v. Raritan Americas, Inc. , Case 10-CV-6100, United States District Court, Southern District of New York.	Keyboard-video-monitor (KVM) switching systems	Defendant	Gibbons-Deldeo, Newark, NJ	Vincent McGeary Erich Falke Michael Cukor	Nov 28, 2011 Jan 4, 2012	Jan 27, 2012	Sept 25, 2012

Case	Technology	Supporting	Law firm	Attorney	Expert report/ declaration	Deposed	Testified
Eastman Kodak Company vs, Kyocera Corporation , Civil Action No. 10-cv-6334-CJS, Western District of New York	- patent dispute Digital camera and cellular handset technology – licensing issue	Defendant	Morrison & Foerster San Diego, CA	Christopher Strate Christian Andreau- von Eaw	May 11, 2012	June 28, 2012	No
USPTO IPR Lone Star WiFi LLC vs. Starwood Hotels, Inc. Case # 612CV957, Eastern District of Texas	Wireless networks with prioritized access - IPR	Petitioner	Oblon-Spivak Arlington, VA	Scott McKeown	Oct 31, 2013	No	No
USPTO IPR: Cisco vs. Rockstar Technologies IPR2014-01220	Multimedia distribution system with user and network controls - IPR	Petitioner	Oblon-Spivak Arlington, VA	Chris Ricciuti	July 30, 2014	No	No
Cresta Technology Corp. vs. Silicon Labs : ITC Investigation 337-TA-910 – “Regarding Certain Television Sets”	Digital TV tuner technology - patent dispute	Respondent	DLA Piper Austin, TX; San Francisco, CA; San Diego, CA	Brian Erickson Gerry Sekimura Kevin Hamilton	Aug 25, 2014 Sep 16, 2014	Sep 29, 2014	Dec 3, 2014
USPTO IPR: Oticon vs. GN ReSound IPR2015-00103 and IPR2015-00104	Hearing assistance devices with wireless access via shared earpiece cord - IPR	Petitioner	Oblon-Spivak Arlington, VA	Victor Cheung Scott McKeown	Sept 9, 2014	July 21, 2015	No
Ericsson vs. Apple , 2:15-cv-290, Eastern District of Texas, Marshall Division.	Location services - patent dispute	Defendant	Hogan-Lovells Denver, CO	Matt Rozier	Nov 11, 2015	No	No
USPTO IPR: Sony vs. Cellular Communications Equipment IPR2016-00367	Emergency wireless alerting system - IPR	Petitioner	Oblon Arlington, VA	Victor Cheung Scott McKeown	Dec 18, 2015	No	No
USPTO IPR: Alcatel-Lucent vs. Adaptix IPR2016-01030	Multi-carrier (OFDM) wireless communications - IPR	Petitioner	Quinn Emanuel New York	Marc Kaplan	May 11, 2016	No	No
USPTO IPR: Securus Technologies vs. Global Tel*Link IPR2016-01115	User authentication in telecommunications management system - IPR	Petitioner	Bragalone Conroy Dallas, TX	Daniel Olejko Nick Kliever Stephaine Wood	May 31, 2016	No	No
Process Control Corporation vs. Conair Group, Inc., and Alan Landers , Civil Action No. 1:13-cv-04274-ELR (N.D. Ga.)	Industrial process control software - trade secrets dispute	Defendant	ClarkHill Pittsburgh, PA	J. Alexander Hershey	May 31, 2016 June 30, 2016	Aug 18, 2016	No
USPTO IPR: Arris International vs. Sony	Device	Respondent	Oblon	Victor Cheung	July 8, 2016	No	No

Case	Technology	Supporting	Law firm	Attorney	Expert report/ declaration	Deposed	Testified
IPR2016-00827	authentication in video control system - IPR		Arlington, VA	Scott McKeown			
USPTO Ex Parte reexam: Cornell Technical Licensing	CSMA and multipacket reception wireless systems	Petitioner	Oblon Arlington, VA	Victor Cheung Scott McKeown	Feb 24, 2017	No	No
Straight Path IP Group, Inc v. Apple, Inc. Case No. 3:16-cv-03582 Northern District of CA	VoIP networking - patent dispute	Defendant	Hogan-Lovells Denver, CO	Matt Rozier Aaron Oakley Lucky Vidmar	April 7, 2017 Aug 31, 2017 Sep 21, 2017 Oct 19, 2017	Apr 12, 2017 Sep 28, 2017	No
USPTO PGR: Supercell OY v. Gree, Inc. PGR2018-00064	Digital and microprocessor devices - IPR	Respondent	Ropes-Gray, Washington, DC	Victor Cheung Scott McKeown	August 16, 2018	No	No
USPTO IPR: Unified Patents vs. Ambush Interactive IPR2019-00495	Speech processing, embedded systems, remote control - IPR	Petitioner	Ropes-Gray, Washington, DC	Victor Cheung Scott McKeown	December 27, 2018	No	No
USPTO IPR: Unified Patents vs. Universal Cipher IPR2019-00498	Encryption techniques for password authentication - IPR	Petitioner	Ropes-Gray, Washington, DC	Victor Cheung Scott McKeown	December 30, 2018	No	No
USPTO IPR: Unified Patents vs. Portal Communications IPR2019-00513	Web-enabled speech processing and location services - IPR	Petitioner	Ropes-Gray, Washington, DC	Victor Cheung Scott McKeown	December 31, 2018	No	No
Broadcom vs. Renesas, et. al., ITC Investigation 337-TA-1119 – “Regarding Certain Infotainment Systems”	Clock control in SoCs - patent dispute	Petitioner	Step toe & Johnson, Washington, DC	Kate Cappaert Brian Johnson	March 4, 2019 March 19, 2019	March 27, 2019	June 3, 2019 June 6, 2019
USPTO IPR: Square Inc. vs. Anywhere Commerce/4361423 Canada, Inc. IPR2019-01625, IPR2019-01626, IPR2019-01627, IPR2019-01628, IPR2019-01629, IPR2019-01630	Smart card and magnetic stripe reader and processing for financial payment systems - IPR	Petitioner	Ropes-Gray, Washington, DC	Victor Cheung Scott McKeown	September 30, 2019 September 30, 2019 September 30, 2019 September 30, 2019 September 30, 2019 October 14, 2020 October 14, 2020 October 14, 2020	No	No
IPR2019-01649, IPR2019-01650			White-Case, New York, NY	David Tennant Grace Wang	September 30, 2019 September 30, 2019 October 14, 2020		

Case	Technology	Supporting	Law firm	Attorney	Expert report/ declaration	Deposed	Testified
USPTO IPR Unified Patents vs. Honeyman Cipher Solutions. IPR2020-00213	Software tamper prevention and detection via encryption - IPR	Petitioner	Unified Patents, Washington, DC	Ashraf Fawzy David Seastrunk	October 14, 2020 December 13, 2019	No	No
Michalski vs. Michalski , Monmouth County Court (NJ), FM-13-1543-16-C	Cell phone usage, geolocation, and propagation and characteristics – civil litigation	Defendant	Latimer, LLP Oakhurst, NJ	Brian Latimer	December 15, 2019	No	No
USPTO IPR: Unified Patents vs. Universal Cipher IPR2019-00498	Encryption techniques for password authentication - IPR	Petitioner	Unified Patents	Jung Hahn Roshan Mansinghani	January 20, 2020	No	No
USPTO IPR Renesas vs. Broadcom , IPR2019-01039	Clock control in SoCs - IPR	Respondant	Steptoe & Johnson, Washington DC	Brian Johnson	February 7, 2020	May 28, 2020 (virtual)	No
TQ Delta vs. ADTRAN , Case 14-cv-954-RGA & 15-cv-121-RGA, District of Delaware	DSL signaling and control - patent dispute	Defendant	Bradley Birmingham, AL	Benn Wilson	February 28, 2020 April 10, 2020 April 24, 2020 Sep 23, 2020 October 23, 2020 Nov 6, 2020 February 26, 2021	May 22, 2020 (virtual) Dec 22, 2020 (virtual)	No
USPTO IPR: Unified Patents vs. Portal Communications IPR2019-00513	Web-enabled speech processing and location services - IPR	Petitioner	Unified Patents, Washington, DC	Jessica Marks Roshan Mansinghani	April 8, 2020	No	No
USPTO IPR: Unified Patents vs. Optima Direct IPR2020-00784	Multifactor authentication - IPR	Petitioner	Greenberg-Traurig McLean, VA	Andrew Sommer	April 10, 2020	No	No
USPTO IPR Unified Patents vs. Voice Tech, IPR2020-01018	Mobile voice control of computer application - IPR	Petitioner	Unified Patents Washington, DC	Jordan Rossen Michelle Callaghan	June 5, 2020 June 28, 2021	No	No
Call vs. Chakra Lounge, RMB, Inc. , Wasted Space, LLC, Shaman, Inc., C.H.U. Holdings, and Corbin Celotto, Case 190900552, Third Judicial District Court for Salt Lake City County, Utah	Geolocation – civil litigation	Defendant	Carr & Waddoups Salt Lake City, UT	Trent Waddoups	August 17, 2020	No	No
USPTO IPR Mycroft vs. Voice Tech, IPR2020-01739	Mobile voice control of computer	Petitioner	Avant Law, Overland Park, KS	Hissan Anis	October 1, 2020 October 20, 2021	No	No

Case	Technology	Supporting	Law firm	Attorney	Expert report/ declaration	Deposed	Testified
USPTO IPR Unified Patents vs. Karetek, IPR2020-01550	application - IPR Multifactor authentication - IPR	Petitioner	Wilson, Sonsini, Goodrich, Rosati Palo Alto, CA Seattle, WA	Matthew Argenti Quincy Lu	October 1, 2020	No	No
Cellcast vs. USDoJ/IBM , Case 15-1307, US Court of Federal Claims	Emergency Alerting Systems-patent dispute	Defendant	Goodwin, NY, NY US DoJ, Washington, DC Unified Patents, Washington, DC	Mark Abate Alexandra Valenti Calvin Wingfield Jaqueline Genovese Bova Philip Sternhell Michelle Aspen	September 14, 2021	Nov 12, 2021 (virtual)	No
USPTO IPR Unified Patents vs. Liberty Peak Ventures, IPR2022-0024	Financial transaction security/RFID	Petitioner	Unified Patents, Washington, DC	Philip Sternhell Michelle Aspen	October 21, 2021	No	No
TQ Delta vs. Nokia , Case 2:21-CV-309-JRG, Eastern District of Texas, Marshall Division	DSL signaling and control - patent dispute	Defendant	Alston Bird New York, NY Charlotte, NC Goodwin Proctor Redwood City, CA	Darlena Subashi Karlee Wroblewski Andrew Ong	March 14, 2022	No	No
USPTO IPR CommScope vs. TQ Delta, IPR2022-00833	Data packet acknowledgement /retransmission protocols	Petitioner	Goodwin Proctor Washington, DC Boston, MA	Amadou Diaw Craig Lytle Kathleen McGuinness	April 21, 2022	No	No
USPTO IPR Roku vs. Universal Electronics, IPR2022- 00943	Environmentally sensitive device volume control	Petitioner	Ropes-Gray Washington, DC Boston, MA	Brendan McLaughlin Rebecca Gentili	April 29, 2022	No	No
USPTO IPR CommScope vs. TQ Delta, IPR2022-00809	Data packet acknowledgement /retransmission protocols	Petitioner	Goodwin Proctor Washington, DC Redwood City, CA	Amadou Diaw Abdul Abdullahi	May 5, 2022	No	No
USPTO IPR CommScope vs. TQ Delta, IPR2022-01012	Data packet acknowledgement /retransmission protocols	Petitioner	Goodwin Proctor Washington, DC	Amadou Diaw Craig Lytle	May 19, 2022	No	No

As 5/19/2022	Total	On behalf of Plaintiff/Complainant/Petitioner	On behalf of Defendant/Respondant
Expert reports/declarations	75	43	32
IPR/USPTO declarations	41	38	3
Depositions	20	6	14
Testimony	6	3	3

APPENDIX

B

Exhibit ("EX")	Description
1001	U.S. Patent No. 9,847,083 ("083")
1002	File History of U.S. Application No. 13/298,629, which led to U.S. Patent No. 9,847,083
1004	U.S. Patent No. 8,995,981 ("Aginsky")
1005	U.S. Patent No. 6,839,670 ("Stammmler")
1006	U.S. Patent Application Publication No. US 2012/0271639 A1 ("Hanson")
1007	U.S. Patent Application Publication No. US 2003/0103088 A1 ("Dresti")
1008	U.S. Provisional Patent Application No. 61/422,537 ("Aginsky Provisional")
1010	Roberto Pieraccini, <i>From AUDREY to Siri. Is speech recognition a solved problem?</i> (presentation), International Science Institute at Berkeley (archived Jun. 26, 2013) (accessed Apr. 6, 2022), available at https://web.archive.org/web/20130626012955/https://www1.icsi.berkeley.edu/pubs/speech/audreytosiri12.pdf
1011	<i>Pioneering Speech Recognition</i> , IBM (accessed Apr. 6, 2022), available at https://www.ibm.com/ibm/history/ibm100/us/en/icons/speechreco/transform/
1012	B.H. Juang & L.R. Rabiner, <i>Speech Recognition, Automatic: History</i> , in <i>ENCYCLOPEDIA OF LANGUAGE & LINGUISTICS</i> 806-819 (2d ed. 2006)
1013	<i>History of Speech & Voice Recognition and Transcription Software</i> , Dragon Naturally Speaking (archived Mar. 19, 2005) (accessed Apr. 6, 2022), available at https://web.archive.org/web/20050319025603/http://www.dragon-medical-transcription.com/history_speech_recognition.html
1014	Xuedong Huang & Li Deng, <i>An Overview of Modern Speech Recognition</i> , in <i>HANDBOOK OF NATURAL LANGUAGE PROCESSING</i> , 339-363 (2d ed. 2010)
1016	<i>Lecture 12: An Overview of Speech Recognition</i> , available at https://web.archive.org/web/20210423171339/https://www.cs.rochester.edu/u/james/CSC248/Lec12.pdf
1017	Scanlon et al., <i>Using Broad Phonetic Group Experts for Improved Speech Recognition</i> , <i>IEEE TRANSACTIONS ON AUDIO SPEECH & LANGUAGE</i>

Exhibit ("EX")	Description
	PROCESSING (Mar. 2007), available at https://academiccommons.columbia.edu/doi/10.7916/D84F219Z/download
1018	Latanya Sweeney & Patrick Thompson, <i>Speech Perception Using Real-Time Phoneme Detection: The BeBe System</i> (1997), available at https://web.archive.org/web/20100712042339/http://publications.csail.mit.edu/lcs/pubs/ps/MIT-LCS-TR-736.ps
1019	Cheng et al., <i>Voice-to-Phoneme Conversion Algorithms for Voice-Tag Applications in Embedded Platforms</i> , EURASIP J. ON AUDIO SPEECH & MUSIC PROCESSING (2008), available at https://asmp-urasipjournals.springeropen.com/articles/10.1155/2008/568737 .
1020	U.S. Patent Application Publication No. 2008/0059193 ("Huang-193")
1021	U.S. Patent No. 6,584,439 ("Geilhufe")
1022	U.S. Patent No. 7,689,417 ("Huang-417")
1023	U.S. Patent No. 7,944,370 ("Harris")
1024	U.S. Patent No. 5,247,580 ("Kimura")
1025	International Patent Publication No. WO2008096944 ("Lee")
1026	U.S. Patent No. 6,397,186 ("Bush")
1027	U.S. Patent Application Publication No. 2006/0235701 ("Cane")
1028	U.S. Patent Application Publication No. US 2006/0041655 ("Holloway")
1029	U.S. Patent Application Publication No. US 2009/0254778 ("Huang-778")
1030	U.S. Patent Application Publication No. US 2005/0216606 ("Hayes")
1031	European Patent No. 1,209,661 ("Hayes-661")
1032	U.S. Patent No. 6,748,361 ("Comerford")
1033	U.S. Patent Application Publication No. 2002/0095286 ("Ross")
1034	U.S. Patent Application Publication No. 2008/0133244 ("Bodin")
1035	U.S. Patent Application Publication No. US 2007/0052549 ("Le")
1036	U.S. Patent No. 7,259,710 ("Kisliakov")
1037	U.S. Patent No. 7,046,161 ("Hayes-161")
1038	GROTH ET AL., NETWORK+ STUDY GUIDE DELUXE EDITION (2d ed. 2005)
1041	Declaration of Dr. Gretchen Hoffman