UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Facebook, Inc., Instagram, LLC
Petitioners

v.

Skky, LLC
Patent Owner

U.S. Patent No. 8,892,465

TITLE: MEDIA DELIVERY PLATFORM

DECLARATION OF TAL LAVIAN, PH.D.

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I, Tal Lavian, Ph.D., declare as follows:

I. INTRODUCTION AND QUALIFICATIONS

A. Qualifications and Experience

1. I have more than 25 years of experience in the networking, telecommunications, Internet, and software fields. I received a Ph.D. in Computer Science, specializing in networking and communications, from the University of California at Berkeley in 2006 and obtained a Master's of Science ("M.Sc.") degree in Electrical Engineering from Tel Aviv University, Israel, in 1996. In 1987, I obtained a Bachelor of Science ("B.Sc.") in Mathematics and Computer Science, also from Tel Aviv University.

2. I am employed by the University of California at Berkeley and was appointed as a lecturer and Industry Fellow in the Center of Entrepreneurship and Technology ("CET") as part of UC Berkeley College of Engineering. I have been with the University of California at Berkeley since 2000 where I served as Berkeley Industry Fellow, Lecturer, Visiting Scientist, Ph.D. Candidate, and Nortel's Scientist Liaison. I have taught several classes on wireless devices and smartphones. Some positions and projects were held concurrently, while others were held sequentially.

3. I have more than 25 years of experience as a scientist, educator and technologist, and much of my experience relates to telecommunication, data

communications, and computer networking technologies. For eleven years from 1996 to 2007, I worked for Bay Networks and Nortel Networks. Bay Networks was in the business of making and selling computer network hardware and software. Nortel Networks acquired Bay Networks in 1998, and I continued to work at Nortel after the acquisition. Throughout my tenure at Bay and Nortel, I held positions including Principal Scientist, Principal Architect, Principal Engineer, Senior Software Engineer, and led the development and research involving a number of networking technologies. I led the efforts of Java technologies at Bay Networks and Nortel Networks. In addition, during 1999-2001, I served as the President of the Silicon Valley Java User Group with over 800 active members from many companies in the Silicon Valley.

4. Prior to that, from 1994 to 1995, I worked as a software engineer and team leader for Aptel Communications, designing and developing wireless technologies, mobile wireless devices and network software products. I worked on development of two-way wireless OFDM technology, in the 915 MHz band, under the FCC part 15. The technology was a continuation of military research for low power, wideband OFDM to reduce wireless transmission detectability.

5. From 1990 to 1993, I worked as a software engineer and team leader at Scitex Ltd., where I developed system and network communications tools (mostly in C and C++).

6. I have extensive experience in communications technologies including wireless technologies, routing and switching architectures and protocols, including Multi-Protocol Label Switching Networks, Layer 2 and Layer 3 Virtual Private Networks, and Pseudowire technologies. Much of my work for Nortel Networks (mentioned above) involved the research and development of these technologies. For example, I wrote software for Bay Networks and Nortel Networks switches and routers, developed network technologies for the Accelar 8600 family of switches and routers, the OPTera 3500 SONET switches, the OPTera 5000 DWDM family, and the Alteon L4-7 switching product family. I wrote software for Java-based device management, including a software interface for device management and network management in the Accelar routing switch family's network management system. I have also worked on enterprise Wi-Fi solutions, wireless mobility management, and wireless infrastructure.

7. I am named as a co-inventor on more than 100 issued patents and I co-authored more than 25 scientific publications, journal articles, and peer-reviewed papers. Furthermore, I am a member of a number of professional affiliations,

including the Association of Computing Machinery ("ACM") and the Institute of Electrical and Electronics Engineers ("IEEE") (senior member). I am also certified under the IEEE WCET (Wireless Communications Engineering Technologies) Program, which was specifically designed by the IEEE Communications Society (ComSoc) to address the worldwide wireless industry's growing and ever-evolving need for qualified communications professionals.

8. From 2007 to the present, I have served as a Principal Scientist at my company TelecommNet Consulting Inc., where I develop network communication technologies and provide research and consulting in advanced technologies, mainly in computer networking and Internet technologies. In addition, I have served as a Co-Founder and Chief Technology Officer (CTO) of VisuMenu, Inc. from 2010 to the present, where I design and develop architecture of visual IVR technologies for smartphones and wireless mobile devices in the area of network communications.

9. I have worked on wireless and cellular systems using a variety of modulation technologies including time-division multiple-access (TDMA), code-division multiple-access (CDMA), and orthogonal frequency-division multiplexing (OFDM). I have additionally worked on various projects involving the transmission and streaming of digital media content.

10. The above outline of my experience with communications systems is not comprehensive of all of my experience over my years of technical experience. Additional details of my background are set forth in my curriculum vitae, attached as **Exhibit A** to this Declaration, which provides a more complete description of my educational background and work experience.

11. I am being compensated for the time I have spent on this matter at the rate of $400 per hour. My compensation does not depend in any way upon the outcome of this proceeding. I hold no interest in the Petitioners (Facebook, Inc. and Instagram, LLC) or the Patent Owner (Skky, LLC).

B. Materials Considered

12. The analysis that I provide in this Declaration is based on my education and experience in the telecommunications and information technology industries, as well as the documents I have considered, including U.S. Patent No. 8,892,465 ("'465" or "'465 patent") **[Ex. 1001]**, which states on its face that it issued from an application filed on June 11, 2014, in turn claiming priority back to an earliest application filed on June 27, 2001. For purposes of this Declaration, I have assumed June 27, 2001 as the effective filing date for the '465 patent. I have cited to the following documents in my analysis below:

Exhibit No.	Title of Document
1001	U.S. Patent No. 8,892,465 to John Mikkelsen et al., entitled "Media Delivery Platform"
1003	U.S. Patent No. 7,065,342 to Devon A. Rolf, entitled "System and Mobile Cellular Telephone Device for Playing Recorded Music"
1013	U.S. Patent No. 6,956,833 to Satoru Yukie et al., entitled "Method, System, and Devices for Wireless Data Storage on a Server and Data Retrieval"
1014	Gene Frantz, *Digital Signal Processor Trends*, IEEE Micro (2000)
1025	U.S. Patent No. 6,931,292 to Marcia R. Brumitt et al., entitled "Noise Reduction Method and Apparatus"
1060	U.S. Patent No. 8,996,698 to James P. Tagg, entitled "Cooperative Network for Mobile Internet Access"
1061	Bob O'Hara et al., *802.11 Handbook: A Designer's Companion*, IEEE Press (1999)
1063	EP 0957489 A1 to Teun Van de Pol, entitled "Portable Device And Method to Record, Edit and Playback Digital Audio"
1066	U.S. Patent No. 6,560,577 to Jay Gilbert et al., entitled "Process for Encoding Audio From an Analog Medium into a Compressed Digital Format Using Attribute Information and Silence Detection"
1070	U.S. Patent No. 5,815,811 to Patrick Pinard et al., entitled "Preemptive Roaming in a Cellular Local Area Wireless Network"

13. I previously submitted a declaration in support of the Petition for Inter Partes Review of the '465 Patent, dated October 14, 2016. I maintain the opinions set forth in that Declaration, and provide additional opinions in this Declaration. I have also read the "Declaration of William H. Beckmann, Ph.D.," dated June 14, 2016, in support of the Petition for Covered Business Method (CBM) Review of U.S. Patent No. 9,037,502 ("'502 patent") ("Beckmann Declaration"). I am

informed that the Beckmann Declaration was submitted by counsel for Facebook and Instagram in connection with a separate petition on the ’502 patent, which I understand shares an identical specification with the ’465 patent, as well as the same earliest claimed priority date. Although I agree with the opinions provided by Dr. Beckmann, I will provide my own discussion to emphasize points that I find pertinent to my analysis of the claims and the prior art addressed in this Declaration. To the extent the analysis in the Beckmann Declaration is informative or applicable to my opinions, I will refer to or incorporate it in my analysis below.

II. PERSON OF ORDINARY SKILL IN THE ART

14. Part III of the Beckmann Declaration includes a discussion of a person of ordinary skill in the art. I agree with the points made by Dr. Beckmann, but I will provide my own discussion to emphasize points that I find pertinent to my analysis of the claims and the prior art addressed in this Declaration.

15. I understand that an assessment of claims of the ’465 patent should be undertaken from the perspective of a person of ordinary skill in the art as of the earliest claimed priority date, which I understand is June 27, 2001. In my opinion, a person of ordinary skill in the art as of June 2001 would have possessed at least a bachelor’s degree in computer science, computer engineering, or electrical engineering (or equivalent degree or experience) with at least four years of

experience with wireless communications systems and at least two years of experience with the communication of digital media.

16. My opinions regarding the level of ordinary skill in the art are based on, among other things, my over 25 years of experience in computer science and network communications, my understanding of the basic qualifications that would be relevant to an engineer or scientist tasked with investigating methods and systems in the relevant area, and my familiarity with the backgrounds of colleagues, co-workers, and employees, both past and present.

17. Although my qualifications and experience exceed those of the hypothetical person having ordinary skill in the art defined above, my analysis and opinions regarding the ’465 patent have been based on the perspective of a person of ordinary skill in the art as of June 2001.

III. RELEVANT TECHNOLOGY BACKGROUND

18. Part IV of the Beckmann Declaration includes an overview of the underlying technology of the ’502 patent, which I understand shares the same specification with the ’465 patent. Although I agree with Dr. Beckmann’s summary, I will provide my own overview to emphasize points that I find pertinent to my analysis of the claims and the prior art addressed in this Declaration.

19. The '465 patent, entitled "Media Delivery Platform," purports to disclose and claim a system and method for delivering digital media files to an electronic device. ('465, Abstract.) In this section, I provide a brief background discussion on technologies pertinent to the '465 patent prior to June 2001.

A. Wireless Telephones and Networks

20. Wireless telephones (also known as "cell phones") were well known prior to June 2001. The '465 patent itself recognizes the existence of "commercially available cellular phone[s]." ('465, 14:36-47.) Cell phones included transmitters and receivers for transmitting and receiving over-the-air signals (e.g., radio frequency waves), which allowed cell phones to communicate wirelessly.

21. The first commercial cellular service was launched in 1979 in Japan, over 20 years before the earliest filing date to which the '465 patent could claim priority. By the 1980s, cell phones were in widespread commercial use. For example, the Motorola "DynaTAC" cell phone was launched in the United States as early as 1983. Typical of early cell phones, the Motorola DynaTAC was designed to communicate over "1G" or "first generation" networks known as the Advanced Mobile Phone System (AMPS). Similar cellular phones and networks were also deployed in other countries throughout the 1980s.

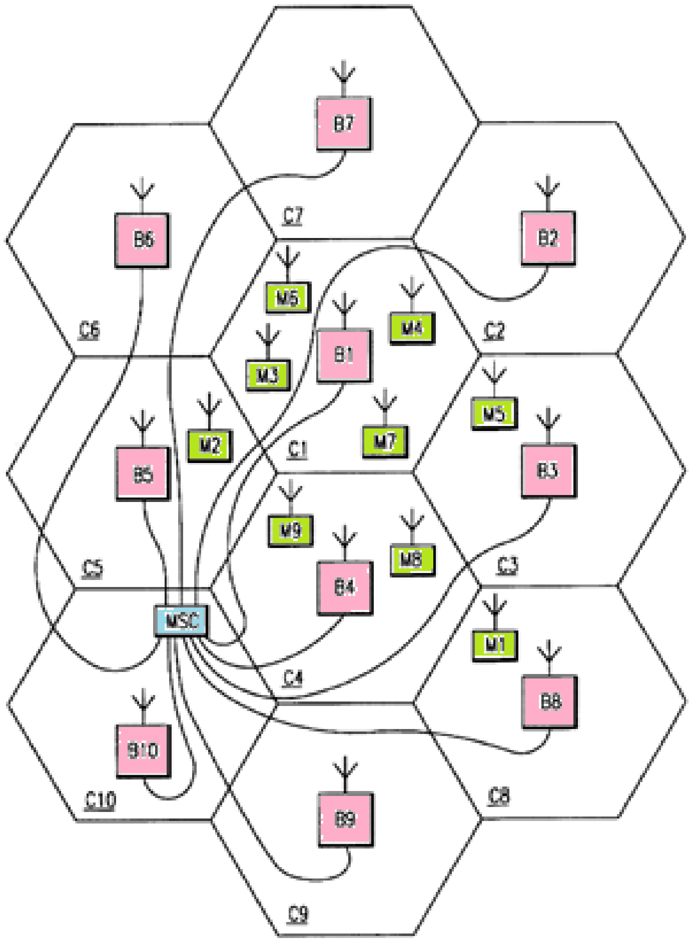


FIG. 1

22. Networks designed for cell phones, such as AMPS mentioned above, are referred to as "cellular" networks because they utilize the concept of "cells." A "cell" is a geographical region within which wireless coverage is provided by a corresponding base station or access point. Accordingly, the base station or access point enables wireless communication between a cell phone (within the corresponding cell) and the rest of the world. This is shown in Figure 1 of U.S. Patent No. 5,726,978 to Carl Magnus Frodigh et al. ("Frodigh") **[Ex. 1006]**, reproduced above. (Frodigh, Fig. 1 (highlighting added).) As shown, "[a]ssociated with and located within each of the cells **C1-C10** is a base station designated as a corresponding one of a plurality of base stations **B1-B10**," highlighted in pink above. (*Id.*, 5:64-66.) The base stations include equipment enabling wireless communication with mobile stations (shown in green) within

their respective cells. (*Id.*, 5:66-6:1, 6:15-16.) Because a single base station may communicate with more than one mobile station at any given time, as shown in cells **C1** and **C4** above, "multiple access" techniques are employed that allow a base station's communication bandwidth to be shared among multiple mobile stations. (*See id.*, 7:51-63, Fig. 2.)

23. Moreover, as shown in Figure 1 above, each base station is connected to a mobile station switching center (MSC) (shown in blue), which couples the cellular network to other networks (e.g., PSTN) via landline and/or wireless connections. (*Id.*, 6:33-47.) As Frodigh makes clear, the cellular phone and networking techniques discussed above were "well known" prior to June 2001. (*Id.*, 6:1, 6:42.) Various methods for providing "multiple access," such as TDMA, CDMA, and OFDM, were also well known. (EP 1039683 A2 **[Ex. 1007]**, at ¶¶ 0002-08; U.S. Patent No. 5,815,488 **[Ex. 1008]**, 1:12-16, 3:38-42; *see also* Cheong Yui Wong et al., *A Real-time Sub-carrier Allocation Scheme for Multiple Access Downlink OFDM Transmission*, IEEE (1999) **[Ex. 1009]**; Wonjong Rhee et al., *Increase in Capacity of Multiuser OFDM System Using Dynamic Subchannel Allocation*, IEEE (2000) **[Ex. 1010]**.)

24. Although cell phones were originally designed for voice communications, techniques were developed to allow them to transmit and receive

non-voice data. For example, it was also well-known that cell phones could be used to download and playback digital media. The Background Art section of the ’465 patent acknowledges, for example, the existence of cell phones that can play music in a compressed format such as MP3. (’465, 1:34-40.) Cell phones with media download and playback features are also discussed in prior art publications including EP 1033894 A2 **[Ex. 1011]**, U.S. Patent No. 6,423,892 **[Ex. 1012]**, U.S. Patent No. 7,065,342 to Devon A. Rolf (“Rolf) **[Ex. 1003]**, U.S. Patent No. 6,956,833 to Satoru Yukie (“Yukie”) **[Ex. 1013]**, and Alan Gatherer, *DSP-Based Architectures for Mobile Communications: Past, Present and Future*, IEEE Communications (Jan. 2000) (“Gatherer”) **[Ex. 1005]**. I discuss Rolf and Yukie in detail in **Parts V.A.1** and **V.A.5, respectively,** below.

B. Optimization of Digital Media

25. Optimization is the process of enhancing the perceived quality of digital media content in the face of real-world constraints. For example, an audio file containing a musical song may include defects that hamper the quality of the audio as perceived by the listener. As explained in U.S. Patent No. 6,560,577 to Jay G. Gilbert et al. (filed Mar. 2000) (“Gilbert”) **[Ex. 1066]**, “[s]uch defects may arise from the reproduction of the information on the analog medium and may include scratch noises, clicks, pops, hissing, etc.” (*Id.*, 4:15-18.) Gilbert explains

that "techniques to identify and compensate for certain defects" were "well known in the art" (*id.*, 4:18-20):

> These techniques include searching for certain values of the digital audio information that are beyond a normal range to identify and correct specific audio defects. Other techniques include: applying high-pass filters to remove low frequency noise, normalizing extreme or inconsistent volume levels to an average value, adjusting the playback pitch, and comparing adjacent data to adjust inconsistent values (i.e., removing blips by averaging the values of adjacent data in a linear fashion).

(*Id.*, 4:20-29.)

26. As disclosed in the '465 patent, optimization can also arise in the context of compression. ('465, 23:64-24:12.) Compression can create a tension between reducing the size of the file that stores the audio content, and the quality of the audio content as perceived by the user. Generally speaking, increasing the reduction in file size achieved by compression can reduce the perceived quality of the audio. One of the key considerations in any system that handles digital audio, therefore, is to implement optimization techniques to achieve a desirable balance between performance and audio quality. As explained in Scott Hacker, *MP3: The Definitive Guide* (2000) ("Hacker") **[Ex. 1069]**, techniques and tools that can be used to "optimize the quality" of compressed MP3 files (*id.*, at p. 161), include

pre-emphasis, normalization, sampling, resampling, bitrates, etc. (*Id*., at pp. 42-43 (explaining the "emphasis bit"), 163-170.)

27. Normalization is the process of adjusting the volume of a signal so that it meets particular criteria. For example, normalization can involve setting the volume of an audio signal to some desired value. (*See* Hacker, at p. 145 ("The general term applied to the process of making multiple volume levels peak at similar thresholds is called *normalization*, … .") (emphasis in original).) As explained in Hacker, "[o]ne bugaboo that often crops up when creating mixed song collections is the fact that the original source materials are all recorded at slightly different levels, leaving you with MP3 files of varying volumes. . . . The solution is to use a normalizer, which will boost the overall signal of weakly recorded tracks and diminish levels for loud ones." (*Id.*, at p. 165; *see also* Gilbert, Ex. 1066, 4:24-29 ("normalizing extreme or inconsistent volume levels to an average value").)

28. Moreover, by the first half of the 20th century, research had demonstrated that the human ear perceives sound differently at different frequencies. *See, e.g.*, W.B. Snow, *Audible Frequency Ranges of Music, Speech and Noise*, Journal of the Acoustical Society of America (July 1931), **[Ex. 1065]**, at p. 1 ("This paper describes the use of an electro-acoustic system … in

determining by ear the frequency ranges required for faithful reproduction of music, speech, and certain noises.").) Audio systems thus used such knowledge to emphasize certain frequencies (i.e., make them louder) over others to improve perceived quality – a technique known as "pre-emphasis." *See, e.g.*, *The IEEE Authoritative Dictionary of IEEE Standards Terms* (2000), **[Ex. 1075]**, at p. 859 (defining "pre-emphasis" as "A process in a system designed to emphasize the magnitude of some frequency components with respect to the magnitude of others, to reduce adverse effects, such as noise, in subsequent parts of the system.").)

29. As explained by Louis D. Felder of Dolby, pre-emphasis had been widely used in audio systems to match the characteristics of the human ear to the background environment:

> The pre- and post-emphasis technique is a method which modifies the spectrum of an audio signal from a music performance at the input of an audio channel with inherently flat overall response and then performs the inverse modification at its output to produce a system with a flat low level frequency response and a modified background noise spectrum. This has been done to match more closely the system background noise to the characteristics of the human ear and the background acoustic noise spectrum of the listening or recording environment in order to produce wider apparent dynamic range. The emphasis technique has found wide application in the past because of the limited dynamic range of audio systems and the fact that music

> sources produce more energy in the low frequency region where the ear is less sensitive to noise.

(Louis D. Fielder, *Pre- and Postemphasis Techniques as Applied to Audio Recording Systems*, 78th Audio Engineering Society Convention (1985), **[Ex. 1076]**, at p. 1 (underlining added).)

C. Digital Signal Processors

30. A digital signal processor, or "DSP," is a specialized microprocessor. It can be programmed to perform a wide variety of computations, and is particularly suited for functions related to digital signal processing, including numerical operations. Off-the-shelf DSPs, including NEC's μPD7720, TI's TMS32010, and Motorola's DSP56000 had been available since at least the early 1980s. And by the turn of the century, DSPs had become immensely popular. As explained in Gene Frantz, *Digital Signal Processor Trends*, IEEE Micro (2000) **[Ex. 1014]** ("Frantz"):

> The mass-storage industry depends on DSPs to produce hard-disk drives and digital versatile disc players. Ever-increasing numbers of digital subscriber line and cable modems, line cards, and other wired telecommunications equipments are based on DSPs. Digital still cameras, hearing aids, motor control, consumer audio gear such as Internet audio are just some of the many mass market applications in which DSPs are routinely found today. More specialized DSP

> applications include image processing, medical instrumentation, navigation, and guidance.

(*Id.*, at p. 52, left column.)

31. The popularity of DSPs was driven by a number of factors, including their favorable size, performance, power consumption, and price. (*Id.*, at p. 55, left column ("[I]n the 1990s, DSPs were entering the realm of price, performance, and power consumption making them appropriate for high-volume applications."); Gatherer, at p. 86, left column ("Architecture design, and process enhancements are producing new generations of processors that provide high performance while maintaining the low power dissipation necessary for battery-powered applications.").) Like many other computer technologies, DSPs only got better – and were expected to continue to get better – with time. (Gatherer, Figs. 3 & 4.) This is succinctly summarized in Table 1 in Frantz below.

Table 1. Two decades of DSP market integration (typical DSP figures).

	1982	1992	2002
Die size (mm)	50	50	50
Technology size (microns)	3	0.8	0.18
MIPS	5	40	5,000
MHz	20	80	500
RAM (words)	144	1,000	16,000
ROM (words)	1,500	4,000	64,000
Price (dollars)	150	15	1.50
Power dissipation (mW/MIPS)	150	12.5	0.1
Transistors	50,000	500,000	5 million
Wafer size (inches/mm)	3 / 75	6 / 150	12 / 300

(Frantz, at p. 55, Table 1.)

32. By the time of the alleged invention, DSPs were standard components in cell phones. As explained in Frantz, "the entire digital wireless industry operate[d] with DSP-enabled handsets." (*Id.*, at p. 52, left column.) Gatherer likewise described the presence of DSPs in cell phones as "pervasive." (Gatherer, at p. 84, left column.) DSPs provided much of the processing required, such as modulation/demodulation and speech coding/decoding. (*Id.*, Fig. 1.) And as their processing power improved, DSPs were also considered for newer features provided by cell phones, including the processing of "audio and visual

entertainment." (*Id.*, at p. 89, left column; *see also id.* Fig. 7.) Moreover, it was well known that DSPs could be used to process signals transmitted using a particular modulation technique called orthogonal frequency-division multiplexing (OFDM), which I explain below. (E. Lawrey, *Multiuser OFDM*, Fifth International Symposium on Signal Processing and its Applications (Aug. 1999), **[Ex. 1015]**, at p. 761, left column ("[A] test hardware solution is presented using SHARC® Digital Signal Processors (DSP) demonstrating the feasibility of a simple multiuser OFDM system."); U.S. Patent No. 5,732,113 (published Mar. 1998), **[Ex. 1016]**, 4:26-44 ("DSP 100 performs a variety of operations on the in-phase and quadrature samples of the received OFDM signal."); U.S. Patent No. 6,711,221 (filed Feb. 2000), **[Ex. 1017]**, 3:33-48.) In short, it was known prior to the alleged invention that "DSPs could provide intelligence for <u>every system that transforms one kind of input to another kind of output</u>." (Frantz, at p. 59, right column (emphasis added).)

D. Orthogonal Frequency-Division Multiplexing (OFDM)

33. Orthogonal frequency-division multiplexing, or "OFDM," is a particular type of frequency-division multiplexing ("FDM"), which refers to a technique in which discrete signals can be combined within a shared frequency band used for communication. The basic concept of FDM can be explained using

the familiar concept of FM radio, in which a user turns a radio receiver to a particular frequency (e.g. 97.1 MHz) to listen to a radio broadcast. FDM divides up an available frequency band (characterized by a particular "bandwidth") into a number of frequency "sub-bands," sometimes referred to as "sub-channels." To reduce interference, these sub-bands usually do not overlap. To use the FM radio example, FM radio stations use a frequency band that ranges from 87.5 to 108 MHz of the radio spectrum. By dividing the available bandwidth into sub-bands, FDM allows multiple signals to be transmitted simultaneously because each sub-band can carry a distinct signal. This is essentially how "frequency division multiplexing" gets its name. FDM was used with the telegraph more than a century ago and continues to be used in numerous applications including, as noted, radio signals broadcast over the air.

34. OFDM is a more advanced variant of FDM. In broad overview, OFDM differs from ordinary FDM in that OFDM uses frequency sub-bands that overlap, but are centered at precise intervals and result in an "orthogonal" property, in which the electromagnetic waves have reduced interference with each other. The basic difference between conventional FDM and OFDM is illustrated in Figure 1.10 of Richard Van Nee et al., *OFDM for Wireless Multimedia Communications* (2000) **[Ex. 1018]** ("Van Nee"):

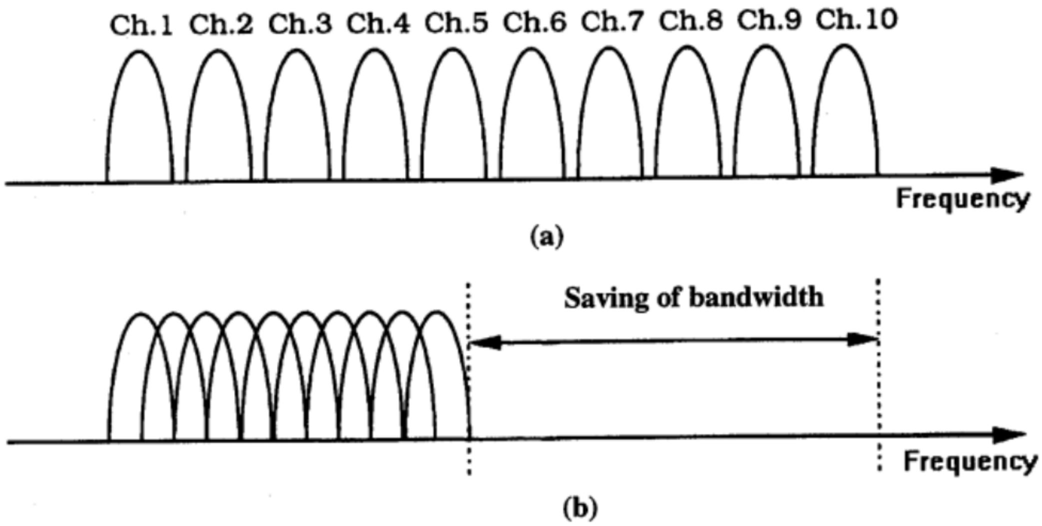


Figure 1.10 Concept of OFDM signal: (a) Conventional multicarrier technique, and (b) orthogonal multicarrier modulation technique.

(Van Nee, Fig. 1.10, at p. 22.) The top portion **(a)** of Figure 1.10 shows a conventional FDM arrangement in which each signal channel occupies a distinct frequency sub-band. The sub-bands in this example do not overlap because each sub-band is separated by what is known as a "guard band," an unused portion of the bandwidth designed to reduce interference between neighboring channels.

35. The bottom portion **(b)** of Figure 1.10 shows an OFDM arrangement. As shown, the sub-bands in OFDM overlap, eliminating the need for a guard band and thus resulting in a more efficient use of the available bandwidth. The spacing between the center frequency of each sub-band is precisely chosen such that the frequencies are "orthogonal" to each other, a characteristic that reduces interchannel interference notwithstanding the overlapping nature of the sub-bands.

36. Because the sub-bands overlap in OFDM, a mathematical method known as the fast Fourier transform ("FFT") is performed at the receiver to "demodulate" the OFDM signal to recover the individual signals carried within each sub-band. (Van Nee, at p. 47 ("[T]he basic OFDM signal is formed using the IFFT, adding a cyclic extension and performing windowing to get a steeper spectral rolloff. . . . In the receiver, the subcarriers are demodulated by an FFT, which performs the reverse operation of an IFFT.").) As I noted above, digital signal processors are well-suited for mathematical operations such as the FFT.

37. OFDM dates back as far as 1966 to a patent and technical paper by Bell Labs inventor Robert W. Chang. (U.S. Patent No. 3,488,445 entitled "Orthogonal Frequency Multiplex Data Transmission System" **[Ex. 1019]**; Robert W. Chang, *Synthesis of Band-limited Orthogonal Signals for Multi-Channel Data Transmission*, Bell Labs Technical Journal, no. 45, **[Ex. 1020],** at pp. 1775-96 (Dec. 1966).) By June 2001, the OFDM technique was well known to those skilled in the art. In fact, in 1996, the University of Hamburg began hosting an annual conference known as the International OFDM Workshop, which, as its name suggests, was specifically dedicated to OFDM technology. (Ex. 1021, 1022, 1023.)

38. OFDM is well-suited to a shared frequency band such as the radio spectrum used for wireless communication (approximately 3 Hz to 3 THz), which includes the bandwidth allocated to cellular networks. Because OFDM allows communication bandwidth to be shared by multiple signals (e.g., sent to different cell phones), OFDM was known by 2000 as one of a number of "multiple access" techniques that can be employed in cellular systems. (Rainer Grünheid et al., *Adaptive Modulation and Multiple Access for the OFDM Transmission Technique*, Wireless Personal Communications (May 2000) **[Ex. 1024]**, Abstract ("Since in OFDM the total bandwidth is divided into a large number of subcarriers, it can be flexibly shared among all the users."); *see also* EP 1039683 A2 **[Ex. 1007]**, at ¶¶ 0001, 0008; Cheong Yui Wong et al., *A Real-time Sub-carrier Allocation Scheme for Multiple Access Downlink OFDM Transmission*, IEEE (1999) **[Ex. 1009]**; Wonjong Rhee et al., *Increase in Capacity of Multiuser OFDM System Using Dynamic Subchannel Allocation*, IEEE (2000) **[Ex. 1010]**.)

39. OFDM was deployed in a number of wireless systems prior to June 2001. For example, the ubiquitous wireless LAN technology commercially known as "Wi-Fi" or "WiFi" uses OFDM. The OFDM air interface was standardized for use in WiFi networks in 1999 in the IEEE 802.11a standard. (IEEE Std 802.11a-1999, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer

(PHY) specifications: High-speed Physical Layer in the 5 GHz Band **[Ex. 1026]**, at p. 4 ("This subclause describes the PHY services provided to the IEEE 802.11 wireless LAN MAC by the 5 GHz (bands) OFDM system.").) The commercial Digital Audio Broadcasting and Digital Video Broadcasting systems also used OFDM for wireless transmission. (U.S. Patent No. 6,125,124 **[Ex. 1027]**, 1:19-23; *see also* U.S. Patent No. 7,133,352 **[Ex. 1028]**, 1:36-45; U.S. Patent No. 6,108,810 **[Ex. 1029]**, 1:31-53.) As explained in Ahmad R.S. Bahai, *Multi-Carrier Digital Communications* (1999) **[Ex. 1030]**: "OFDM has been particularly successful in numerous wireless applications, where its superior performance in multi-path environments is desirable." (*Id.*, at p. 14.)

40. As mentioned above, it was well-known that OFDM could be employed in cellular environments, and that there would be advantages to do so. Beyond its superior performance in multi-path environments, OFDM allows the allocated communication bandwidth (e.g., of a particular cell) to be shared among multiple cell phone users. The prior art before June 2001 is replete with references describing the use of OFDM in cellular systems:

- Leonard J. Cimini, Jr., *Analysis and Simulation of a Digital Mobile Channel Using Orthogonal Frequency Division Multiplexing*, IEEE Trans. Commun., Vol. 33, No. 7, pp. 665-75 (July, 1985) **[Ex. 1031]**;

- Giovanni Santella, *Performance Evaluation of Broadband Microcellular Mobile Radio in M-QAM OFDM Systems*, IEEE (1996) **[Ex. 1032]**;
- H. Rohling et al., *Performance of an OFDM-TDMA Mobile Communication System*, IEEE (1996) **[Ex. 1033]**;
- Antti Toskala et al., *Cellular OFDM/CDMA Downlink Performance in the Link and System Levels*, IEEE (1997) **[Ex. 1034]**;
- Fredrik Tufvesson et al., *Pilot Assisted Channel Estimation for OFDM in Mobile Cellular Systems*, IEEE (1997) **[Ex. 1035]**;
- Branimir Stantchev et al., *An Integrated FSK-signaling Scheme for OFDM-based Advanced Cellular Radio*, IEEE (1997) **[Ex. 1036]**;
- J. C-I Chuang, *An OFDM-based System with Dynamic Packet Assignment and Interference Suppression for Advanced Cellular Internet Service*, IEEE (1998) **[Ex. 1037]**;
- Branimir Stantchev et al., *Burst Synchronization for OFDM-based Cellular Systems with Separate Signaling Channel*, IEEE (1998) **[Ex. 1038]**;
- Kevin L. Baum, *A Synchronous Coherent OFDM Air Interface Concept for High Data Rate Cellular Systems*, IEEE (1998) **[Ex. 1039]**;

- Li Ping, *A Combined OFDM-CsDMA Approach to Cellular Mobile Communications*, IEEE Transactions on Communications, Vol. 47, No. 7, pp. 979-82 (July 1999) **[Ex. 1040]**;
- Justin Chuang et al., *High-Speed Wireless Data Access Based on Combining EDGE with Wideband OFDM*, IEEE Communications Magazine, Vol. 37, No. 11, pp. 92-98 (Nov. 1999) **[Ex. 1041]**;
- Justin Chuang et al., *Beyond 3G: Wideband Wireless Data Access Based on OFDM and Dynamic Packet Assignment*, IEEE Communications Magazine (July 2000) **[Ex. 1042]**;
- Chi-Hsiao Yih et al., *Adaptive Modulation, Power Allocation and Control for OFDM Wireless Networks*, IEEE (2000) **[Ex. 1043]**;
- Fumihide Kojima et al., *Adaptive Sub-carriers Control Scheme for OFDM Cellular Systems*, IEEE (2000) **[Ex. 1044]**; and
- Chi-Hsiao Yih et al., *Power Allocation and Control for Coded OFDM Wireless Networks*, IEEE (2000) **[Ex. 1045]**.

41. By the late 1990s, in fact, key players in the wireless industry including Ericsson, Nokia and Sony were publishing technologies and filing patent applications on ways to use OFDM over cellular networks. These include:

- Ericsson's U.S. Patent No. 5,726,978 **[Ex. 1006]**, filed in June 1995 and issuing in March 1998 (*see id.*, 2:38-41);
- Nokia's U.S. Patent No. 5,828,650 **[Ex. 1046]**, filed in July 1996 and issuing in October 1998 (*see id.*, 4:26-30);
- Sony's EP 0786890 A2 **[Ex. 1047]**, filed in January 1997 and published in July 1997 (*see id.*, 4:7-9; 5:28-31; *see also id.*, 3:20-21);
- Telia's WO 1997030531 A1 **[Ex. 1048]**, filed in January 1997 and published in August 1997 (*see id.*, 3:21-32, 9:15-17);[1]
- US 6,188,717 **[Ex. 1049]**, filed November 17, 1997 and published February 13, 2001 (*see id.*, Abstract, 1:51-55, 11:15-17 (Claim 17));
- Flarion's (a spin-off from Lucent) U.S. 6,711,120 **[Ex. 1050]**, filed March 11, 1999 (*see id.*, Abstract, 8:2-4);
- Flarion's U.S. 6,553,019 **[Ex. 1051]**, filed December 23, 1999 (*see id.*, 7:7-9);

---

[1] The Telia reference specifically notes that "[t]he design and implementation of OFDM systems are well known to those skilled in the art of telecommunications." (Ex. 1048, 9:27-29.)

- Lucent's U.S. 6,922,388 **[Ex. 1052]**, filed February 11, 2000 (*see id.*, 1:24-26);
- Flarion's EP 1039683 B1 **[Ex. 1007]**, filed February 28, 2000 and published September 27, 2000 (*see id.*, ¶ 0009); and
- Toshiba's U.S. 2001/0021182 **[Ex. 1053]**, filed February 26, 2001 (*see id.*, ¶¶ 0003, 0018, 0021).

42. As demonstrated by the numerous prior art publications and patent applications listed above, the communications industry had been actively developing systems for cellular communication using OFDM since at least the mid-1990s, and this continued unabated right up to the time of the alleged invention in 2001. In fact, by 2001, commercialization of cellular systems that use OFDM was already underway. (Laurie Ann Toupin, *Flash-OFDM 'Hops' Wireless Data Communications into the Main Stream*, **[Ex. 1054]**.)

IV. THE '465 PATENT

A. The Specification

43. Part V of the Beckmann Declaration includes a section containing an overview of the specification of the '502 patent, which I understand shares the same specification with the '465 patent. To the extent applicable, I have adopted portions of Dr. Beckmann's analysis, but provided my own overview to emphasize points that I find pertinent here.

44. The ’465 patent purports to describe a system and method for delivering digital media files to an electronic device. (’465, Abstract.) In one embodiment, the patent describes a server (**206**) for storing digital media files. (’465, 15:13-14; *see also id.*, 13:1-2 (describing a similar server **106**).) The server can store the media files in a database. (’465, 13:56-60.) The server can also provide the stored media files for download. (’465, 15:17-19.)

45. The basic architecture is shown in Figure 2, reproduced at right. The right side of the figure shows a cell phone **202** (on the right) that communicates with a cellular service provider **208**. (’465, 14:23-28, 14:45-47.) On the left side is a server **206**, which includes server software **207**. (’465, 14:34-35.) Above server **206** is a voice adapter **210** that exchanges audio (sound) signals with a public switched telephone network (PSTN), which in turn communicates with the cellular service provider **208**. (’465, 18:37-45.)

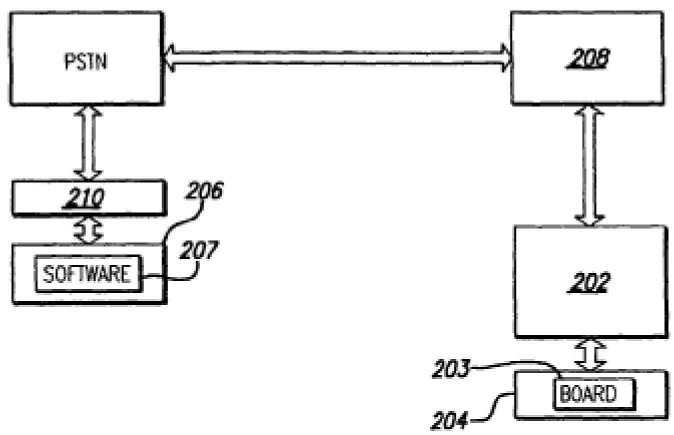
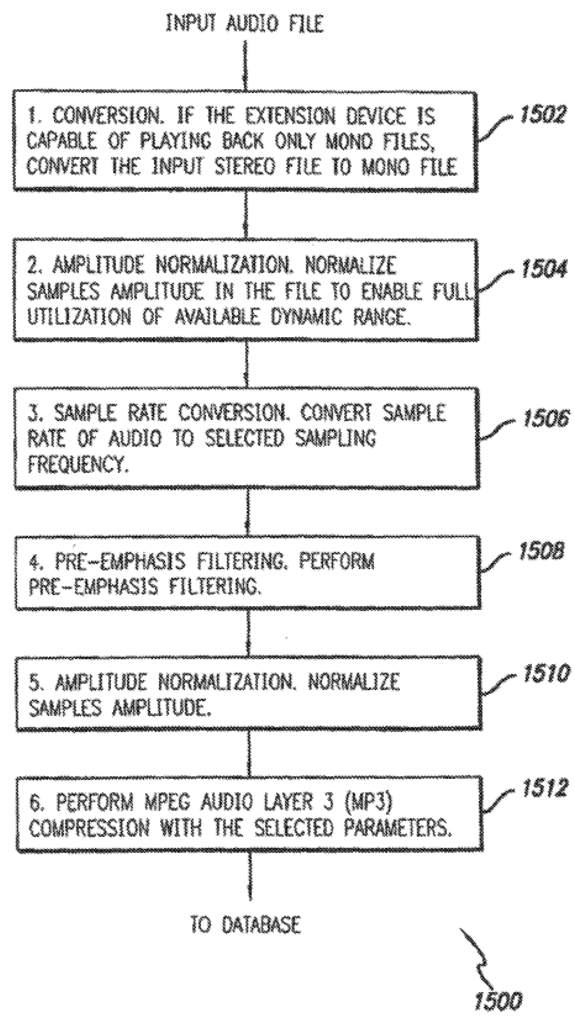


FIG. 2

46. The specification explains that the server can receive requests from the phone (’465, 12:8-13:4), “which may be given through user voice commands

or commands using the phone keys." ('465, 13:3-4.) If the user requests to download a particular digital media file, the server allows for the file to be transmitted to the cell phone for storage and playback. ('465, 12:59-64, 13:10-15, 13:44-45, 14:6-15:3, 15:40-52.) This is shown in Figure 2 above.

47. The '465 patent discloses that "[a]n orthogonal frequency-division multiplex (OFDM) modulation scheme" can be used for data transmission. ('465, 16:65-66.) The specification discloses that the transmission method using OFDM includes the step of "symbol synchonization." ('465, 16:47-56; *see also id.* 17:39-51.) Further, in one embodiment, the server includes an "audio data optimization and compression element **1205**" that "utilizes a music compression algorithm outlined in FIG. 15 (shown at right), which converts common music files into compressed files in order to reduce the audio clip size for



minimizing its download time, while maintaining predetermined audio quality." ('465, 23:64-24:2.)

B. The Claims of the '465 Patent

48. This Declaration addresses claims 1-2 and 7-11. Claims 1 and 9 are independent claims that recite substantially similar limitations. Claim 1 reads:

> 1. A digital media communication system, the system comprising:
>
> a server operably coupled to a database, the database including a plurality of digital media files, said server including a server digital signal processor and memory,
>
> wherein the server digital signal processor is configured to,
>
> > receive a non-optimized digital media file,
> >
> > optionally store the non-optimized digital media file in the database,
> >
> > optimize the non-optimized digital media file according to an optimization scheme,
> >
> > store the optimized digital media file in the database,
> >
> > receive a request for the digital media file, and
>
> cause a transmission of the requested optimized digital media file by synchronized orthogonal frequency-division multiplex modulation to a wireless electronic device, said device

> including a device digital signal processor configured to receive and process the optimized digital media file sent by synchronized orthogonal frequency-division multiplex modulation.

('465, 33:5-24 (Claim 1).) I will address the other claims in the '465 patent in my detailed analysis in **Part V.B** below.

C. Claim Construction

49. I am informed that, in an *inter partes* review, the terms in a patent are construed in accordance with their broadest reasonable interpretation consistent with the specification. I have identified two terms in the '465 patent that, in my opinion, would benefit from an explicit construction.

1. "Non-Optimized Digital Media File" (Claims 1, 9)

50. Claims 1 and 9 recite the phrase, "non-optimized digital media file." The term "non-optimized" (or any variant of that term, including "nonoptimized," "unoptimized," etc.) does not appear in the written description of the '465 patent. In fact, I could not locate the term "optimized" in the written description, either.

51. The written description describes a technique for "audio parametric optimization and compression" (Figure 15 (**1500**)), which performs a number of steps performed on an input data file. ('465, 24:7-15.) The specification explains that these optimizations are considered part of a compression algorithm: "The

server audio data optimization and compression element **1205**, utilizes a music compression algorithm outlined in FIG. 15, which converts common music files into compressed files in order to reduce the audio clip size for minimizing its download time, while maintaining predetermined audio quality." ('465, 23:64-24:2 (underlining added).) The specification describes all of the sub-steps of the optimization and compression process as part of a compression process. ('465, 24:6-12 ("The method **1500** of compressing the files comprises the steps of a) conversion **1502**; b) amplitude normalization **1504**; c) sample rate conversion **1506**; d) pre-emphasis filtering **1508**; e) amplitude normalization **1510**; and f) performance of MPEG audio layer 3 (MP3) compression with the selected parameters **1512**. The compressed files are then transferred to the server database.") (underlining added).) In other words, an **optimized** digital media file is a file that has been compressed in order to reduce its size.

52. The written description does not describe the format or composition of the original input file to which the compression algorithm is applied. Nevertheless, because the specification describes "optimization" as compression, the negative term "**non**-optimized digital media file" would be understood by a person of ordinary skill in the art as a "**digital media file that has not undergone compression or other processing**."

2. "Content-Rich Digital Media File" (Claim 9)

53. The term "content-rich media file" (or any variant of the term) does not appear in the written description. Nevertheless, the written description repeatedly refers to the media files and "sound and/or image files." ('465, e.g., 2:3, 3:11, 5:19, 31:30.) Based on the specification, therefore, a person of ordinary skill in the art would construe "**content-rich media file**" as a "**sound and/or image file**."

V. APPLICATION OF THE PRIOR ART TO THE CLAIMS

54. For purposes of my analysis below, I have treated independent claim 1 as being similar to independent claim 9. In **Part V.B.5** below, I will explain why claim 9 is similar to claim 1 for purposes of my analysis and for application of the prior art.

55. I have reviewed and analyzed the prior art references and materials listed in **Part I.B** above. In my opinion, each limitation of claims 1 and 8 is disclosed and rendered obvious by Rolf (Ex. 1003) in view of Frantz (Ex. 1014), Gilbert (Ex. 1066), O'Hara (Ex. 1061) and Tagg (Ex. 1060). Each limitation of claim 2 is disclosed and rendered obvious by Rolf (Ex. 1003) in view of Frantz (Ex. 1014), Gilbert (Ex. 1066), O'Hara (Ex. 1061) Tagg (Ex. 1060), and Brumitt (Ex. 1025). Each limitation of claim 7 is disclosed by Rolf (Ex. 1003) in view of Frantz (Ex. 1014), Gilbert (Ex. 1066), O'Hara (Ex. 1061) Tagg (Ex. 1060), Yukie

(Ex. 1013), and Van de Pol (Ex. 1063). Each limitation of claim 9-11 is disclosed and rendered obvious by Rolf (Ex. 1003) in view of Frantz (Ex. 1014), Gilbert (Ex. 1066), O'Hara (Ex. 1061), Tagg (Ex. 1060), and Pinard (Ex. 1070).

56. Counsel has informed me that Rolf, Gilbert, Brumitt, Tagg, Pinard, and Yukie qualify as prior art to the '465 patent at least because they are U.S. patents issuing from applications filed before June 27, 2001, the filing date of the earliest application to which the '465 patent could claim priority. I am informed by counsel that Frantz, O'Hara, and Van de Pol qualify as prior art to the '465 patent at least because they were all published before June 27, 2001. I will provide a brief summary of these references before applying them to the claims.

A. Brief Description and Summary of the Prior Art

1. Brief Summary of Rolf [Ex. 1003]

57. **Rolf**, U.S. Patent No. 7,065,342, entitled "System and Mobile Cellular Telephone Device for Playing Recorded Music," describes a "system and method for wirelessly transmitting encoded music, via a wireless communications link, to a portable or mobile communications device which includes a player for playing the music or audio." (Rolf, Ex. 1003, 1:17-21.) This is generally shown in Figure 1, reproduced below.

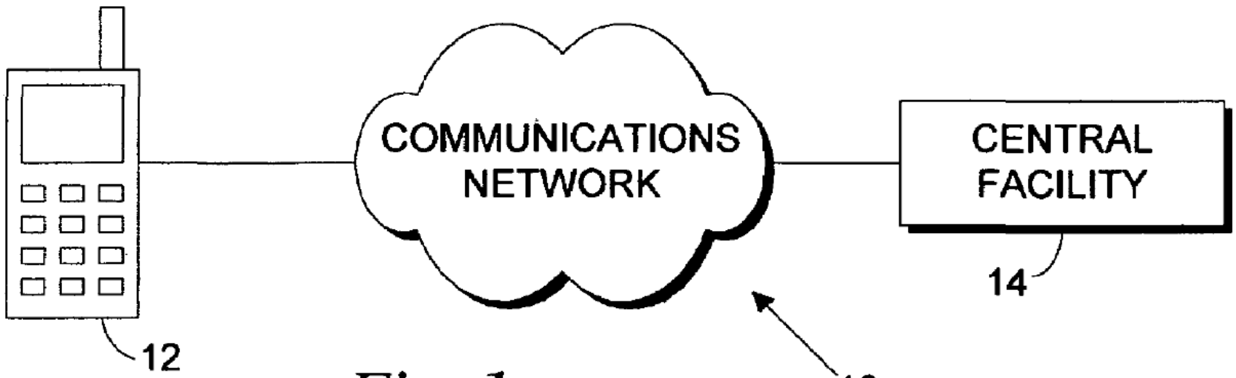


Fig. 1.

(*Id.*, Fig. 1.) As shown, the communications device can be a "cellular telephone or personal digital assistant." (*Id.*, 1:27-28.) This Declaration relies on Rolf as the primary reference that discloses the majority of the limitations of the claims.

58. Rolf explains that "a user of the cellular telephone (for example) may use the telephone to establish a wireless communications link …, and then wirelessly download one or more selected music recordings for storage in a memory of the cellular telephone. In particular, the selected music recording(s) is/are transmitted via a wireless data communications link to the cellular telephone." (*Id.*, 1:28-35.) Rolf also explains that the music recording "need not be fully stored" within the cell phone, but rather could be "streamed" to the cell phone via the communications link. (*Id.*, 6:21-26.)

59. Moreover, Rolf teaches that the music can be "encoded by a compression algorithm into an encoded (such as MP3 or other) format." (*Id.*, 1:35-

38 (underlining added); *see also id.*, 5:37-39; 8:63-9:6.) Further details about Rolf are provided in my detailed analysis of the claim limitations below.

The Rolf Provisional

60. Even though I understand that Rolf is, on its own, prior art to the ’465 patent, I have also been asked to examine U.S. Provisional Patent Application No. 60/167,179 (“Rolf Provisional”) **[Ex. 1071]**, in case Patent Owner should attempt to swear behind Rolf in some way. On its face, Rolf claims priority to the Rolf Provisional, which appears to have been filed on November 23, 1999. (Rolf, 1:8-11.) I understand that for Rolf to be considered prior art to the ’465 patent as of the earlier filing date of the Rolf Provisional (rather than simply the filing date of the non-provisional application from which Rolf issued), (1) portions of Rolf cited for invalidity must be supported by disclosure in the Rolf Provisional, and (2) at least one claim issued in Rolf must be supported by disclosure in the Rolf Provisional. It is my opinion that the Rolf Provisional satisfies these requirements.

61. First, I note that the text of the Rolf Provisional and Rolf are substantively identical apart from the title, abstract, the claim language, and four paragraphs where some language was added in the non-provisional application. I have created an exhibit comparing the textual contents of Rolf and the Rolf Provisional. (“Rolf Redline”) **[Ex. 1072].** The exhibit shows differences between

the two documents with blue indicating the matter added or deleted from the Rolf Provisional. As can be seen from the few differences, much of the added language appears to be non-substantive.

62. Even the figures of Rolf and the Rolf Provisional are the same, despite being hand-drawn in the provisional and formally rendered in the issued patent. (*Compare* Rolf, Figs. 1-10 *with* Rolf Provisional, Figs. 1-10.) In terms of its substantive disclosure, the Rolf Provisional has been entirely carried forward (with the exception of its title and claims) into the later non-provisional application that gave rise to Rolf.

63. In this Declaration, to the extent I cite language from Rolf that is not literally contained verbatim in the Rolf Provisional, I have included cites to substantially similar language that is contained in the Rolf Provisional and provides adequate support for the same proposition. All citations to Rolf made in this Declaration are supported by disclosures from the Rolf Provisional, as shown in **Exhibit B** to this Declaration.

64. Second, I have determined that there is sufficient description and support within the Rolf Provisional for at least one of the claims that issued in Rolf, such that a person of ordinary skill would have understood and been able to practice that claim. In fact, I performed the analysis for eight exemplary claims for

the avoidance of any doubt that the claims of Rolf are adequately supported by the Rolf Provisional. The chart in **Exhibit C** to this Declaration contains a listing of exemplary issued claims of Rolf (claims 1-3) with corresponding support from the Rolf Provisional. I have included exemplary support, but I will provide additional detail should it be required to address any arguments made by Patent Owner in response.

2. Brief Summary of Frantz [Ex. 1014]

65. **Frantz**, entitled "Digital Signal Processor Trends," is an article appearing in the November-December 2000 issue of the IEEE Micro Magazine. The independent claims of the '465 patent recite a "**server digital signal processor**" and a wireless device or cellular telephone that has a "**digital signal processor**." This Declaration cites Frantz to confirm that digital signal processors, and their use in servers, wireless devices, and cell phones, was known prior to June 2001.

66. Frantz explains that "DSPs could provide intelligence for every system that transforms one kind of input to another kind of output." (Frantz, at p. 59, right column.) Thus, they can provide processing power for a wide variety of applications. As Frantz explains:

> The mass-storage industry depends on DSPs to produce hard-disk drives and digital versatile disc players. Ever-increasing numbers of

> digital subscriber line and cable modems, line cards, and other wired telecommunications equipments are based on DSPs. Digital still cameras, hearing aids, motor control, consumer audio gear such as Internet audio are just some of the many mass market applications in which DSPs are routinely found today. More specialized DSP applications include image processing, medical instrumentation, navigation, and guidance.

(*Id.*, at p. 52, left column.) Moreover, Frantz explains that DSPs are particularly suitable for "number crunching." (*Id.*, at p. 52, right column – p. 53, left column.) Frantz also discloses that DSPs are ubiquitous in the digital wireless industry, and appear in many wireless handsets. (*Id.*, p. 52, left column ("Today, the entire digital wireless industry operates with DSP-enabled handsets and base stations.") (underlining added); *see also id.*, at p. 58, Fig. 5.)

3. Brief Summary of Gilbert [Ex. 1066]

67. **Gilbert**, U.S. Patent No. 6,560,577, entitled "Process for Encoding Audio from an Analog Medium into a Compressed Digital Format Using Attribute Information and Silence Detection," discloses a variety of techniques for optimizing digital audio files. My Declaration cites Gilbert in connection with limitations in claims 1 and 9 relating to the optimization of digital media files, and the first "normalizing" step in dependent claim 2. In particular, Gilbert discloses a technique in which a digital audio file can be generated from an original analog

audio source, which is then subjected to a number of optimization techniques to enhance the perceived quality of digital audio files. (Gilbert, Ex. 1066, 3:62-66, 4:6-10.) Further discussion of Gilbert is provided in the analysis below.

4. Brief Summary of Brumitt [Ex. 1025]

68. **Brumitt**, U.S. Patent No. 6,931,292, entitled "Noise Reduction Method and Apparatus" describes a technique "for reducing unwanted noise in a signal." (Brumitt, 1:7-8; *see also id.*, Abstract ("A method and system for reducing the undesirable noise in a communication signal is provided.").) I rely on Brumitt in connection with certain optimization steps recited in claim 2. Brumitt explains that the system "employs digital signal processing of the communication signal to selectively emphasize, buffer, amplify, and smooth the components of the signal, thereby enhancing the signal quality (signal to noise ratio) of the presented communication signal." (*Id.*, Abstract.) Brumitt's technique is generally shown in Figure 1, reproduced below.

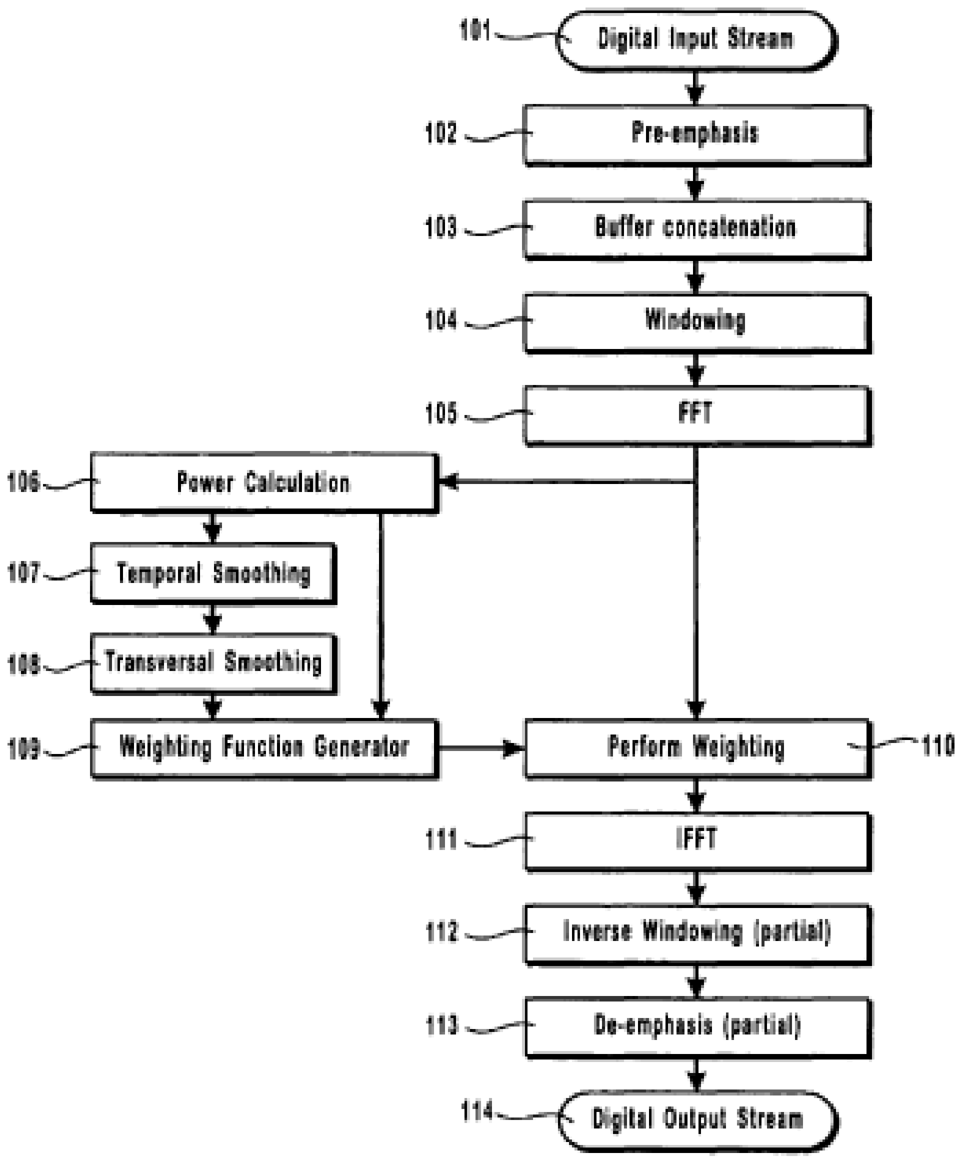


Fig. 1

(*Id.*, Fig. 1.)

69. In the initial step in Figure 1 shown above, "the noise cancellation algorithm receives **101** a digital data stream." (*Id.*, 3:64-65.) Brumitt explains that "[t]ypically, this desired signal content is a voice or speech signal, although

alternative signal content can be used." (*Id.*, 4:5-7.) The digital audio signal is next "passed through a pre-emphasis function **102**, which flattens the spectral energy of the desired signal content." (*Id.*, 4:2-5.) Brumitt discloses that the pre-emphasis-filtered signal can be "normalized" in a subsequent weighting step **110**. (*Id.*, 4:54-57 ("If <u>signal normalization</u> is required later in the Weighting block **110**, ...") (underlining added); *see also id.*, 4:62-5:10, 6:5-9, 8:39-51.) The weighting step **110** normalizes the audio signal as necessary such that signal frequencies corresponding to noise can be more accurately identified for attenuation. (*Id.*, 4:65-5:10; *see also id.*, 6:5-18, 8:30-39, Fig. 6.) Further discussion of Brumitt is provided in the analysis below.

5. Brief Summary of Yukie [Ex. 1013]

70. **<u>Yukie</u>**, U.S. Patent No. 6,956,833, entitled "Method, System and Devices for Wireless Data Storage on a Server and Data Retrieval," describes a method by which a "user device **10** establishes a wireless connection to data server **16** and sends data to data server **16** for storage and later access by user device **10**." (Yukie, Ex. 1013, 4:23-26.) I have cited Yukie in connection with dependent claim 7, which recites that a digital media file is "received from the wireless electronic device." ('465, 34:12-13 (claim 7).) The overall system of Yukie is shown in Figure 1, reproduced below:

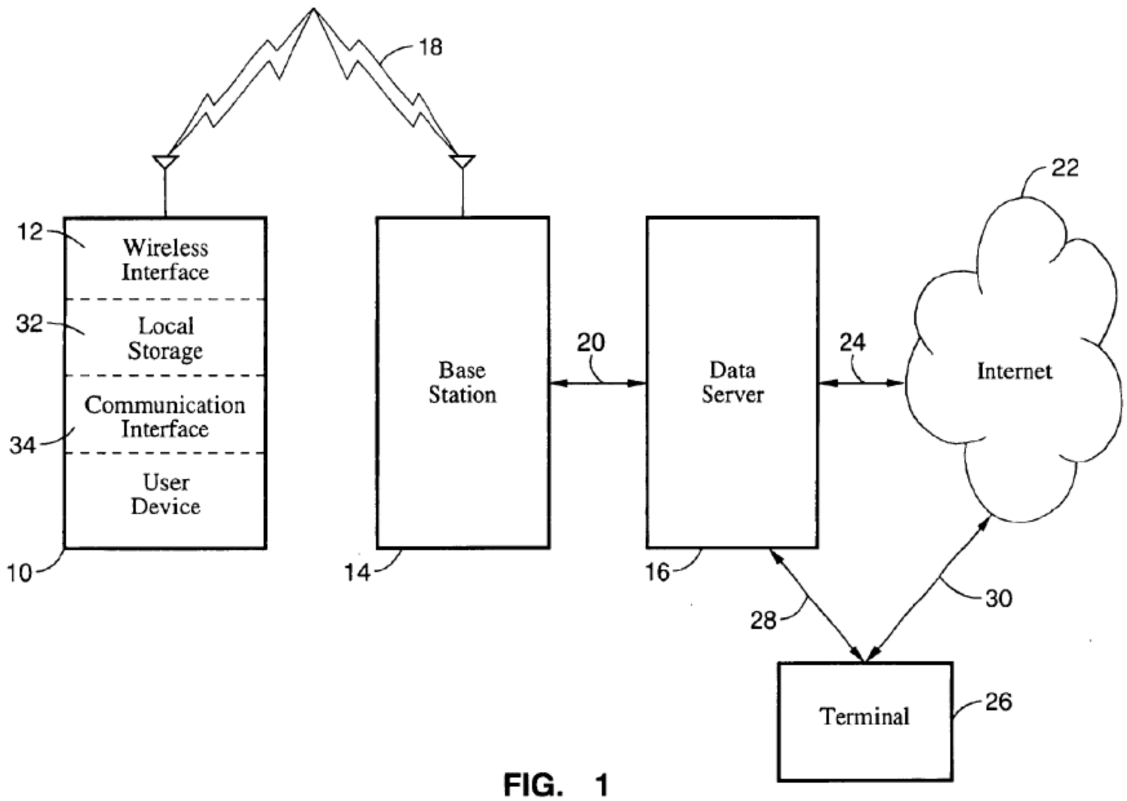


FIG. 1

User device **10** shown in Figure 1 can be "any device which receives, transmits, or otherwise utilizes data in one form or another." (Yukie, 16:67-17:2.) For example, the device **10** can be a "cellular phone" or "music player." (*Id.*, 10:41-43, 3:42-48.) Yukie also contemplates that the device **10** can include functionalities of both a cell phone and music player. (*Id.*, 16:64-17:6 ("As can be seen, therefore, user device **10** can take the form of a number of embodiments. While several examples have been described, the user devices are unlimited in scope. … Note also that the wireless user devices tend to fall into several categories, …") (underlining added).)

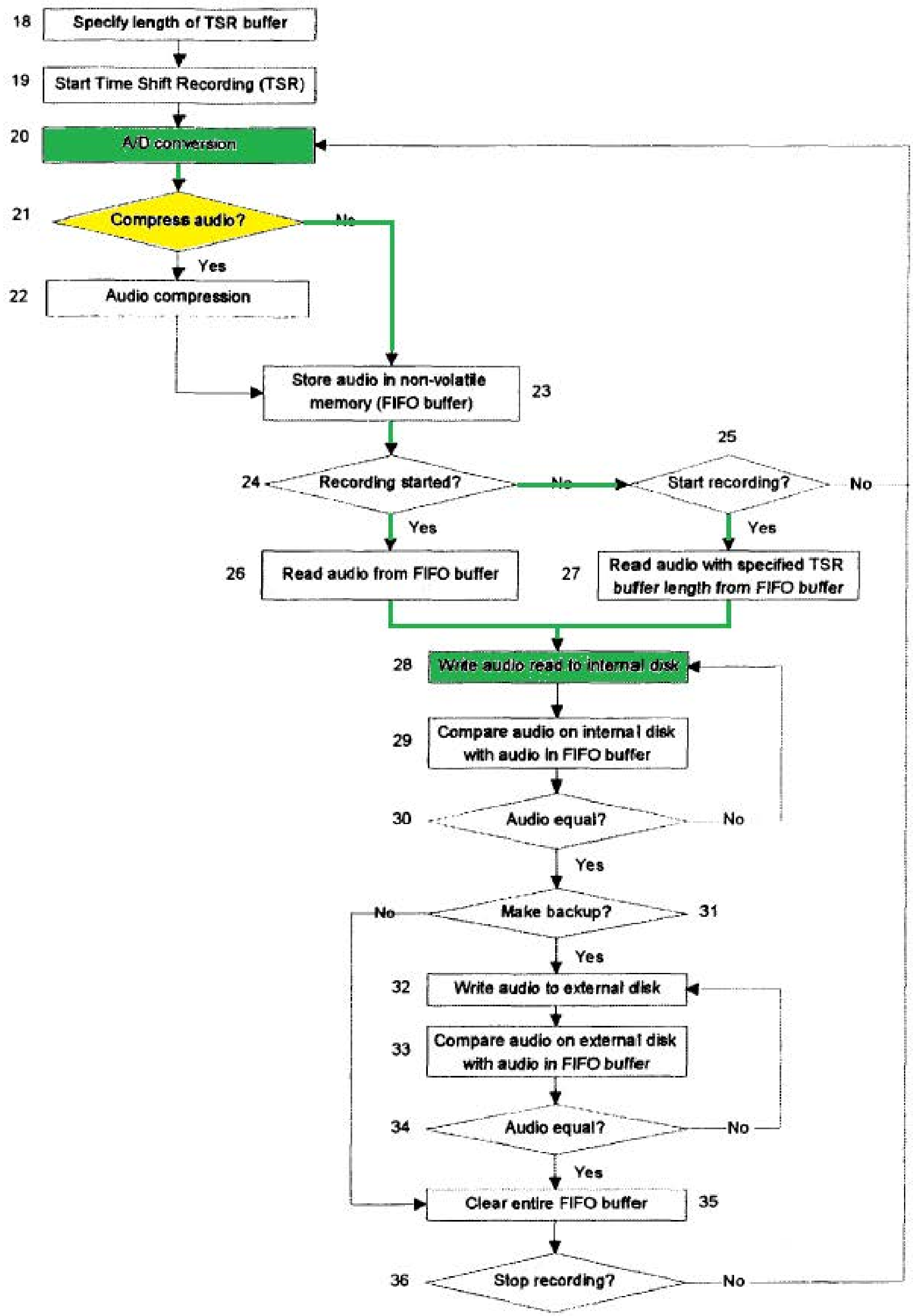
71. Yukie teaches that a user can record a digital audio file using the wireless device and transmit the audio file from the device to the server for storage. (*Id.*, 6:44-47 ("[T]he music player can optionally include a microphone for audio recording. The input audio would be encoded and sent to data server **16** across the wireless connection.").) This functionality is not limited to "music players." Yukie also discloses that a cell phone may be used to record and transmit a digital audio file to the server for storage. (*Id.*, 11:13-22 ("[A]ny of the embodiments of the telephonic device, . . . could include audio input and output components, available for telephony functions for <u>audio recording</u> and playback. . . . <u>The audio data can be stored . . . on data server **16** across the wireless connection</u>, as described above. For playback, the device would download audio data in an audio stream from data server **16** and outputs the audio in real-time.") (underlining added).)

6. Brief Summary of Van de Pol [Ex. 1063]

72. Van de Pol, EP 0957489 A1, entitled "Portable Device and Method to Record, Edit and Playback Digital Audio," discloses a portable device that can be used for digitally recoding audio. (Van de Pol, ¶ 0001.) As Van de Pol explains, it "can be used by journalists, radio stations and all other users, who wish to record, store and edit high quality audio." (*Id.*) I have cited Van de Pol in connection with

dependent claim 7, which recites that a "**non-optimized** digital media file is received from the wireless electronic device."

73. Van de Pol discloses a method of recording and storing digital audio that does not involve compression or other processing. This is shown in Figure 2, reproduced below.


18
Specify length of TSR buffer
19
Start Time Shift Recording (TSR)
20
A/D conversion
21
Compress audio?
No
Yes
22
Audio compression
Store audio in non-volatile memory (FIFO buffer)
23
25
24
Recording started?
No
Start recording?
No
Yes
Yes
26
Read audio from FIFO buffer
27
Read audio with specified TSR buffer length from FIFO buffer
28
Write audio read to internal disk
29
Compare audio on internal disk with audio in FIFO buffer
30
Audio equal?
No
Yes
No
Make backup?
31
Yes
32
Write audio to external disk
33
Compare audio on external disk with audio in FIFO buffer
34
Audio equal?
No
Yes
Clear entire FIFO buffer
35
36
Stop recording?
No

(*Id.*, Fig. 2 (color annotation added); *see also id.*, ¶¶ 0020-24.) As shown by the steps traced in green, the audio is never compressed or otherwise processed from the moment when the audio is digitized in step 20 to when it is stored in permanent memory in step 28.

7. Brief Summary of O'Hara [Ex. 1061], Tagg [Ex. 1060], and Pinard [Ex. 1070]

74. I rely on the teachings of **O'Hara**, **Tagg,** and **Pinard** to show the OFDM and cellular data channel limitations in the claims.

75. Just about anyone who has used a cellular phone or a laptop computer would be familiar with IEEE 802.11 wireless networking, commercially referred to as "WiFi." IEEE 802.11 refers to a series of international standards initially published in the late 1990s by the Institute of Electrical and Electronics Engineers (IEEE). Generally speaking, IEEE 802.11 describes a series of technical standards for providing wireless networking services through one or more wireless "access points" (APs). IEEE 802.11 is a wildly popular technology that has spawned a number of variants, including IEEE 802.11a and 802.11b, the early variants published in the late 1990s, and later variants such as 802.11g, 802.11n, and 802.11ac. IEEE 802.11 is important to my analysis because IEEE 802.11**a** – one of the earlier variants of 802.11 published in the late 1990s – transmits information to mobile devices using OFDM.

76. I have cited O'Hara because, as I explain below, it discloses and confirms that IEEE 802.11a wireless networking involves the transmission of digital information to mobile devices using OFDM. I have cited Tagg because it discloses that it was known, prior to the alleged invention, to incorporate IEEE 802.11 functionality into a cell phone. It therefore would have been obvious to adapt the cellular phone **12** of Rolf to receive digital media files, such as music, wirelessly using IEEE 802.11a, thus disclosing transmission by OFDM modulation as recited in the challenged claims.

77. **O'Hara**, published in 1999, provides "a guide for those who will implement interoperable IEEE 802.11 2.4 GHz and 5GHz LAN (WLAN) product." (O'Hara, at p. v (under "Acknowledgment").) O'Hara explains that wireless LANs "are exploding in popularity." (*Id.*, at p. viii.) "One of the key drivers of this new market expansion," according to O'Hara, "is the IEEE 802.11 standard." (*Id.*) O'Hara confirms that the IEEE 802.11a variant used OFDM. (*Id.*, at p. 143 ("In July of 1998, the IEEE 802.11 Working Group adopted OFDM modulation as the basis for IEEE 802.11a."); *id.*, at p. 139 ("The IEEE 802.11a PHY is one of the physical layer (PHY) extensions of IEEE 802.11a and is referred to as the orthogonal frequency division multiplexing (OFDM) PHY. The OFDM PHY provides the capability to transmit PSDU frames at multiple data rates up to 54

Mbps for WLAN networks where transmission of multimedia content is a consideration.").)

78. **Tagg**, entitled "Cooperative Network for Mobile Internet Access," discloses a technique for allowing a mobile device (such as a cellular phone) to communicate over the Internet using a number of IEEE 802.11 access points. I have relied on Tagg for the simple proposition that a cellular phone, such as cell phone **12** in Rolf, could incorporate IEEE 802.11 wireless networking capability, and use that technology (instead of connections with traditional cell towers) to receive digital files. Figure 1 of Tagg provides a basic overview of the system:

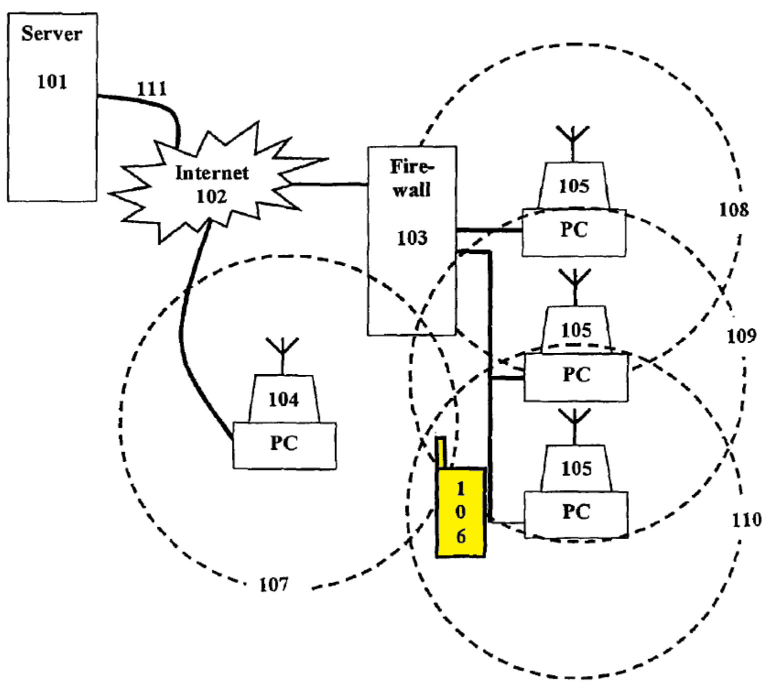


Fig. 1

(Tagg, Fig. 1 (annotation added).) Mobile roaming device **106**, shown highlighted in yellow, may be a "mobile computer, PDA, cellular telephone, or home appliance." (*Id.*, 7:63-66 (underlining added).) The circles shown in Figure 1 (**107-110**) show the range of wireless network access provided by fixed devices **104** and **105**. (*Id.*)

79. The gist of the Tagg reference is the ability of the mobile device **106** to switch between a number of available wireless technologies that will provide the best connectivity. As explained in Tagg, "[t]he mobile device determines the connection methodologies available to it and their relative merits and then connects to the host using the best available standards." (*Id.*, 6:67-7:2.) Although Tagg discloses Cooperative Tunneling Agent (CTA) software for evaluating available networks and performing a handoff from one wireless network to another, those details go far beyond the requirements of the challenged claims. I have cited Tagg for the more pedestrian proposition that a cell phone (such as the one in Yukie) can incorporate IEEE 802.11 wireless networking – a proposition that Tagg clearly confirms. In one embodiment in Tagg, for example, a cellular phone can determine when a suitable IEEE 802.11 wireless network is available, and then switch to that network to access the Internet or carry out voice telephone calls. (*Id.*, 5:22-34, 11:20-46, 11:60-12:26 (describing handoff process from cellular to 802.11 networks), Fig. 9.) The cost savings are, of course, obvious. It was well-

known that use of cellular services provided by traditional carriers (such as AT&T), including cellular data services, was potentially costly. Tagg explains, however, that "[a] cell phone located within 100 feet of a fixed host device can connect to the Internet through that device, obtaining phone calls at a fraction of the cost of a regular cellular connection." (*Id.*, 5:31-34; *see also id.*, 5:64-66 ("Our technology sits between the user and the Internet constantly negotiating the most cost effective means by which they can gain access.").)

80. Tagg confirms that allowing a cellular phone to alternatively switch to IEEE 802.11 wireless networks has distinct and obvious advantages. For example, Tagg explains that some cellular networks often provided limited potential connection speeds (*id.*, 11:24-28 ("9.6 Kbps")), and the greater network throughput provided by alternative wireless networks allows mobile users to take advantage of "high bandwidth services such as MP3 files and movies." (*Id.*, 5:27-29.)

81. Claim 9 further recites that files are transmitted "over a **cellular data channel**," for which I have cited the **<u>Pinard</u>** reference. The term "cellular" is often equated by the lay public with large scale commercial cellular telephone providers such as AT&T, T-Mobile, and Sprint. But the term "cellular data channel," in this context, has a more precise and technical definition. A cellular data channel is a data channel in a network in which wireless communications are

provided through a series of "cells," each cell providing network access for a particular geographic area. *See also:*

- *Webster's New Dictionary of the English Language* (2001), **[Ex. 1055]**, at p. 84, (definition of "cellular" as "of, relating to, or being a radiotelephone system in which a geographical area is divided into small sections each served by a transmitter of limited range");
- *The Dictionary of Multimedia Terms & Acronyms* (1997), **[Ex. 1056]**, at p. 38 ("Describes a means of dividing an area into regions, or cells, so that each region becomes a network in which every point exists within the range of a central transmission facility");
- *Encarta World English Dictionary* (1999), **[Ex. 1057]**, at p. 294 ("organized as a system of cells, especially for radio communication");
- *Modern Dictionary of Electronics* (1999), **[Ex. 1058]**, at p. 106 ("Type of mobile telephone service in which the geographic serving area is divided into subregions (cells), each with its own antenna and switching node");

- *The Oxford American Desk Dictionary* (1998), **[Ex. 1059]**, at p. 91 ("system of mobile radiotelephone transmission with an area divided into 'cells,' each served by its own transmitter");
- *Merriam-Webster's Collegiate Dictionary* (1996), **[Ex. 1067]**, at p. 184 ("of, relating to, or being a radiotelephone system in which a geographical area (as a city) is divided into small sections each served by a transmitter of limited range so that any available radio channel can be used in different parts of the area simultaneously");
- *McGraw-Hill Illustrated Telecom Dictionary* (2000), **[Ex. 1068]**, at p. 116 ("A wireless local telephone service that operates by dividing a geographical area into sections (*cells*). Each cell has its own transmitter/receiver that tracks and operates with cellular telephones within its area. The dimensions of a cell can range from several hundred feed to several miles.").

82. The term "cellular data channel" under its broadest reasonable construction, therefore, is not limited to a particular type of wireless networking technology, or technology that provides the same type of wireless range as a commercial cellular carrier.

83. In this regard, I have cited **Pinard** for the simple proposition that a "cellular data channel" can be provided based on IEEE 802.11 wireless access points. Pinard states that it "relates generally to preemptive roaming among cells in a cellular network. In particular, the invention relates to a local area wireless network including a plurality of mobile units and a plurality of access points." (Pinard, 1:21-24.) Pinard discloses that "[t]he cellular communications network may comprise a 1 Mbps frequency-hopping spread spectrum wireless LAN conforming to the IEEE 802.11 draft specification[2]." (*Id.*, 2:50-53.) Pinard further explains that this cellular network provides data channels for communication. (*Id.*, 1:39-40 (describing the "data rates" featured in the draft 802.11 specification), 2:31-41, 4:26-35 (explaining that the invention "provide[s] a data communications network").)

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[2] Pinard refers to the "IEEE 802.11 draft specification" because the standard had not yet been finalized when Pinard was filed in 1995. A person of ordinary skill in the art by June 2001 would have understood "IEEE 802.11," as referenced in Pinard, to include the wider range of IEEE 802.11 technologies available by the time the standard was published, including IEEE 802.11a and its higher bit rates.

84. As I will explain in **Part V.B** below, the OFDM and cellular data channel limitations of the challenged claims would have been obvious over O'Hara, Tagg, and Pinard.

B. Comparison of the Prior Art to the Claims of the '465 Patent

1. Claim 1

85. I have reproduced independent claim 1 below, and divided up the limitations using bracketed notations (e.g. "[a]," "[b]," etc.) to facilitate easier identification of the limitations in my analysis below:

1. A digital media communication system, the system comprising:

[a] a server operably coupled to a database, the database including a plurality of digital media files, said server including a server digital signal processor and memory,

[b] wherein the server digital signal processor is configured to,

receive a non-optimized digital media file,

optionally store the non-optimized digital media file in the database,

optimize the non-optimized digital media file according to an optimization scheme,

store the optimized digital media file in the database,

receive a request for the digital media file, and

cause a transmission of the requested optimized digital media file by synchronized orthogonal frequency-division multiplex modulation to a wireless electronic device,

[c] said device including a device digital signal processor configured to receive and process the optimized digital media file sent by synchronized orthogonal frequency-division multiplex modulation.

('465, 33:5-24 (Claim 1).) Each limitation of claim 1 is disclosed and rendered obvious by Rolf in view of Frantz, Gilbert, O'Hara, and Tagg.

86. The preamble of claim 1 recites, "**[a] digital media communication system**." Assuming the preamble of claim 1 provides a claim limitation, it is fully disclosed by Rolf. Rolf describes a "system and method for wirelessly transmitting encoded music, via a wireless communications link, to a portable or mobile communications device which includes a player for playing the music or audio." (Rolf, Ex. 1003, 1:17-21.)[3] The system includes a "remote storage facility" "at an address on the world wide web" that "includes a data base having a plurality of music recordings." (*Id.*, 5:32-35.) Additional details about the digital media

[3] Rolf also expressly notes that its teachings with respect to music files are "applicable to recordings of other types, such as <u>video recordings</u>." (Rolf, 14:57-58 (underlining added).)

communication system disclosed in Rolf are provided in the claim limitations below.

a. "a server operably coupled to a database, the database including a plurality of digital media files, said server including a server digital signal processor and memory" (Claim 1[a])

87. Rolf discloses limitation 1[a]. In light of the length of this claim limitation, I will divide it into pieces to provide a more organized discussion.

"a server operably coupled to a database, the database including a plurality of digital media files"

88. The "server" in Rolf sits within the "facility **14**," shown in Figure 1 below.

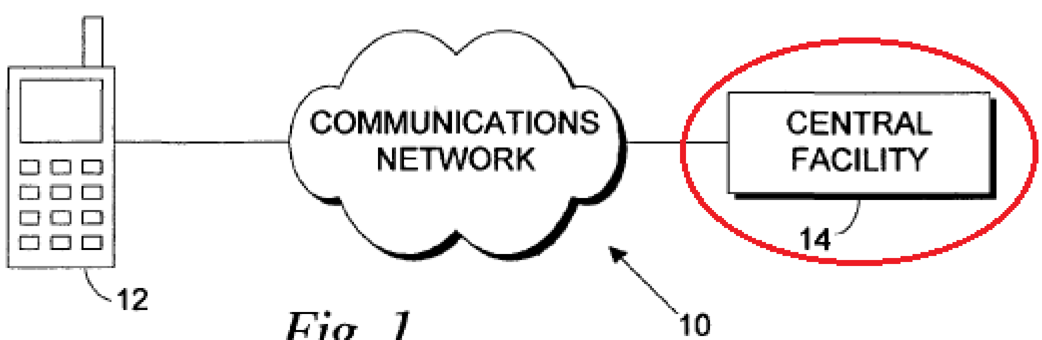

Fig. 1.

(Rolf, Fig. 1 (red circle added).) Rolf explains that the facility **14** responds to commands from the wireless communications device **12**, and sends music files to the wireless device **12**. (*Id.*, 5:46-53 ("[T]he wireless communications device **12** may be utilized to establish a communications link with the remote storage facility

14. Then, using a keypad and input on the wireless communications device, or by voice commands, one or more selected music recordings may be retrieved from the storage facility **14**, for transmission, via wireless communications link, to the device **12**.")).)

89. Figure 5 (below) illustrates central facility **14** in greater detail. (*Id.*, 5:1-2, 8:54-9:18.)

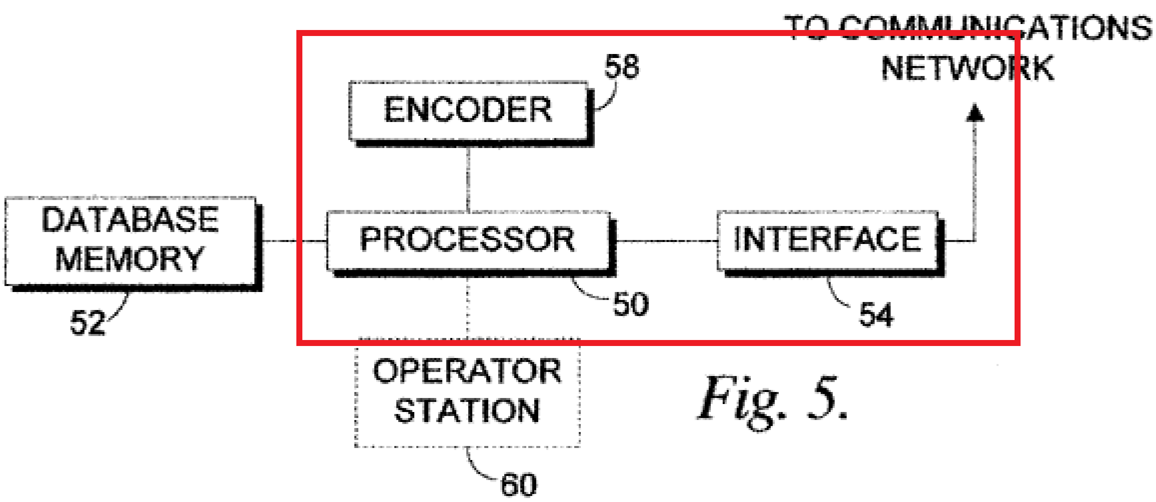

Fig. 5.

(*Id.*, Fig. 5 (red box added.) For the purposes of claim 1, the recited "**server**" is disclosed by the combination of the processor **50**, interface **54**, and encoder **58**. Rolf explains that the interface **54** can be a "transceiver or modem" "for transmitting and receiving communications signals." (*Id.*, 8:57-59.) "The encoder **58** is a set of <u>processing instructions stored in a memory</u> for encoding music recordings stored within data base memory **52**." (*Id.*, 8:61-63 (underlining added).) One of ordinary skill in the art would have understood and found it obvious that these components comprise a "**server**" as recited in the claim. (*See* Microsoft Press Computer Dictionary (3d ed. 1997), **[Ex. 1083]**, at p. 430 ("On the Internet or other network, a computer or program that responds to commands from a client. For example, a file server may contain an archive of data or program files; when a client submits a request for a file, the server transfers a copy of the file to the client.").) This is confirmed by the fact that the facility **14**, as a whole, "has a uniform resource locator (URL) on a global communications network (such as the world-wide web)," and can be accessed "via a server in the communications network." (Rolf, 12:52-55 (underlining added); *see also id.*, 3:10-16 ("[I]t is an aspect of the present invention that an identifier, such as a server address, associated with the remote central facility is encoded along with the transmitted data ….") (underlining added), 6:65-7:2.)

90. The "**database**" in Rolf corresponds to the "data base memory **52**." (*Id.*, 8:57.) As shown in Figure 5 above, the data base memory **52** is operably coupled to the set of components that comprise the "server" (i.e., processor **50**, interface **54**, and encoder **58**). Rolf's written description also makes this clear. (*Id.*, 8:56-9:18.) Rolf therefore discloses "**a server operably coupled to a database**," as recited in the claim.

91. Rolf further discloses that the "**database include[s] a plurality of digital media files**." Rolf discloses that the data base memory **52** "store[s]" music recordings. (Rolf, 8:62-63, 9:4-5; *see also id.*, 5:32-35 ("The remote storage facility may, for example, be at an address on the world wide web, and <u>includes a data base having a plurality of music recordings therein</u>.") (underlining added).) The stored music recordings can be categorized by various fields "such as "title", "artist", "album or CD type", "recording label", etc." (*Id.*, 5:35-37.)

"said server including a server digital signal processor and memory"

92. As I explained above, the claimed "server" includes the processor **50**, interface **54**, and encoder **58**. As noted, "[t]he encoder **58** is a set of processing instructions <u>stored in a memory</u>." (*Id.*, 8:61-63 (underlining added).) One of ordinary skill in the art would therefore have understood that the server in Rolf includes a "**memory**," as recited in the claim.

93. Rolf does not appear to expressly disclose that the server includes a "**server digital signal processor**," but this would have been obvious in view of Frantz. As I discussed in **Part III.C** above, digital signal processors, or "DSPs," are specialized microprocessors that can be programmed to perform a wide variety of computations. Frantz specifically discloses that "DSPs could provide intelligence for <u>every system that transforms one kind of input to another kind of</u>

output." (Frantz, Ex. 1014, at p. 59, right column (underlining added).) It would therefore have been obvious for the server in Rolf to include a server digital signal processor.

94. ***Rationale and Motivation to Combine***: It would have been obvious to a person of ordinary skill in the art to combine Frantz with Rolf, with no change in their respective functions, predictably resulting in a server that includes a server DSP. Frantz provides express motivations to combine in this manner.

95. To begin with, a person of ordinary skill in the art would have immediately recognized that the server in Rolf performs processes that could have significantly benefitted from use of a DSP. For example, Rolf explains that "the encoder **58** [in facility **14**] may be utilized to encode the music, according to any preferred encryption and/or compression algorithm (such as mp3, liquid audio, etc.), for transmission of the encoded recording(s) to the wireless communications device **12**." (Rolf, 8:67-9:3.) It is well-known that encryption and compression are mathematically and computationally intensive transformations – precisely the operations that could benefit from a DSP. In fact, Frantz explains that "[e]ssentially, DSPs are designed for number crunching." (Frantz, at p. 52, right column – p. 53, left column.)

96. A person of ordinary skill in the art would therefore have appreciated that including a specialized DSP in the central facility **14** of Rolf could expedite computationally-intensive encryption and compression operations, resulting in increased system performance by relieving the general purpose processor from having to perform these tasks. A person of ordinary skill in the art would have found it obvious that the processes performed by encoder **58** of central facility **14** (Fig. 5) could be enhanced by use of a DSP.

97. Frantz confirms that the potential performance gains achievable by using such a DSP are substantial. Frantz explains that "advancements in digital signal processing technology are enabling its use for increasingly widespread applications. Developers will be challenged to use this processing power to its utmost, while creating new applications and improving existing ones." (Frantz, at p. 52 (all-caps removed) (underlining added).) One of ordinary skill in the art would have therefore appreciated that the processing power provided by the DSP would improve the performance of a server beyond, for example, that provided by a general purpose processor.

98. In fact, one of ordinary skill in the art would have been particularly motivated to implement a DSP in the server in Rolf because the advantages offered by DSPs, including high performance and low cost, were improving dramatically

at the time of the alleged invention – and were expected to continue to improve with time. This is succinctly summarized in Table 1 in Frantz below. As can be seen from the table, quantification of the above progress is about 100x in several parameters (RAM, Price, Power, Transistors) and even 1000x in processing power (MIPS). Therefore, a person of ordinary skill in the art would therefore have appreciated these benefits of DSP.

Table 1. Two decades of DSP market integration (typical DSP figures).

	1982	1992	2002
Die size (mm)	50	50	50
Technology size (microns)	3	0.8	0.18
MIPS	5	40	5,000
MHz	20	80	500
RAM (words)	144	1,000	16,000
ROM (words)	1,500	4,000	64,000
Price (dollars)	150	15	1.50
Power dissipation (mW/MIPS)	150	12.5	0.1
Transistors	50,000	500,000	5 million
Wafer size (inches/mm)	3 / 75	6 / 150	12 / 300

(Frantz, at p. 55, Table 1; *see also id.*, at p. 54, left column ("Top-flight DSP performance was no longer measured in hundreds of millions of instructions per seconds (MIPS), but in thousands of MIPS."), p. 58, left column ("Shrinking process geometries are driving designers relentlessly toward larger, faster DSPs that cost less and consume less power per MIPS.”).) In fact, Frantz predicted that “[a]dvances in manufacturing processes; architectural developments; software innovations; DSP differentiation for the optimization of performance, price, and power consumption are all factors driving DSPs to become so powerful as to make them ubiquitous in the future.” (*Id.*, at p. 59, left column – p. 59, right column.)

99. Moreover, because of the recent availability of compilers that facilitate the programming of DSPs, all of the advantages discussed above can be had without requiring a person of ordinary skill in the art to “becom[e] familiar with the instruction set and underlying mechanics of the processor.” (*Id.*, at p. 54, left column.) As explained in Frantz, “[s]ince DSP assembly code is often seen as intimidating by noninitiates, the availability of straightforward compilers designed to use the underlying hardware most efficiently has made DSP development much more approachable for the vast pool of C programmers.” (*Id.*)

100. Finally, Rolf and Frantz are analogous references in the same field of computing. As I discussed above, Rolf discloses server hardware for storing, processing, and transmitting data including music files. (Rolf, 8:56-9:18.) Frantz, for its part, discusses wide-ranging data processing applications enabled by a particular type of microprocessor, the DSP. (Frantz, at p. 59, right column (“DSPs

could provide intelligence for every system that transforms one kind of input to another kind of output.”).) One of ordinary skill in the art would have found the server in Rolf to be naturally combinable with the DSP disclosed in Frantz.

b. “wherein the server digital signal processor is configured to, receive a non-optimized digital media file, optionally store the non-optimized digital media file in the database, optimize the non-optimized digital media file according to an optimization scheme, store the optimized digital media file in the database, receive a request for the digital media file, and cause a transmission of the requested optimized digital media file by synchronized orthogonal frequency-division multiplex modulation to a wireless electronic device” (Claim 1[b])

101. In light of the length of this claim limitation, I will again divide it into pieces to ensure that I cover all of its elements.

“wherein the server digital signal processor is configured”

102. As I explained above, it would have been obvious that the server in Rolf could include a server digital signal processor. Further, as noted, Frantz discloses that DSPs can be programmed or “**configured**” to execute computer processes. (Frantz, at p. 54, left column (“Programmers who have little familiarity with DSPs can then write code quickly without becoming familiar with the instruction set and underlying mechanics of the processor. . . . Since DSP assembly code is often seen as intimidating by noninitiates, the availability of

straightforward compilers designed to use the underlying hardware most efficiently has made DSP development much more approachable for the vast pool of C programmers.”).) As I will explain below, the prior art makes clear that the server, discussed at length above, could perform the steps recited in the remainder of the claim limitation. Moreover, as I explain below, it would have been obvious to program the server DSP to execute these steps.

“receive a non-optimized digital media file”

103. As discussed previously, the server in Rolf includes an encoder **58**. Rolf discloses that the server – specifically, the encoder **58** – can receive digital audio files for processing. (Rolf, 8:61-63 (“The encoder **58** is a set of <u>processing instructions</u> stored in a memory for <u>encoding music recordings</u> stored within data base memory **52**.”) (underlining added); *see also id.*, 8:63-9:3.) Rolf does not appear to expressly disclose that the digital audio files received by the server (e.g., for encoding) include “**non-optimized** digital media files,” but this is clearly disclosed in **<u>Gilbert</u>**.

104. As discussed in **Part V.A.3** above, Gilbert discloses a technique in which newly generated digital audio files undergo computer processing to enhance their perceived quality. As Gilbert explains, the “computer system **230** includes a software application **230C** that samples the analog audio signal to generate a

digital audio file." (Gilbert, Ex. 1066, 3:62-66.) This generated digital audio file is a "**non-optimized digital media file**" because it has not undergone compression or any other processing. For example, Gilbert explains that after generating the digital audio file, "process **250** operates on the digital audio file, … to correct any defects, separate the digital audio file into discrete track-oriented files or tracks, and compress the discrete tracks." (*Id.*, 4:6-10.) As explained in the limitations below, process **250** is an optimization scheme that enhances the perceived quality of digital audio files and compresses them. An explanation of the rationale for combining Rolf with Gilbert is provided below.

"optionally store the non-optimized digital media file in the database"

105. Gilbert satisfies this step. As discussed above, Gilbert discloses "sampl[ing] the analog audio signal to generate a digital audio file." (Gilbert, 3:62-66.) Gilbert further explains that the newly generated digital audio file "may be formatted as an audio WAV file and subsequently stored in the memory **230B** of computer system **230**." (*Id.*, 4:2-5 (underlining added).) To the extent Gilbert does not expressly disclose storing in the "**database**," it would have been trivially obvious that the memory **230B** could take the form of database memory, such as the data base memory **52** disclosed in Rolf, as I explain in more detail below. Gilbert therefore satisfies "**optionally stor[ing] the non-optimized digital media**

file in the database." An explanation of the rationale for combining Rolf with Gilbert is provided below.

"optimize the non-optimized digital media file according to an optimization scheme"

106. As noted above, Gilbert teaches a process **250** that "operates on the digital audio file, … to correct any defects, separate the digital audio file into discrete track-oriented files or tracks, and compress the discrete tracks." (Gilbert, 4:6-10.) Specifically, as explained in Gilbert:

> [F]iltering operations are applied to correct defects in the information contained within the digital audio file. … Such defects may arise from the reproduction of the information on the analog medium and may include scratch noises, clicks, pops, hissing, etc. As is well known in the art, filtering applications **230D** employ various techniques to identify and compensate for certain defects. These techniques include searching for certain values of the digital audio information that are beyond a normal range to identify and correct specific audio defects. Other techniques include: applying high-pass filters to remove low frequency noise, normalizing extreme or inconsistent volume levels to an average value, adjusting the playback pitch, and comparing adjacent data to adjust inconsistent values (i.e., removing blips by averaging the values of adjacent data in a linear fashion).

(*Id.*, 4:10-29.) Next, "process **250** separates the digital audio file into a plurality of discrete digital audio tracks." (*Id.*, 4:30-31.) "Finally, … the discrete digital audio tracks are compressed …. [C]omputer system **230** further includes a compression application **230G**, which compresses each of the discrete digital audio tracks into smaller-sized files. Compression application **230G** may comprise an MP3 encoder application, to ensure the fidelity of the discrete digital files." (*Id.*, 5:38-48.) Gilbert therefore discloses "**optimiz[ing] the non-optimized digital media file according to an optimization scheme**." An explanation of the rationale for combining Rolf with Gilbert is provided below.

107. I note that Gilbert's disclosure on optimization, which includes the steps of normalization, applying a frequency filter, and MP3 compression, mirrors the optimization process described in the '465 patent. ('465, 24:4-11 ("Preferred Procedure for Audio Data Parametric Optimization and Compression[:] The method **1500** of compressing the files comprises the steps of a) conversion **1502**; <u>b) amplitude normalization **1504**</u>; c) sample rate conversion **1506**; <u>d) pre-emphasis filtering **1508**</u>; e) amplitude normalization 1510; and t) [sic] <u>performance of MPEG audio layer 3 (MP3) compression with the selected parameters **1512**</u>.") (underlining added).)

"store the optimized digital media file in the database"

108. Gilbert also satisfies this step. Gilbert explains that after compression, the final step in the optimization scheme discussed above, "the compressed

discrete tracks are stored in the memory **230B** of computer system **230**." (Gilbert, 5:38-41.) As explained above, to the extent Gilbert does not expressly disclose storing in the "**database**," it would have been trivially obvious that the memory **230B** could take the form of database memory, such as the data base memory **52** disclosed in Rolf. Gilbert therefore discloses "**stor[ing] the optimized digital media file**." An explanation of the rationale for combining Rolf with Gilbert is provided below.

"receive a request for the digital media file"

109. Rolf discloses "**receiv[ing] a request for the digital media file**." As I noted above, Rolf discloses that the facility **14** responds to commands from the wireless device **12**, and sends music files to the wireless device **12**. (Rolf, 5:46-53.) More specifically, the processor **50** of the server in Rolf "provid[es] a menu driven system to wireless communications device **12**, such that the wireless communications device **12** can be utilized to select [a] recording via a menu or listing of recordings." (*Id.*, 9:12-15 (underlining added).) The selection can be made "using a keypad and input on the wireless communications device," and accordingly, "one or more selected music recordings may be retrieved from the storage facility **14**, for transmission, via wireless communications link, to the device **12**." (*Id.*, 5:49-53 (underlining added); *see also id.*, 1:39-41 ("Using an

input of the cellular telephone, a user may select one or more recordings for transmission to the cellular telephone."), 5:64-66 ("[A] wireless communications device **12** communicates with a central facility **14** for retrieval of one or more stored music recordings.").) Because a music file is retrieved from the facility **14** for transmission in response to a selection made from the wireless device, one of ordinary skill in the art would have understood that a request for the music file was received by the server.

"cause a transmission of the requested optimized digital media file"

110. As I explained above, the server in Rolf includes the interface **54**, which can be a "transceiver or modem" "for transmitting and receiving communications signals." (Rolf, 8:57-59 (underlining added).) As further noted, "one or more selected music recordings may be retrieved from the storage facility **14**, for transmission, via wireless communications link, to the device **12**." (*Id.*, 5:49-53 (underlining added).) Rolf therefore discloses that the server (which sits within the facility **14**) can "**cause a transmission of the requested … digital media file**." Although Rolf does not appear to expressly disclose that the requested and transmitted music file is "**optimized**," optimizing digital audio files is disclosed in Gilbert, as explained at length above. This step is therefore obvious over the prior art.

111. ***Rationale and Motivation to Combine***: It would have been obvious to a person of ordinary skill in the art to combine Gilbert and Frantz with Rolf, with no change in their respective functions. This would have predictably resulted in a server, as disclosed in Rolf, having the capability to receive a non-optimized digital media file (e.g., music file) and optimize it according to an optimization scheme, store the non-optimized and/or optimized digital media files in the database, and receive a request and cause the optimized digital media file to be transmitted to the wireless device, in which each of these steps is executed by the server digital signal processor.

112. Gilbert provides express motivations to combine in this manner. Gilbert explains that "[n]otwithstanding the recent advancements in digital recording and the obsolescence of analog recording technology," there remains a large number of musical works that were originally recorded on analog media such as cassette tapes. (Gilbert, 1:17-30.) Gilbert further notes that it has grown more difficult for users to enjoy music recorded on analog media because of degradation in the storage media and a decline in the availability of analog playback devices. (See *id.*, 1:30-40.) Gilbert recognized that "[c]onverting information recorded on analog media into a digital format would ensure that the content is preserved in the event that the analog media is no longer accessible due to equipment obsolescence

or media degradation." (*Id.*, 1:40-45.) From these teachings, one of ordinary skill in the art would have appreciated that the audio intake, optimization, and storage techniques disclosed in Gilbert would be especially suitable for the digital audio system of Rolf because implementing Gilbert's techniques using the server in Rolf would address the problems of degradation and shortage of playback devices associated with music originally recorded on analog media, while making a growing number of musical works (e.g., older classics) available to users for download.

113. In fact, one of ordinary skill in the art would have recognized that the benefits of the optimization techniques disclosed in Gilbert, which include "applying high-pass filters to remove low frequency noise, normalizing extreme or inconsistent volume levels to an average value, adjusting the playback pitch, and comparing adjacent data to adjust inconsistent values (i.e., removing blips by averaging the values of adjacent data in a linear fashion)" (*id.*, 4:24-29), are not limited to music recorded on analog media, and are equally applicable to music in raw digital formats (e.g., uncompressed music tracks ripped from CDs). Accordingly, one of ordinary skill in the art would have appreciated that applying the optimization techniques of Gilbert (e.g., using a server computer) to the

existing digital music files in the database in Rolf would further enhance the perceived audio quality of those music files.

114. One of ordinary skill in the art would also have appreciated that storing both non-optimized and optimized copies of the same musical work provides flexibility and performance because the optimized copy in storage can be more instantly delivered to users upon request, while the non-optimized copy enables "on-demand" optimization using parameters that can be varied depending on the circumstances of a particular request, such as the device used for download and playback, and current bandwidth. In fact, Rolf appears to recognize that both scenarios can provide their own advantages by teaching that its music files can be stored in compressed form, or alternatively, stored in uncompressed form and encoded "on-demand" in response to a user request. (Rolf, 8:63-9:6 ("[W]hen wireless communications device **12** accesses the central facility **14** via the communications network for purpose of retrieving one or more selected recordings, the encoder **58** may be utilized to encode the music, according to any preferred encryption and/or compression algorithm (such as mp3, liquid audio, etc.), for transmission of the encoded recording(s) to the wireless communications device **12**. Alternatively, the music recording stored within data base memory **52** may be stored in an encoded/compressed manner, such that the encoder **58** is not

necessary.”).) One of ordinary skill in the art would therefore have been motivated by these advantages and benefits to combine Gilbert with Rolf in the manner described above.

115. Rolf and Gilbert are also analogous references in the same field of audio processing. Indeed, their analogous nature is highlighted by the fact that both Rolf and Gilbert teach the use of compression algorithms such as MP3. One of ordinary skill in the art would have understood that the two references pertain to the same technology area and are readily combinable.

116. One of ordinary skill in the art would also have been motivated to implement the audio processing steps disclosed in Rolf and Gilbert using a digital signal processor (“DSP”). The motivation and rationale for including a DSP in the server of Rolf, discussed at length above, applies with equal force here. Frantz further provides express motivations to implement the audio processing techniques discussed above, including the audio intake, optimization, and storage steps disclosed in Gilbert, using a digital signal processor. As noted, Frantz teaches that “DSPs could provide intelligence for every system that transforms one kind of input to another kind of output.” (Frantz, at p. 59, right column.) Frantz further explains that existing, well-known applications for DSPs include “image processing” and “consumer audio gear such as Internet audio” (*id.*, at p. 52, left

column), and predicts that the "signal processing and control" provided by DSPs "will be inexpensive enough to introduce into just about any kind of equipment." (*Id.*, at p. 58, right column.) One of ordinary skill in the art would therefore have appreciated that DSPs are readily applicable to audio processing, including audio intake, optimization, and storage, all of which involve the generation of output based on input, and signal processing and control. Moreover, Frantz teaches that "[e]ssentially, DSPs are designed for number crunching." (*Id.*, at p. 52, right column – p. 53, left column.) It would have been readily apparent to a person of ordinary skill in the art that DSPs are particularly well-suited for the audio optimization techniques taught by Gilbert (e.g., normalization, filtering, and compression), which rely heavily on numerical operations. Accordingly, one of ordinary skill in the art would have had ample motivation to program a server DSP to execute the steps recited in limitation 1[b].

117. I explained above that it would have been obvious to perform the audio processing steps recited in limitation 1[b] using the server in Rolf. Moreover, DSPs were one of a finite number of known processors for performing processing in computing devices. It would therefore have been obvious to a person of ordinary skill in the art to choose to implement the audio processing techniques

discussed above on the server using a DSP, and she would have had every expectation that the DSP would be successful in performing those techniques.

118. Finally, Rolf, Frantz, and Gilbert are all analogous references in the same field of computing. Rolf and Gilbert describe computer techniques for processing audio data. Frantz discusses the many forms of data processing that can be performed by the DSP. One of ordinary skill the art would have found the three references to be a natural combination.

transmission "by synchronized orthogonal frequency-division multiplex modulation to a wireless electronic device"

119. As I discussed above, Rolf discloses "wirelessly transmitting encoded music, via a wireless communications link, to a portable or mobile communications device which includes a player for playing the music or audio." (Rolf, 1:17-21; *see also id.*, 5:46-53.) Rolf explains that the wireless communications device can be a "cellular telephone or personal digital assistant." (*Id.*, 1:27-28.) Rolf therefore discloses transmission of the requested music file "**to a wireless electronic device**."

120. While the music file in Rolf is not disclosed as being "**transmitted by synchronized orthogonal frequency-division multiplex modulation**," this would have been obvious in view of O'Hara and Tagg. As I explained in **Part V.A.7** above, I cite O'Hara and Tagg for two straightforward propositions: that (1) prior

art IEEE 802.11a wireless networking transmits digital information to mobile devices using synchronized OFDM modulation (O'Hara); and (2) IEEE 802.11 wireless networking functionality can be incorporated into a wireless device such as the cell phone **12** of Rolf (Tagg).

121. With respect to the first proposition, **O'Hara** clearly confirms that at least the IEEE 802.11a variant of IEEE 802.11 uses OFDM to wirelessly transmit data. (O'Hara, at p. 143 ("In July of 1998, the IEEE 802.11 Working Group adopted OFDM modulation as the basis for IEEE 802.11a."); *id.*, at p. 139 ("The IEEE 802.11a PHY is one of the physical layer (PHY) extensions of IEEE 802.11a and is referred to as the orthogonal frequency division multiplexing (OFDM) PHY. The OFDM PHY provides the capability to transmit PSDU[4] frames at multiple data rates up to 54 Mbps for WLAN networks where transmission of multimedia content is a consideration.").) O'Hara further teaches an 802.11a receiver that can be implemented in mobile devices to receive and process OFDM signals. (*Id.*, at p. 144 ("At the receiver, the carrier is converted back to a multicarrier lower data rate form using an FFT. The lower data subcarriers are combined to form the high rate

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[4] The term "PSDU" refers to a PLCP service data unit, a basic unit of data for transmission over an IEEE network. (O'Hara, at p. 174 (explaining PSDU acronym); *id.*, at p. 141 (Fig. 7-1, showing OFDM header and PSDU).)

PPDU[5]. An example of an IEEE 802.11a OFDM PMD[6] is illustrated in Figure 7-2."), Fig. 7-2 (showing a block diagram of an 802.11a receiver).)

122. O'Hara also makes clear that the use of OFDM in IEEE 802.11a is "**synchronized**." O'Hara explains that OFDM signals are transmitted as frames of data referred to as the "PPDU." (*Id.*, at p. 140 ("The PPDU is unique to the OFDM PHY.").) "The PPDU frame consists of a PLCP preamble and signal and data fields as shown in Figure 7-1," reproduced below. (*Id.*)

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[5] The term "PPDU" refers to a PLCP protocol data unit, a unit of data that includes a preamble and header. (O'Hara, at p. 174 (explaining PPDU acronym); *id.*, at p. 141 (Fig. 7-1, showing OFDM PPDU).)

[6] The term "PMD" refers to "Physical Medium Dependent," which is a description of the details of transmission and reception of individual bits on a physical medium. (O'Hara, at p. 174 (explaining PMD acronym).)

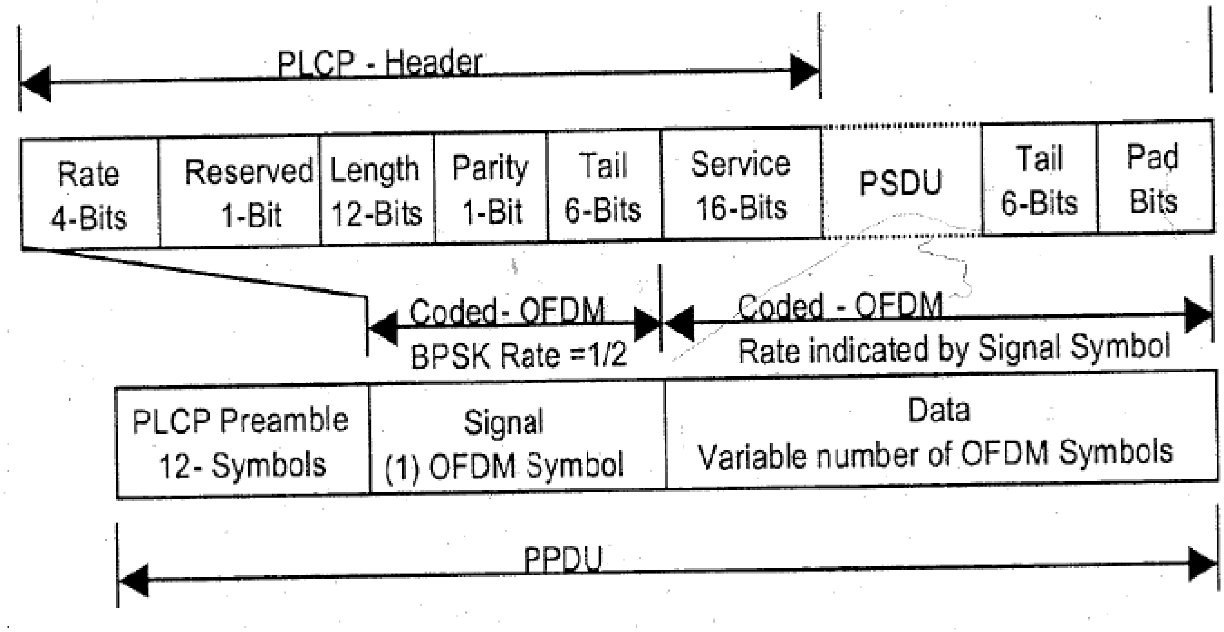

Figure 7-1 – OFDM PLCP Preamble, Header, and PSDU

(*Id.*, at p. 141, Fig. 7-1.) "The receiver uses the PLCP preamble to acquire the incoming OFDM signal and synchronize the demodulator." (*Id.*, at p. 140 (underlining added).) O'Hara describes in detail the use of the PLCP preamble for synchronization:

> PLCP preamble: This field is used to acquire the incoming signal and train and synchronize the receiver. The PLCP preamble consists of 12 symbols, ten of which are short symbols, and two long symbols. The short symbols are used to train the receiver's AGG and obtain a coarse estimate of the carrier frequency and the channel. The long symbols are used to fine-tune the frequency and channel estimates. Twelve subcarriers are used for the short symbols and 53 for the long. The

training of an OFDM is accomplished in 16 μs. PLCP preamble is BPSK-OFDM modulated at 6 Mbps.

(*Id.* (underlining added).)

123. With respect to the second proposition, as I explained in detail in **Part V.A**, **Tagg** discloses a cell phone that can receive data using IEEE 802.11. Figure 1 of Tagg provides a basic overview of the system:

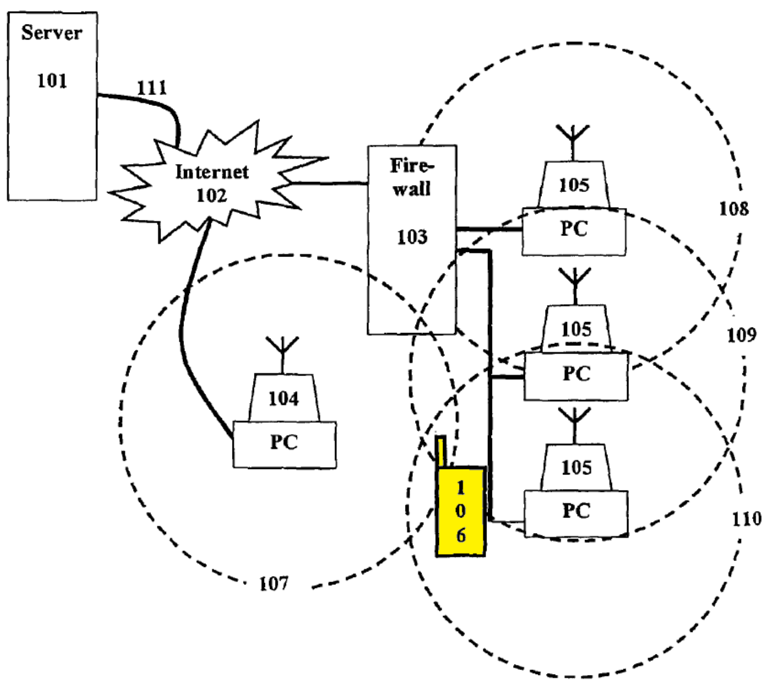

Fig. 1

(Tagg, Fig. 1.) Mobile roaming device **106**, shown highlighted in yellow, may be a "mobile computer, PDA, cellular telephone, or home appliance." (*Id.*, 7:63-66 (underlining added).) The circles shown in Figure 1 (**107-110**) show the range of wireless network access provided by fixed devices **104** and **105**. (*Id.*)

124. Tagg confirms that the mobile device **106** can switch between a number of available wireless technologies. As explained in Tagg, "[t]he mobile device determines the connection methodologies available to it and their relative merits and then connects to the host using the best available standards." (*Id.*, 7:67-8:2.) An example of how this might work is illustrated in Figure 9:

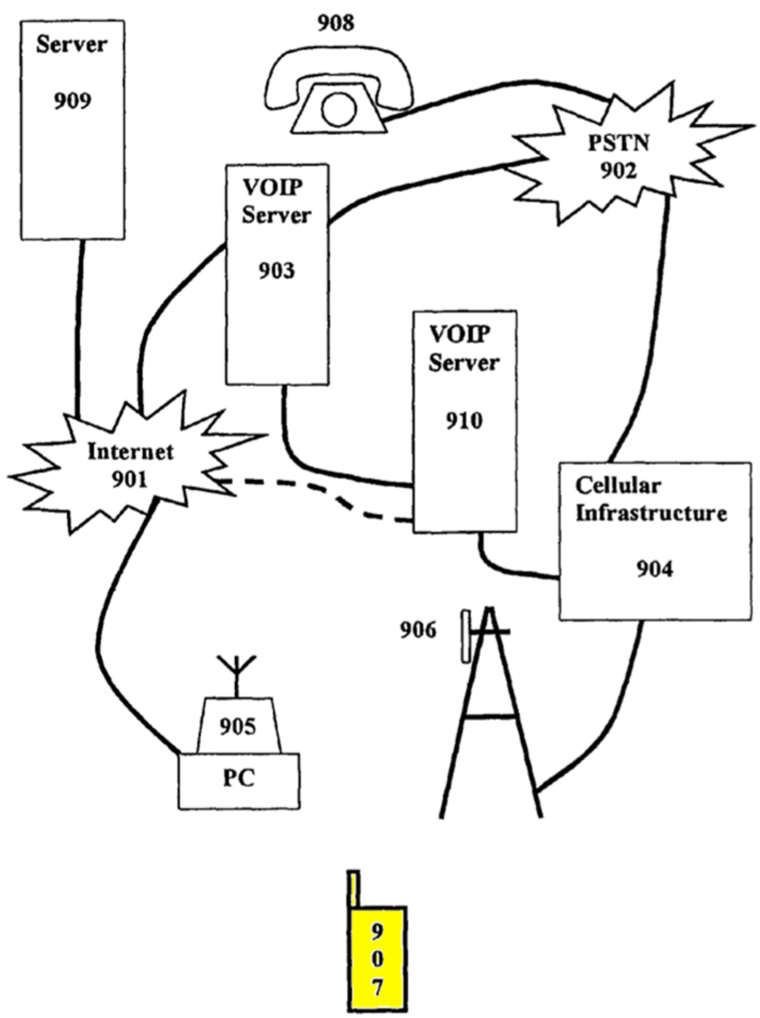

Fig. 9

125. Figure 9 above shows a cellular phone **907**, highlighted in yellow, and illustrates "the handoff between a fixed wireless, Internet based, VOW [voice over WLAN] system and a cellular system. A mobile user **907** is within range of two methods for placing a call; a PC running our cooperative networking service and a cellular tower. The call might preferentially be placed to either unit based on the user[']s pre-set preferences or based on the current situation." (*Id.*, 11:60-66.) "In the case of connection made over the Internet voice packets are sent over the air using a wireless link such as Bluetooth or IEEE802.11 to the host **905**[.] These packets are routed thru [sic] the Internet **901** to a VOW server **903**. The VOW server converts IP packets to a form suitable for use over the PSTN and handles making and breaking the connection to users." (*Id.*, 11:67-12:6.) Although the example above involves use of voice-over-IP (VOIP), Tagg makes clear that an IEEE 802.11 network can also be used to transmit digital data instead of voice. (*Id.*, 5:22, 5:27-29 ("The link can transport either data or voice. . . The software allows the user to access the Internet, send and receive e-mail and obtain high bandwidth services such as MP3 files and movies.").)

126. As I noted previously, the details of the handoff, and the Cooperative Tunneling Agent (CTA) software for evaluating available networks and performing a handoff from one wireless network to another, is not relevant to my

analysis. The disclosures above simply confirm the more basic point that a cell phone can incorporate IEEE 802.11 wireless networking, and use that capability to receive digital data such as media files.

127. ***Rationale and Motivation to Combine:*** It would have been obvious to a person of ordinary skill in the art to combine Rolf with O'Hara and Tagg, predictably resulting in a wireless communications device configured to receive and process digital media files (e.g., music files), as disclosed in Rolf, in which the files are transmitted to the wireless device by use of IEEE 802.11a networking, thus using synchronized OFDM modulation. Tagg, as noted, specifically discloses the ability to incorporate IEEE 802.11 wireless networking technology into a cell phone, and discloses two basic and fundamental reasons why such a combination would be desirable: (a) speed and (b) cost.

128. **Speed**: It was well-known to persons of ordinary skill in the art in June 2001 that IEEE 802.11 wireless networks were capable of much greater network performance than existing cellular data networks provided by traditional carriers (e.g., AT&T). For example, Tagg describes a scenario in which a user switches to a traditional cellular data connection, causing performance to drop to just 9.6 kilobits per second (Kbps). (Tagg, 11:24-28.) But O'Hara confirms that

IEEE 802.11a (using OFDM[7]) could transmit digital multimedia content at up to 54 megabits per second (54 Mbps), which is more than 5,000 times faster than the 9.6 Kbps data rate reported in Tagg. (O'Hara, at p. 139 ("The OFDM PHY provides the capability to transmit PSDU frames at multiple data rates up to 54 Mbps for WLAN networks where transmission of multimedia content is a consideration.").) It is therefore no surprise that O'Hara suggests use of short-range wireless networks, such as IEEE 802.11, to allow mobile users to take advantage of "high bandwidth services" such as "MP3 files" (Tagg, 5:27-29), precisely the use case contemplated in Rolf. Accordingly, a person of ordinary skill in the art would have been amply motivated to incorporate IEEE 802.11 wireless networking into a cell phone (as disclosed in Tagg) to achieve the dramatically improved network performance for multimedia content (as disclosed in O'Hara), which could have reduced download times for selected MP3 files and significantly improved user experience.

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[7] One of ordinary skill in the art would have also appreciated that the use of OFDM offers advantages, including reduced intersymbol interference. (*See* O'Hara, at p. 143 ("The basic principal of operation first divides a high-speed binary signal to be transmitted into a number of lower data rate subcarriers. . . . Intersymbol interference is generally not a concern for lower speed carrier, ...").)

129. **Cost**: It was also well-known to persons of ordinary skill in the art that cellular data services provided by traditional carriers (e.g., AT&T) in June 2001 could be costly, with users potentially having to pay based on the amount of time or amount of bandwidth consumed. Tagg makes clear that these types of cellular connection charges can be dramatically reduced by allowing the cell phone to switch a short-range wireless network such as IEEE 802.11. For example, Tagg explains that "[a] cell phone located within 100 feet of a fixed host device can connect to the Internet through that device, obtaining phone calls at a fraction of the cost of a regular cellular connection." (*Id.*, 5:31-33; *see also id.*, 5:64-66 ("Our technology sits between the user and the Internet constantly negotiating the most cost effective means by which they can gain access.").) A person of ordinary skill in the art would have understood that the same rationale for voice telephone calls would also apply to data transmissions, such as downloads of MP3 files from a server.

130. The dual motivations – speed and cost – are also interrelated. Because of the more limited bandwidth of a traditional cellular data connection as compared to IEEE 802.11, the time it would take to download MP3 files over a traditional cellular data connection could be considerable, resulting in even higher connection time charges and an even greater cost disparity. A person of ordinary

skill in the art would have been motivated to incorporate IEEE 802.11 into the cell phone **12** of Rolf to obtain these performance and cost benefits.

131. Tagg does not explicitly disclose that the IEEE 802.11 wireless network uses OFDM, but it was well-known and understood that IEEE 802.11**a**, one of the two variants of IEEE 802.11 introduced in the late 1990s, used OFDM. This point was expressly confirmed by O'Hara. It would therefore have been obvious to a person of ordinary skill in the art to incorporate IEEE 802.11a wireless networking into the cell phones of Tagg and Rolf, predictably resulting in those devices receiving digital audio and/or visual files using OFDM. Although Tagg does not disclose any particular variant of IEEE 802.11 (it simply refers to "802.11" without any "a" or "b" suffix), a person of ordinary skill in the art would have readily understood that IEEE 802.11a was one of a finite number of potential variants of IEEE 802.11. Nothing in Tagg limits IEEE 802.11 to one particular variant or would otherwise prevent the use of IEEE 802.11a. Moreover, a person of ordinary skill in the art would have appreciated that because IEEE 802.11a enabled data rates of up to 54 Mbps (compared to 11 Mbps for IEEE 802.11b), the 802.11a variant would have provided enormous advantages in terms of speed, which I explained at length above. (*See* O'Hara, at p. 139 ("In October 1997 the IEEE 802 Executive Committee approved two projects to for higher rate physical

layer (PHY) extensions to IEEE 802.11. The first extension, IEEE 802.11a, defines requirements for a PHY operating in the 5.0 GHz U-NII frequency and data rates ranging from 6 Mbps to 5,4 Mbps. The second extension, IEEE 802.11b, defines a set of PHY specifications operating in the 2.4 GHz ISM frequency band up to 11 Mbps.").) Finally, by September 2000, inexpensive chipsets for implementing IEEE 802.11a were already commercially available and designed for incorporation into existing IEEE 802.11 products. (Bryan E. Braswell, *Modeling Data Rate Agility in the IEEE 802.11a Wireless Local Area Networking Protocol*, **[Ex. 1064]**, at pp. 8-9.)

c. "said device including a device digital signal processor configured to receive and process the optimized digital media file sent by synchronized orthogonal frequency-division multiplex modulation" (Claim 1[c])

132. In light of the length of this claim limitation, I will again divide it into pieces to ensure that I cover all of its elements.

"said device including a device digital signal processor"

133. As noted and shown in Figure 1 above, Rolf discloses a "wireless communications device **12**." (Rolf, 5:21-22, 5:30-32.) Rolf explains that the wireless communications device can be a "cellular telephone or personal digital

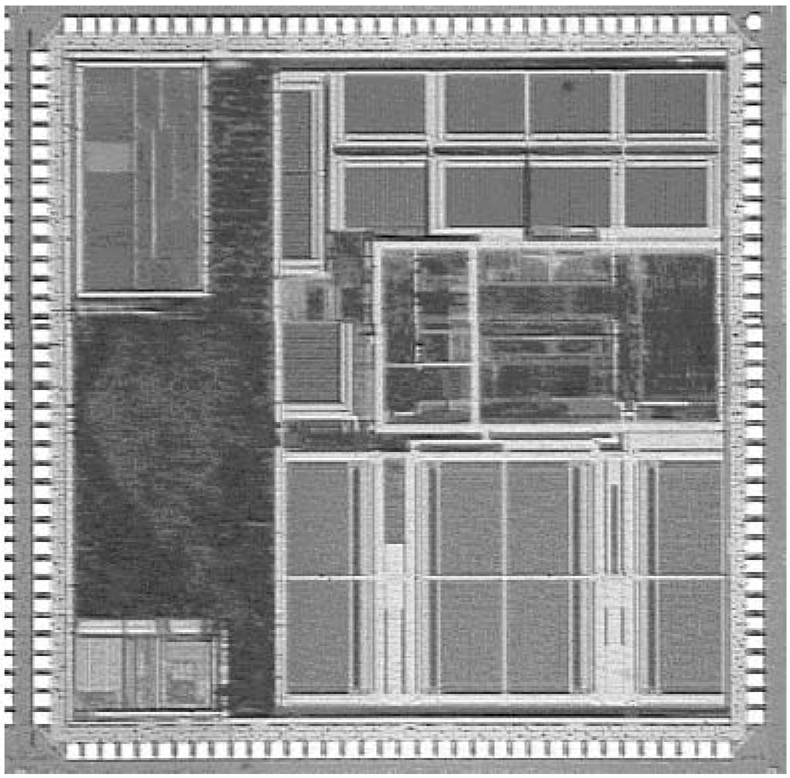
assistant." (*Id.*, 1:27-28.) The wireless device is also configured to receive and play back music files transmitted from the facility **14**. (*Id.*, 5:46-59.)

134. Rolf discloses that the "wireless communications device **12** has a processor **20**." (*Id.*, 7:49-50.) Rolf explains that the processor **20** performs functions including processing data packets received by the wireless device and outputting information to be displayed. (*Id.*, 10:44-46, 13:37-40.)

135. Rolf does not appear to expressly disclose that the wireless device includes a "**digital signal processor**." However, it was well-known to persons of ordinary skill in the art that wireless devices of the sort disclosed in Rolf (e.g., cell phones) could include one or more digital signal processors, which were advantageously used for functions such as speech coding and noise suppression. Thus, one of ordinary skill in the art would have understood and found it obvious that the wireless device in Rolf could include a digital signal processor. To the extent there is any question, this detail is confirmed and expressly disclosed by Frantz.

136. As Frantz explains, "the entire digital wireless industry operates with DSP-enabled handsets." (Frantz, at p. 52, left column (underlining added).) Frantz also discloses a "[c]ellular phone baseband system on a chip featuring a 100- to 200-MHz DSP plus a microcontroller unit, ASIC logic, dense memory, and analog

functions." (*Id.*, at p. 58, left column, Fig. 5 (underlining added).) This is shown in Figure 5, reproduced below.



(*Id.*, at p. 58, Fig. 5.)

137. ***Rationale and Motivation to Combine:*** It would have been obvious to a person of ordinary skill in the art to combine Rolf with Frantz, predictably resulting in a wireless device that included one or more digital signal processors.

138. As noted above, Rolf and Frantz are analogous references in the same field of computing. Their analogous nature is confirmed by the fact that both references disclose mobile handsets and contemplate their use for web-based

services. (*See* Frantz, at p. 58, right column ("Portable electronic equipment will become smaller, lighter, and more personal, letting people hold video conversations and routinely access the Internet from anywhere, among other things.") (underlining added).) A person of ordinary skill in the art implementing the wireless device of Rolf would naturally have consulted Frantz in ascertaining the components of cell phones, and would have understood that the two references pertain to the same technology area and are readily combinable.

139. Moreover, the advantages offered by DSPs in terms of performance, cost, and programmibility discussed in detail above, apply with full force here. Indeed, Frantz suggests that these advantages – which were expected to only get better with time – are particularly applicable to the wireless devices. (*Id.*, at p. 59, left column ("What will happen when the DSP in a wireless handset offers enough performance for twenty cellular phones yet is inexpensive enough and draws little enough power that it is still the best choice for the system?").) Accordingly, one of ordinary skill in the art would have been motivated to implement the wireless device in Rolf using a digital signal processor.

140. One of ordinary skill in the art would also have been motivated to make the proposed combination by the widespread availability of off-the-shelf DSPs. As Frantz explains, "[d]uring the past decade digital signal processors

(DSPs) have hit critical mass for high-volume applications." (*Id.*, at p. 52, left column.) The increasing availability of commercial DSPs is shown in Figure 1, reproduced below.

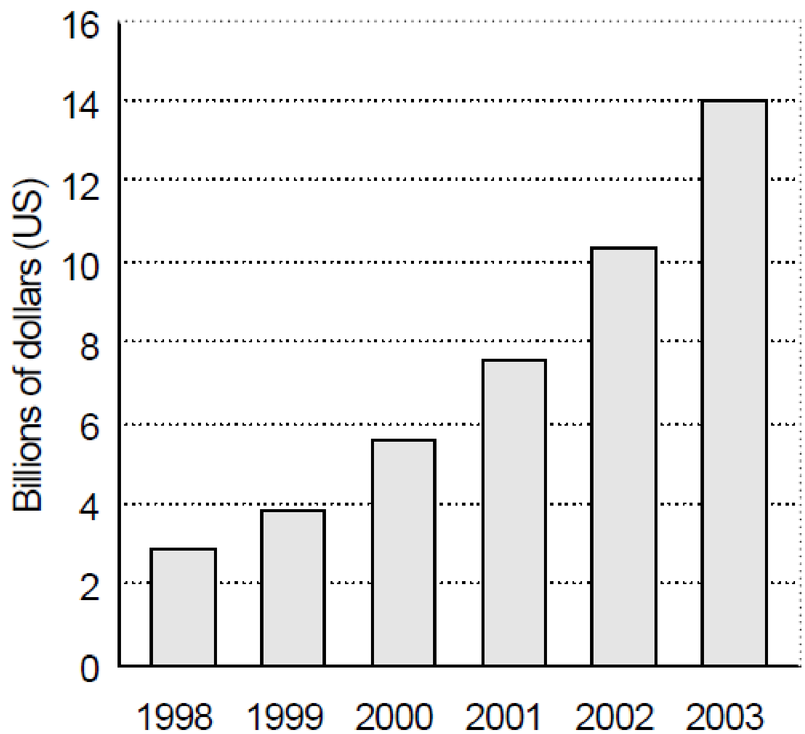


Figure 1. DSP market size (source: Forward Concepts).

(*Id.*, at p. 53, Fig. 1.) This environment would have motivated a person of ordinary skill in the art to incorporate one or more digital signal processors into the wireless device described in Rolf.

device digital signal processor "configured to receive and process the optimized digital media file sent by synchronized orthogonal frequency-division multiplex modulation"

141. As I explained at length above, the prior art discloses that a wireless communications device can receive and play back music files "sent by synchronized orthogonal frequency-division multiplex modulation." It would have been obvious that the digital signal processor included in the wireless device can be "**configured to receive and process the optimized digital media file sent by synchronized orthogonal frequency-division multiplex modulation**."

142. As I mentioned above, Frantz discloses that a desirable feature of digital signal processors is their programmability. (Frantz, at p. 54, left column ("When a VLIW architecture is supported by a carefully tuned C compiler, the powerful performance of the DSP engine becomes both highly efficient and easy to use. Programmers who have little familiarity with DSPs can then write code quickly without becoming familiar with the instruction set and underlying mechanics of the processor.").) Frantz further predicted that as digital signal processors became more powerful, they would be used to support a growing number of functions performed by wireless devices. (*Id.*, at p. 59, left column ("What will happen when the DSP in a wireless handset offers enough performance for twenty cellular phones yet is inexpensive enough and draws little enough power that it is still the best choice for the system?"); *see also id.*, at p. 58, right column ("Portable electronic equipment will become smaller, lighter, and

more personal, letting people hold video conversations and routinely access the Internet from anywhere, among other things.”).) As such, one of ordinary skill in the art would have understood and found it obvious that, when included in a wireless device that receives files transmitted by OFDM modulation, the digital signal processor could process the OFDM signals.

143. One of ordinary skill in the art would have had ample motivations to implement functions of the OFDM receiver, as described in O’Hara, using a digital signal processor. To begin with, it was well known that DSPs could be programmed to receive and process OFDM signals. (E. Lawrey, *Multiuser OFDM*, Fifth International Symposium on Signal Processing and its Applications (Aug. 1999), **[Ex. 1015]**, at p. 761, left column (“[A] test hardware solution is presented using SHARC® Digital Signal Processors (DSP) demonstrating the feasibility of a simple multiuser OFDM system.”); U.S. Patent No. 6,711,221 (filed Feb. 2000), **[Ex. 1017]**, 3:33-48.) In fact, as explained in U.S. Patent No. 5,732,113 to Timothy Schmidl et al. (1998), it was “typical” for prior art OFDM receivers to include a DSP. (Ex. 1016, 3:38-41; *see also id.*, Fig. 3 (showing a typical prior art receiver that includes DSP **100**).).

144. Moreover, a person of ordinary skill in the art would have been motivated to use a DSP to perform the functions of the OFDM receiver described

in O'Hara because she would have appreciated that DSPs can efficiently implement the mathematical algorithms involved in the processing of OFDM signals, such as the Fast Fourier Transform (FFT). (O'Hara, at p. 144 ("At the receiver, the carrier is converted back to a multicarrier lower data rate form using an FFT.""), Fig. 7-2.) Indeed, Frantz provides express suggestions for doing so. (Frantz, at p. 52, right column – p. 53, left column ("Essentially, DSPs are designed for number crunching.").) Accordingly, it would have been obvious to configure a digital signal processor included in a wireless device to receive and process files transmitted by synchronized OFDM modulation.

145. A person of ordinary skill in the art would also have been motivated to implement functions of the music player disclosed in Rolf using a digital signal processor. (Rolf, 1:17-21 ("The present invention is generally directed to a system and method for wirelessly transmitting encoded music, via a wireless communications link, to a portable or mobile communications device which includes a player for playing the music or audio.").) As Frantz explains, "consumer audio gear such as Internet audio are just some of the many mass market applications in which DSPs are routinely found today." (Frantz, at p. 52, left column.) It would therefore have been obvious that the digital signal processor

could be configured to receive and process for playback the music files that were sent to the cell phone by synchronized OFDM modulation.

2. Dependent Claim 8: "The system of claim 1, wherein the request for the digital media file is received from the wireless electronic device."

146. I will next address dependent claim 8 because my analysis relies on the same prior art as claim 1. As I explained above, claim 1 is disclosed by and obvious over Rolf, Frantz, Gilbert, O'Hara, and Tagg. Claim 2 depends from claim 1, and is obvious in view of further disclosures from Rolf.

147. Rolf discloses that a user accessing the facility **14** components from wireless device **12** can make a selection via a "<u>menu</u> or <u>listing</u> of recordings." (Rolf, 9:14-15; *see also id.*, 5:35-37 ("Preferably, the music recordings are categorized by a plurality of selectable fields, such as 'title', 'artist', 'album or CD type', 'recording label', etc.").) Rolf discloses that the music recordings can be selected for download using the cell phone **12**. (*Id.*, 5:49-53; *see also id.*, 1:39-41, 5:64-66, 9:10-15.) Rolf therefore discloses that "**the request for the digital media file is received from the wireless electronic device**."

3. Dependent Claim 2: "The system of claim 1, wherein the optimization scheme comprises: normalizing an amplitude of the digital media file; performing a pre-emphasis filtering on the normalized digital media file; and re-normalizing the pre-emphasis-filtered and normalized digital media file."

148. As I explained above, claim 1 is disclosed by and obvious over Rolf, Frantz, Gilbert, O'Hara, and Tagg. Claim 2 depends from claim 1, and is obvious in further view of Brumitt.

149. As I discussed above for claim 1, Gilbert teaches a technique in which newly generated ("non-optimized") digital audio files undergo computer processing to enhance their perceived quality. (Gilbert, 3:62-4:10.) As described in Gilbert, "[u]pon generating a digital audio file, process **250** operates on the digital audio file, … to correct any defects, separate the digital audio file into discrete track-oriented files or tracks, and compress the discrete tracks." (*Id.*, 4:6-10.) As I explained previously, process **250** corresponds to the "**optimization scheme**" recited in claim 1.

150. Gilbert explains that as part of process **250** (the "optimization scheme"):

> [F]iltering operations are applied to correct defects in the information contained within the digital audio file. As depicted in FIG. 2A, computer system **230** includes filtering applications **230**D that operate on the digital audio file. Such defects may arise from the reproduction

> of the information on the analog medium and may include scratch noises, clicks, pops, hissing, etc. As is well known in the art, filtering applications **230**D employ various techniques to identify and compensate for certain defects. These techniques include . . . normalizing extreme or inconsistent volume levels to an average value, ...

(*Id.*, 4:10-29 (underlining added).) Gilbert therefore discloses that the optimization scheme can include at least the step of "**normalizing an amplitude of the digital media file**."

151. While Gilbert discloses that the optimization scheme can include other "filtering applications" including "applying high-pass filters to remove low frequency noise" (*id.*, 4:18-29), Gilbert does not appear to expressly disclose that its optimization scheme includes "performing a **pre-emphasis filtering** on the normalized digital media file[,] and **re-normalizing** the pre-emphasis-filtered and normalized digital media file." But these steps would have been obvious in view of Brumitt.

152. Like Gilbert, Brumitt recognized that the perceived quality of an audio signal can be hampered by noise. (Gilbert, 4:15-18 ("[D]efects may arise from the reproduction of the information on the analog medium and may include scratch noises, clicks, pops, hissing, etc."); *e.g.*, Brumitt, 1:25-47.) Brumitt therefore teaches a technique "for reducing unwanted noise in a signal." (Brumitt,

1:7-8; *see also id.*, Abstract ("A method and system for reducing the undesirable noise in a communication signal is provided.").) Brumitt's technique is generally shown in Figure 1, reproduced below.

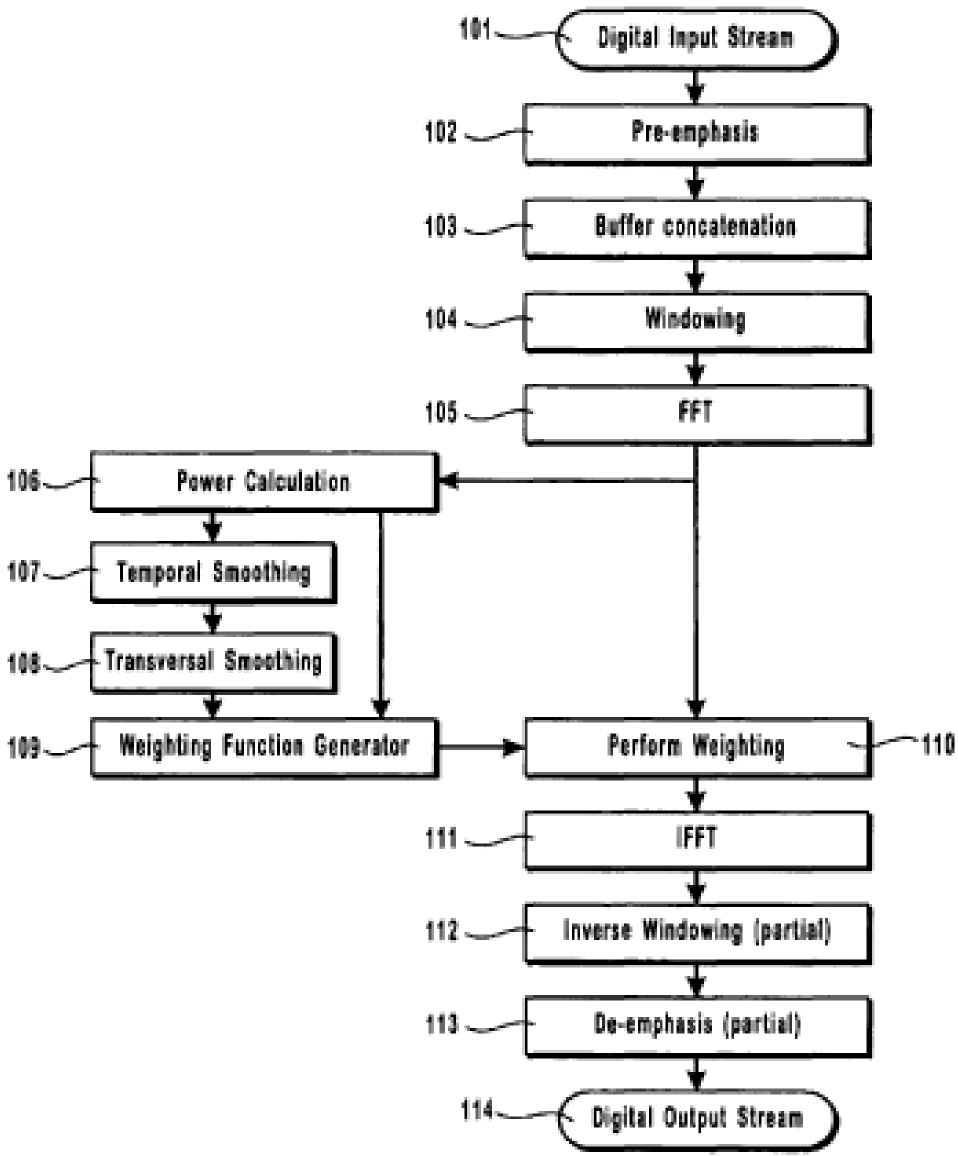


Fig. 1

(*Id.*, Fig. 1.)

153. In the initial step in Figure 1 shown above, "the noise cancellation algorithm receives **101** a digital data stream." (*Id.*, 3:61-65.) Brumitt explains that "[t]ypically, this desired signal content is a voice or speech signal, although alternative signal content can be used." (*Id.*, 4:5-7.) As I explain below, it would have been obvious to apply Brumitt's noise cancellation algorithm to the normalized digital audio file disclosed by Gilbert and discussed above.

154. Brumitt discloses that the digital audio signal is "passed through a pre-emphasis function **102**, which flattens the spectral energy of the desired signal content." (*Id.*, 4:2-5 (underlining added).) Brumitt explains that "[i]n the preferred embodiment of the invention, differencing is used for pre-emphasis." (*Id.*, 7:43-45; *see also id.*, 4:7-13.) For example:

> If s(n) is the current speech sample and s(n−1) is the previous speech sample, then the frequency compensated signal s' is given by:

> s'(n)=s(n)−s(n−1).[8] Hence, the high frequency components of the signal are emphasized while the low frequency components are de-emphasized.

(*Id.*, 4:14-18 (underlining added); *see also id.*, 7:30-43, Figs. 2a, 2b, 3a, 3b.)

155. Brumitt further explains that "[d]ifferencing is the simplest pre-emphasis function, although it provides only a rough approximation of the spectral roll off of the speech signal. In alternative embodiments of the invention, if a better approximation is required a more complex pre-emphasis function can be substituted." (*Id.*, 7:45-50.) Brumitt thus satisfies the step of "**performing a pre-emphasis filtering on the normalized digital media file**." (*See also The IEEE Authoritative Dictionary of IEEE Standards Terms* (2000), **[Ex. 1075]**, at p. 859 (defining "pre-emphasis" as "[a] process in a system designed to emphasize the magnitude of some frequency components with respect to the magnitude of others,

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[8] A person of ordinary skill in the art would have understood that the difference function "s'(n)=s(n)−s(n−1)" is a finite impulse response (FIR) pre-emphasis filter (of length M = 2 and having two filter coefficients b_0=1 and b_1=-1). (*See* John G. Proakis et al., *Digital Signal Processing Principles, Algorithms, and Applications* (1996), **[Ex. 1080]**, at p. 620 (explaining the general difference equation used to describe FIR filters).)

to reduce adverse effects, such as noise, in subsequent parts of the system."), p. 435 (defining "filter" as "(A) A circuit that eliminates certain portions of a signal, by frequency, voltage, or some other parameter. (B) A mathematical model which performs the same function on a sampled version of the signal.") (underlining added).)

156. After performing a pre-emphasis filtering on the digital audio signal in step **102**, Brumitt's noise cancellation algorithm performs a number of operations on the pre-emphasis-filtered signal, including storing in a buffer (step **103**), applying a windowing function (step **104**), and applying a Fast Fourier Transform (FFT) (step **105**). (*Id.*, 4:19-39.) As relevant to claim 2, Brumitt discloses that the pre-emphasis-filtered signal can be "normalized" in a subsequent weighting step **110**. (*Id.*, 4:54-57 ("If signal normalization is required later in the Weighting block **110**, ...") (underlining added); *see also id.*, 4:62-65 ("It is often desirable to apply normalization only to signals above a certain level, in which case the mean power, Pm, can be limited to a minimum value, Po.") (underlining added), 6:5-9 ("W[n] being a function of (Pf[n]−Pm) in the normalized case.") (underlining added), 8:39-51 (discussing different weighting techniques in consideration of the potential effects of normalization).) As Brumitt explains:

> Signal normalization is usually necessary when the background noise and speech level change with time, such as is commonly found in an

> automobile environment. When a car speeds up the background noise and, in particular, the road noise increases. When the level of background noise increases, the speaker automatically and naturally compensates by raising his or her voice. Fixed weighting thresholds do not tent [sic] to work particularly well in this situation. Where the background noise is somewhat constant, such as in an office environment, the speakers voice level does not tend to change substantially and, therefore, normalization may not be necessary in such an environment.

(*Id.*, 4:65-5:10 (underlining added).) Thus, the weighting step **110** normalizes the audio signal as necessary such that signal frequencies corresponding to noise can be more accurately identified for attenuation. (*Id.*; *see also id.*, 6:5-18, 8:30-39, Fig. 6.)

157. As noted above and explain in detail below, it would have been obvious to apply Brumitt's noise cancellation algorithm, including the steps of pre-emphasis filtering and subsequent normalization, to the previously-normalized digital audio file of Gilbert. Brumitt thus satisfies the step of "**re-normalizing the pre-emphasis-filtered and normalized digital media file**."

158. ***Rationale and Motivation to Further Combine with Brumitt***: As I explained in **Part V.B.1.b** for claim 1 above, it would have been obvious to a person of ordinary skill in the art to combine Gilbert and Frantz with Rolf, with no

change in their respective functions. And this would have predictably resulted in a server, as disclosed in Rolf, having the capability to receive a non-optimized digital media file (e.g., music file) and optimize it according to an optimization scheme, in which the optimization is executed by the server digital signal processor (DSP). It would have been further obvious to combine with Brumitt, such that the optimization scheme performed by the server DSP includes the steps of (1) normalizing an amplitude of the digital media file, (2) performing a pre-emphasis filtering on the normalized digital media file, and (3) re-normalizing the pre-emphasis-filtered and normalized digital media file.

159. Gilbert and Brumitt provide express motivations to combine in this manner. As noted, Gilbert explains that as part of its optimization scheme:

> [F]iltering operations are applied to correct defects in the information contained within the digital audio file. . . . [C]omputer system **230** includes filtering applications **230**D that operate on the digital audio file. Such defects may arise from the reproduction of the information on the analog medium and may include scratch noises, clicks, pops, hissing, etc. As is well known in the art, filtering applications **230**D employ various techniques to identify and compensate for certain defects.

(Gilbert, 4:10-29 (underlining added).) Brumitt, for its part, describes a technique "for reducing unwanted noise in a signal." (Brumitt, 1:7-8.) One of ordinary skill in the art would have appreciated that Brumitt's technique for reducing noise could advantageously be used to mitigate the potential defects in audio files described in Gilbert, such as scratch noises and hissing.

160. In fact, a person of ordinary skill in the art would have recognized that the noise reduction technique in Brumitt is well-suited for the types of audio recordings processed in Gilbert. As noted previously, Gilbert discloses that "[c]onverting information recorded on analog media into a digital format would ensure that the content is preserved in the event that the analog media is no longer accessible due to equipment obsolescence or media degradation." (Gilbert, 1:40-45.) Gilbert explains that audio recorded on analog media includes "music, speeches, narrations, plays, etc." (*Id.*, 1:21-22.) Brumitt, for its part, confirms that its noise reduction technique can be applied to "speech signals" and other audio content ("alternative signal content"). (Brumitt, 4:5-7.) Thus, it would have been readily apparent to a person of ordinary skill in the art that Brumitt's technique can be applied to the audio signals disclosed in Gilbert, including speech and music.

161. Moreover, a person of ordinary skill in the art would have appreciated that Brumitt's noise reduction technique is particularly well-suited for the types of noise identified in Gilbert. As noted, Gilbert explains that "defects may arise from the reproduction of the information on the analog medium and may include scratch

noises, clicks, pops, hissing, etc." (Gilbert, 4:15-18.) A person of ordinary skill in the art would have appreciated that these are precisely the types of "background" noises that Brumitt seeks to address. (Brumitt, 1:28-35, 4:65-5:10.) For example, the "hissing" in Gilbert (Gilbert, 4:15-18) is similar to the noise induced by "fans" discussed in Brumitt (Brumitt, 1:32-35), in that they are persistent noises characterized by particular frequencies. As such, these types of noises are well-suited for attenuation, or even complete removal, by the frequency-dependent weighting function used in Brumitt's noise reduction algorithm. (Brumitt, 6:11-15 ("The purpose of the weighting function is to leave the frequency bins with relatively large power levels unchanged and to attenuate the frequency bins with relatively low power levels."); *see also id.*, 6:5-18, 8:30-39, Fig. 6.)

162. As I explained above, Gilbert discloses that its optimization scheme can include the step of "normalizing extreme or inconsistent volume levels to an average value," thus disclosing "**normalizing an amplitude of the digital media file**." (Gilbert, 4:24-30.) A person of ordinary skill in the art would have been motivated to apply Brumitt's noise cancellation algorithm, including its steps of "**pre-emphasis filtering**" and subsequent "**normalization**," after the initial normalization disclosed in Gilbert. As noted, Gilbert teaches a computer processing system that samples an analog audio signal to generate a digital audio

file. (Gilbert, 3:62-66.) Gilbert explains that the input analog signal can be generated from a variety of storage media, such as vinyl recordings and cassette tapes, using a variety of audio reproduction devices, such as record players and casette decks:

> [I]n block B**255**, process **250** reproduces the audio information contained within the analog medium **205**. <u>The analog medium **205** may comprise a vinyl or cassette tape recording</u>, in which the audio information is recorded in discrete analog tracks. Each track typically corresponds to an individual song of a predetermined length. <u>The recorded information is reproduced by playing the medium **205** on analog reproducing device **210**, such as, for example, a record player or tape deck.</u>

(*Id.*, 3:34-43 (underlining added); *see also id.*, 1:25-35, Abstract.) One of ordinary skill in the art would have appreciated that because the system in Gilbert digitizes audio from many different analog sources (e.g., multiple vinyl recordings and cassette tapes) reproduced by different playback devices (e.g., record player and tape deck), each digital audio file generated by the system could have widely different volume levels. Accordingly, it would be beneficial – even imperative – to normalize digital audio files with extreme volumes (e.g., to a predetermined average volume), as taught by Gilbert, before performing any subsequent processing that depends upon a file's particular volume characteristics, including noise cancellation as described in Brumitt. It is an elementary concept of signal processing that the processing only works as intended if the input signal falls within an acceptable range contemplated by the process. (*See also* Hacker, at p. 165 ("One bugaboo that often crops up when creating mixed song collections is the fact that the original source materials are all recorded at slightly different levels, leaving you with MP3 files of varying volumes. . . . The solution is to use a normalizer, which will boost the overall signal of weakly recorded tracks and diminish levels for loud ones.").)

163. Indeed, one of ordinary skill in the art would have appreciated that normalizing digital audio files with extreme volumes before applying Brumitt's noise cancellation algorithm would be critical to the computational accuracy of the noise cancellation algorithm. This is because Brumitt's noise cancellation algorithm distinguishes between "signal" and "noise" components of an audio signal based on power levels associated with individual frequencies. (Brumitt, 6:11-15 ("The purpose of the weighting function is to leave the frequency bins with relatively large power levels unchanged and to attenuate the frequency bins with relatively low power levels."); *see also id.*, 8:30-39, Fig. 6.) Thus, if the range of volumes of the input audio file is too extreme – either too high or too low – the power levels of individual frequencies will be similarly extreme in their

differences, and the frequencies that are not responsible for "noise" may have relatively low power levels as compared to the frequencies with high power, and thus interpreted as being noise. In this scenario, frequency content that is not noise may be attenuated, thereby removing desired signal content.

164. Moreover, one of ordinary skill in the art would have appreciated that the normalization step in Brumitt's noise cancellation algorithm is not redundant of the initial normalization described in Gilbert, and would provide additional benefits. Brumitt explains that normalization as part of noise cancellation is beneficial where both the noise and signal change with time. (*Id.*, 4:65-5:1 ("Signal normalization is usually necessary when the background noise and speech level change with time, ...").) For example, as Brumitt explains, "[w]hen a car speeds up the background noise and, in particular, the road noise increases. When the level of background noise increases, the speaker automatically and naturally compensates by raising his or her voice." (*Id.*, 5:1-4.) One of ordinary skill in the art would have recognized that there may be similar variations in noise and signal within an audio track reproduced from an analog storage medium. This may be the result of, for example, defects in the original recording (e.g., due to degradation) or defects during the reproduction process (e.g., less-than-perfect record player). These variations would not have been corrected by the initial normalization of

"extreme" volumes disclosed in Gilbert, and as such, would advantageously be accounted for by subsequent normalization during noise cancellation. (*Id.*, 4:62-65 ("It is often desirable to apply normalization only to signals above a certain level, in which case the mean power, Pm, can be limited to a minimum value, Po. If Pm is less than Po, then Pm is sent to Po.").) And as noted, the normalization in Brumitt allows signal frequencies that correspond to noise to be more accurately identified for attenuation, thereby resulting in better perceived audio quality. (*Id.*; *see also id.*, 6:5-18, 8:30-39, Fig. 6.)

165. As I explained in **Part V.B.1.b** for claim 1 above, it would have been obvious that the optimization scheme taught by Gilbert could be performed by a server DSP in the music server disclosed in Rolf. It would additionally have been obvious that the server DSP could perform the specific optimization steps recited in claim 2. The rationale and motivation for using a server DSP are provided in **Part V.B.1.b**, and apply equally here. Moreover, Brumitt expressly discloses that its noise cancellation algorithm can be performed by a DSP. (*Id.*, 2:52-3:9.)

166. Finally, Rolf, Frantz, Gilbert, and Brumitt are all analogous references in the same field of computing. Rolf, Gilbert, and Brumitt describe computer techniques for processing audio data, and Frantz confirms that such processing can be performed by a DSP. Indeed, the analogous nature of Gilbert and Brumitt is

confirmed by the fact that both contemplate using computer systems to enhance the perceived quality of digital audio. (Gilbert, e.g., 4:14-15 ("computer system 230 includes filtering applications 230D that operate on the digital audio file."); Brumitt, e.g., 1:34-36 ("[I]t is desirable to provide a method that may be performed within the computer system.").) One of ordinary skill in the art would have found Brumitt to be a natural combination with Rolf, Frantz, and Gilbert.

4. Dependent Claim 7: "The system of claim 1, wherein the non-optimized digital media file is received from the wireless electronic device."

167. Claim 7 depends from claim 1 and recites "[t]he system of claim 1, wherein the non-optimized digital media file is received from the wireless electronic device." As I explained above, claim 1 is disclosed by and obvious over Rolf, Frantz, Gilbert, O'Hara, and Tagg. Claim 7 would have been obvious in further view of Yukie and Van de Pol.

168. As I explained above in **Part V.B.1.b**, it would have been obvious in view of Gilbert and Frantz that the server in Rolf could include a server digital signal processor (DSP) that receives a non-optimized digital media file for processing. Those references do not disclose that the non-optimized digital media file is "**received from the wireless electronic device**," but this would have been obvious in further view of Yukie and Van de Pol.

169. As I discussed in **Part V.A** above, Yukie discloses a system similar to Rolf in which a server stores data that can be retrieved using a consumer device, such as a cell phone or music player, via a wireless connection. (Yukie, Abstract, 2:31-49 ("The present invention addresses the limitations associated with relying on local data storage media by employing a wireless communications link to a remote data server. . . ."), 3:42-48 ("User device **10** can comprise any number of devices, without restriction, such as a music player, … a telephonic device, …") (underlining added), 10:41-43 ("User device **10** can also be a telephonic communication device such as a telephone, cellular phone, telephonically enabled personal digital assistant (PDA) . . . .") (underlining added); *see also id.*, 16:64-17:6.)

170. Yukie further discloses that the server stores both content that originated from the user's wireless device as well as other content, such as commercially available audio and video. (*Id.*, 2:39-44.) For example, a user can record a digital audio file using the wireless device and transmit the audio file from the device to the server for storage. (*Id.*, 6:44-47 ("[T]he music player can optionally include a microphone for audio recording. The input audio would be encoded and sent to data server **16** across the wireless connection.")

171. This functionality is not limited to "music players." As noted previously, Yukie explains that the user device **10** can be a "cellular phone" or a "music player," or may include the functionalities of both devices. (*Id.*, 10:41-43, 3:42-48, 16:64-17:6 ("As can be seen, therefore, user device **10** can take the form of a number of embodiments. While several examples have been described, the user devices are unlimited in scope. … Note also that the wireless user devices tend to fall into several categories, …") (underlining added).) Yukie also discloses that a cell phone may be used to record and transmit a digital audio file to the server for storage. (*Id.*, 11:13-22 ("[A]ny of the embodiments of the telephonic device, . . . could include audio input and output components, available for telephony functions for audio recording and playback. . . . The audio data can be stored . . . on data server **16** across the wireless connection, as described above. For playback, the device would download audio data in an audio stream from data server **16** and outputs the audio in real-time.") (underlining added).)

172. Yukie makes clear that a digital audio file recorded using the wireless device need not be stored locally before it is sent to the server for permanent storage:

> [V]arious embodiments of user device **10** can include local storage which is limited in size to an amount which allows operation of the device and transmission of data to data server **16** for storage, but not

> substantially beyond that amount. For example, local data storage media **32** would comprise only transient storage, such as RAM. Accordingly, when user device **10** stores data for long-term use (e.g., data which is not for immediate operation of the device), user device **10** sends the data to data server **16** through the wireless connection.

(*Id.*, 17:21-30; *see also id.*, 4:41-57). This "reduce[s] or eliminate[s] the need for local data storage media in a consumer device." (*Id.*, 2:53-54; *see also id.*, 2:31-52, 3:48-55, 6:11-15, 14:26-28.)

173. Yukie discloses that the recorded audio can be "encoded" by the wireless device before sending it to the server (*id.*, 6:45-47),[9] but does not otherwise describe the details of its formatting prior to transmission, including whether it has undergone compression or other processing. Nevertheless, a person

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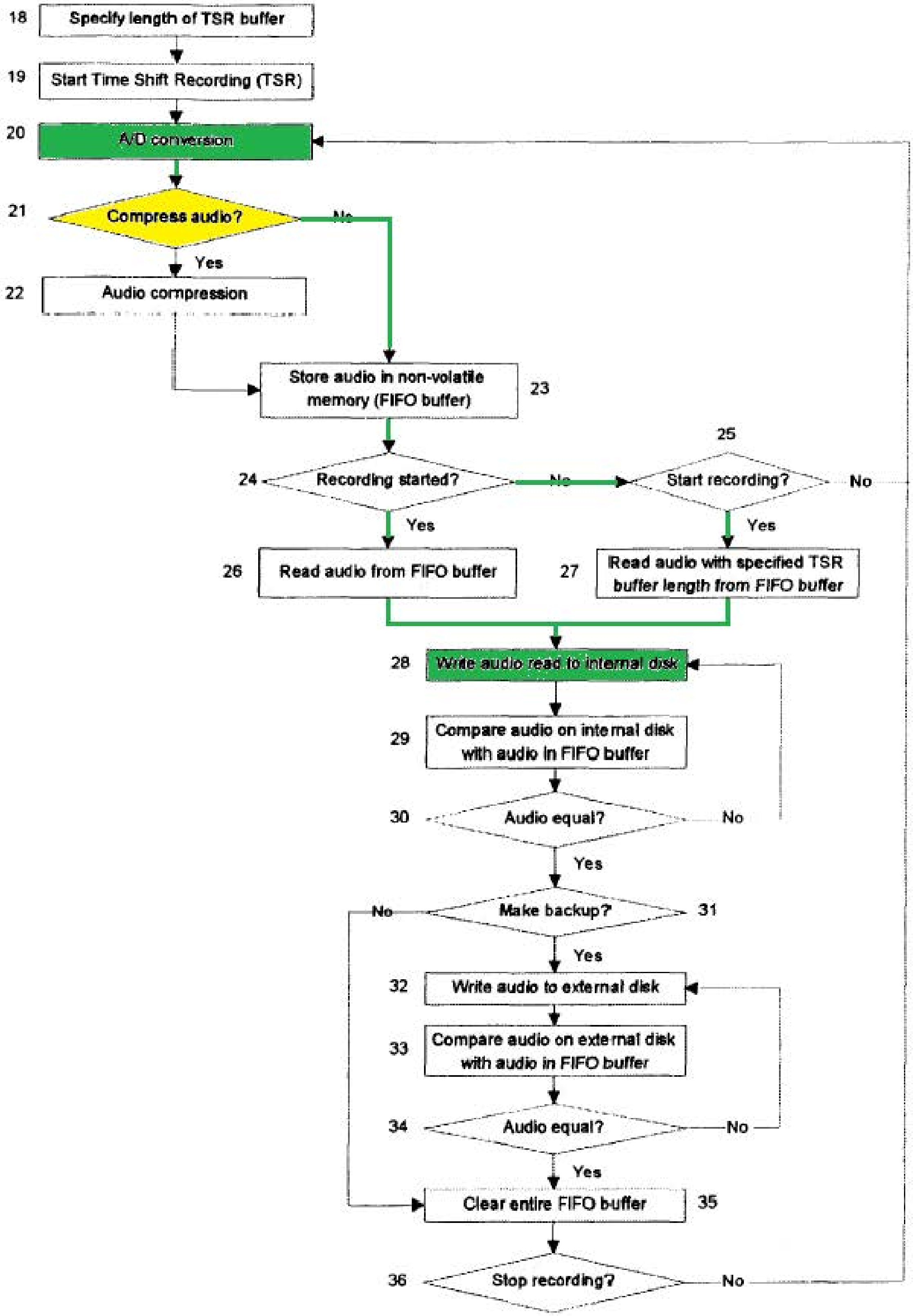
[9] One of ordinary skill in the art would therefore have understood that the recorded audio signal has been digitized by the wireless device prior to sending, but not necessarily compressed or otherwise processed. (*See Newton's Telecom Dictionary* (2000), **[Ex. 1077]**, p. 308 (defining "encoding" as "[t]he process of converting data into code or analog voice into a digital signal."); *The IEEE Authoritative Dictionary of IEEE Standards Terms* (2000), **[Ex. 1075]**, at p. 379 (defining "encoding" as "[a] means of producing a unique combination of bits (a code) in response to an analog input signal").)

of ordinary skill in the art would have found it obvious that where the wireless device does not store the digital audio file locally before sending (*id.*, 17:21-30, 4:41-57, 2:53-54, 2:31-52, 3:48-55, 6:11-15), the wireless device could send a "**non-optimized**" digital audio file to the server for storage.

174. To the extent there is any question, Van de Pol confirms that the wireless device in Yukie could send "non-optimized" digital audio to the server for storage. As I discussed above in **Part V.A**, Van de Pol discloses a portable device that can be used to digitally record audio. (Van de Pol, ¶ 0001.) As Van de Pol explains, it "can be used by journalists, radio stations and all other users, who wish to record, store and edit high quality audio." (*Id.*) Van de Pol discloses a method of recording and storing digital audio that does not involve compression or other processing. This is shown in Figure 2, reproduced below.


18
Specify length of TSR buffer
19
Start Time Shift Recording (TSR)
20
A/D conversion
21
Compress audio?
No
Yes
22
Audio compression
Store audio in non-volatile memory (FIFO buffer)
23
25
24
Recording started?
No
Start recording?
No
Yes
Yes
26
Read audio from FIFO buffer
27
Read audio with specified TSR buffer length from FIFO buffer
28
Write audio read to internal disk
29
Compare audio on internal disk with audio in FIFO buffer
30
Audio equal?
No
Yes
No
Make backup?
31
Yes
32
Write audio to external disk
33
Compare audio on external disk with audio in FIFO buffer
34
Audio equal?
No
Yes
Clear entire FIFO buffer
35
36
Stop recording?
No

(*Id.*, Fig. 2 (color annotation added); *see also id.*, ¶¶ 0020-24.) As shown by the steps traced in green, the audio is never compressed or otherwise processed from the moment when the audio is digitized in step 20 to when it is stored in permanent memory in step 28. Van de Pol's method includes the steps of comparing the audio recently saved with audio in RAM to ensure that the audio has been properly stored in permanent memory (steps 29-30 and 33-34), but these steps do not alter the recorded audio data in any way. (*Id.*, ¶¶ 0023, 0024.) In fact, Van de Pol expressly notes that the audio need not undergo compression. (*Id.*, ¶¶ 0021 ("The invention gives the possibility to store the audio linear or compressed, this will be checked at (21).") (underlining added); *see also id.*, Fig. 2 (portion highlighted in yellow above).) Accordingly, Van de Pol confirms that a portable device, such as the wireless device in Yukie, can record a "non-optimized" digital audio file for permanent storage. And because Yukie teaches that a recorded audio file can be sent from the wireless recording device to the server for permanent storage (Yukie, 17:21-30, 4:41-57, 2:53-54, 2:31-52, 3:48-55, 6:11-15), one of ordinary skill in the art would have understood that a "**non-optimized digital media file is received from the wireless electronic device**" at the server.

175. ***Rationale and Motivation to Combine:*** It would have been obvious to a person of ordinary skill in the art to combine Rolf, Frantz, and Gilbert with Yukie

and Van de Pol, with no change in their respectively functions, predictably resulting in a server having a server digital signal processor (DSP) that receives a non-optimized digital media file for optimization, in which the non-optimized digital media file is received from the wireless device, as taught by Yukie and Van de Pol. A person of ordinary skill in the art would have had many reasons to make such a combination.

176. There can be no doubt that user-created recordings were commonplace long before the '465 patent was filed. The ability to create audio recordings using consumer equipment dates back more than a century to at least U.S. Patent No. 341,214, entitled "Recording and Reproducing Speech and Other Sounds" **[Ex. 1078]**, which issued in 1886 to the cousin of Alexander Graham Bell. By no later than the 1980s, portable cassette tape recorders were widely available. Allowing users to make their own audio recordings was a long-standing practice whose benefits were well-known to persons of ordinary skill in the art.

177. It would have been obvious to a person of ordinary skill in the art, in light of the teachings of Yukie, to adapt the wireless communications device **12** of Rolf to include the ability to record a digital audio file. In fact, the wireless communications device **12** in Rolf includes a microphone **32** for receiving voice input from the user, as well as a transceiver **40** for transmitting digital content.

(Rolf, Fig. 4, 7:49-54, 8:10-16.) Thus, the wireless communications device **12** in Rolf could have been readily adapted to add Yukie's ability to record digital audio files, which could then be transmitted to and permanently stored in a remote server, such as the server disclosed in Yukie and Rolf. This would have required nothing more than a combination of known elements according to known methods, producing results that would have been predictable to a person of ordinary skill in the art.

178. Yukie provides express motivations to create such a combination. It was well-known to persons of ordinary skill in the art that portable wireless devices as of June 2001 often had limited local storage space, as Yukie itself confirms. (Yukie, 2:18-28, 2:49-54, 10:64-11:6.) Yukie explains that by storing audio files on the server for later retrieval, the user device **10** does not need to store them locally on the device, which reduces storage and power consumption requirements:

> [T]he present invention provides for any user device to use a wireless feed instead of using tapes, memory sticks, etc. The wireless network is preferably bi-directional, and provides for remote storage of the information. The data would be transmitted in IP format so that it can be sent efficiently in packets over the wireless connection. <u>The remote server would store the information for later retrieval</u>. Therefore, it would no longer be necessary to incorporate local storage in a user

> device unless desired. The result is that the memory requirements of the user device are eliminated, which reduces power consumption as well as storage limitations.

(*Id.*, 6:5-15 (underlining added); *see also id.*, 2:31-52, 2:53-54 ("An object of the invention is to reduce or eliminate the need for local data storage media in a consumer device."), 3:48-55, 6:11-15, 14:26-28.) A person of ordinary skill in the art would have been motivated to apply the teachings of Yukie to improve the system of Rolf in the same way to reduce storage and power consumption requirements.

179. Indeed, a person of ordinary skill in the art would have appreciated that user-recorded audio may only be needed occasionally or infrequently, making it undesirable in those circumstances to store them persistently in the wireless device's limited local memory. By permanently storing the recordings on the server, as disclosed in Yukie, they remain available to the user for retrieval and playback.

180. Moreover, a person of ordinary skill in the art would have been motivated to send a "non-optimized" digital audio file from the wireless device to the server for permanent storage for two main reasons: (1) better audio quality, and (2) reduced processing on the wireless device.

181. **Better Audio Quality:** As I discussed in **Part III.B** above, it was well-known to persons of ordinary skill in the art that compression can create a tension between reducing the size of the file that stores the audio content, and the quality of the audio content as perceived by the user. Generally speaking, increasing the reduction in file size achieved by compression can reduce the perceived quality of the audio. As such, in systems where file size is less of a constraint, one of ordinary skill in the art would be motivated to avoid compression to preserve audio quality. Such is the case here.

182. As I explained above, Yukie teaches that the wireless device can use a remote server for permanent storage. (Yukie, 2:31-52, 2:53-54, 3:48-55, 6:5-15, 14:26-28.) Because it is no longer necessary to rely on the more limited memory of the wireless device, one of ordinary skill in the art would have been motivated to store recorded audio in uncompressed form to optimize quality. In fact, Van de Pol provides express motivations for doing so. (Van de Pol, ¶ 0006 ("Because the internal storage medium is fast and large, it gives the opportunity to record also uncompressed audio.") (underlining added); *see also id.*, ¶ 0001 ("The system can be used by journalists, radio stations and all other users, who wish to record, store and edit high quality audio.") (underlining added).)

183. Moreover, I explained previously that it would have been obvious to for the wireless device to communicate with a remote server using IEEE 802.11a, which offered tremendous bandwidth (up to 54 Mbps). This makes network performance less of an issue. One of ordinary skill in the art would therefore have been motivated to exploit the high connection speed by transmitting the recorded audio in uncompressed form, so as to optimize quality.

184. **Reduced Processing on the Audio Device:** One of ordinary skill in the art would have appreciated that any processing performed by the wireless device on the recorded audio, compression or otherwise, would consume power. Thus, it would have been readily apparent that performing compression and other processing at the server would reduce power consumption at the wireless device. Indeed, the combined teachings of Rolf and Gilbert provide express motivations for doing so by disclosing servers that perform various audio processing techniques, including compression and optimization. One of ordinary skill in the art would have appreciated that low power consumption is especially critical for portable devices, as it increases the time they can be used in between battery charges.

185. One of ordinary skill in the art would have also appreciated that performing audio processing at the server would further conserve local memory,

because it would obviate the need to store on the wireless device the programming instructions needed to execute such processing.

186. Finally, Rolf, Frantz, Gilbert, Yukie, and Van de Pol are all analogous references in the same field of computing. As noted, Rolf and Yukie disclose very similar systems for storing media on a server and delivering that media to a user device. (*See, e.g.*, Yukie, 2:49-52.) Moreover, one of ordinary skill in the art would have appreciated that the optimization techniques described in Gilbert, which "identify and compensate for certain defects" in audio recordings (Gilbert, 4:19-20), are a natural fit with the user-recorded audio taught by Yukie and Van de Pol. Therefore, a person of ordinary skill in the art would have found the references fully combinable, and would have been motivated to apply the teachings of Yukie and Van de Pol in the manner described above.

5. Independent Claim 9

187. Independent claim 9 is substantially similar to independent claim 1, which I analyzed in detail above. I have reproduced independent claim 9 below:

> 9. A system for communicating content-rich digital media files to a wireless telephone having a digital signal processor, the system comprising:
>
> a database configured to store a plurality of content-rich digital media files; and

> a server operably coupled to the database and including a server digital signal processor and memory,
>
> the server digital signal processor configured to,
>
> > optimize the non-optimized digital media file according to an optimization scheme,
> >
> > store the optimized digital media file in the database,
> >
> > receive a request from the wireless telephone, the request identifying at least one of the plurality of content-rich digital media files, and
> >
> > cause to transmit to the wireless telephone over a cellular data channel by orthogonal frequency-division multiplex (OFDM) modulation the identified at least one of the plurality of content-rich digital media files
>
> wherein the wireless telephone is configured to receive and process OFDM transmitted content-rich digital media files.

('465, 34:16-36 (Claim 9).) Each limitation of claim 9 is disclosed and rendered obvious by Rolf in view of Frantz, Gilbert, O'Hara, Tagg, and Pinard. Because claim 9 is substantially similar to claim 1, I will refer to the discussion above with respect to claim 1 as appropriate in my analysis of claim 9 below.

188. The preamble of claim 9 recites "[a] system for communicating content-rich digital media files to a wireless telephone having a digital signal processor." Assuming this is limiting, it is fully disclosed by Rolf in view of

Frantz. As explained in **Part V.B.1** above, Rolf discloses a "**system for communicating … digital media files to a wireless telephone**." (Rolf, 1:17-21 ("…transmitting encoded music…"), 1:27-28 ("a wireless communications device, such as a cellular telephone").) As explained in **Part IV.C.2** above, the limitation "**content-rich digital media files**" under its broadest reasonable construction is "**sound and/or image files**." The digital music files in Rolf therefore satisfy this definition. (*Id.*, 8:61-9:6; *see also id.*, 5:32-35.) Moreover, as explained in Part **V.B.1.b**, it would have been obvious in view of Frantz that the wireless telephone in Rolf could "**hav[e] a digital signal processor**."

189. Rolf further discloses "**a database configured to store a plurality of content-rich digital media files**." (*Id.*, 8:62-63, 9:4-5; *see also id.*, 5:32-35.) Moreover, as explained in **Part V.B.1.a** above, Rolf in view of Frantz discloses "**a server operably coupled to the database and including a server digital signal processor and memory**."

190. The steps performed by the server digital signal processor in claim 9 are substantially similar to steps previously discussed with respect to claim 1. A side-by-side comparison of the digital signal processor steps in claim 9 with steps in claim 1 is shown below, with common or overlapping language shown in underlining:

Independent Claim 1	Independent Claim 9
[a] optimize the non-optimized digital media file according to an optimization scheme,	[a] optimize the non-optimized digital media file according to an optimization scheme,
[b] store the optimized digital media file in the database,	[b] store the optimized digital media file in the database,
[c] receive a request for the digital media file, and	[c] receive a request from the wireless telephone, the request identifying at least one of the plurality of content-rich digital media files, and
[d] cause a transmission of the requested optimized digital media file by synchronized orthogonal frequency-division multiplex modulation to a wireless electronic device,	[d] cause to transmit to the wireless telephone over a cellular data channel by orthogonal frequency-division multiplex (OFDM) modulation the identified at least one of the plurality of content-rich digital media files

191. As shown, steps 9[a] and 9[b] are identical to steps 1[a] and 1[b], respectively. Step 9[c] specifies that the request is received "**from the wireless telephone**" and "**identif[ies] at least one of the plurality of content-rich digital media files**." But this does not provide a basis to distinguish the claim from the prior art. As explained in **Part V.B.1.b** above, the processor **50** of the server in Rolf "provid[es] a menu driven system to wireless communications device **12**, such that the wireless communications device **12** can be utilized to select [a] recording via a menu or listing of recordings." (*Id.*, 9:12-15 (underlining added).)

The selection can be made "using a keypad and input on the wireless communications device," and accordingly, "one or more selected music recordings may be retrieved from the storage facility **14**, for transmission, via wireless communications link, to the device **12**." (*Id.*, 5:49-53 (underlining added); *see also id.*, 1:39-41 ("Using an input of the cellular telephone, a user may select one or more recordings for transmission to the cellular telephone."), 5:64-66 ("[A] wireless communications device **12** communicates with a central facility **14** for retrieval of one or more stored music recordings.").) Because the "selected" digital music file (selected "via a menu or listing of recordings") is retrieved from the facility **14** for transmission in response to a selection made from the wireless device, one of ordinary skill in the art would have understood that the server in Rolf "**receive[s] a request from the wireless telephone, the request identifying at least one of the plurality of content-rich digital media files**," as recited in claim 9.

192. The only material difference between steps 9[d] and 1[d] is that step 9[d] requires that the transmission of the identified music file to the wireless telephone occur by OFDM modulation "**over a cellular data channel**." As I explained above, Rolf discloses providing for the wireless transmission of requested music files from the facility **14** to the cell phone. (Rolf, 1:18-21, 1:25-

28, 5:46-53.) While Rolf does not disclose that the transmission occurs "**over a cellular data channel by orthogonal frequency-division multiplex (OFDM) modulation**," this would have been obvious in view of O'Hara, Tagg, and Pinard. As I explained in **Part V.B.1.b** above, it would have been obvious, in view of O'Hara and Tagg, to transmit data to a cell phone by OFDM modulation. Moreover, it would have been obvious, in further view of **Pinard**, that the transmission could occur "**over a cellular data channel**."

193. As I explained above in **Part V.B.1.b**, I have cited O'Hara and Tagg for the propositions that (1) prior art IEEE 802.11a wireless networking transmits digital information to mobile devices using OFDM modulation (O'Hara) and (2) IEEE 802.11 wireless networking functionality can be incorporated into a cell phone, such as the cell phone **12** of Rolf (Tagg). I now cite Pinard for the proposition that (3) a "cellular data channel," as recited in claim 9, can be provided based on IEEE 802.11 wireless networking technology.

194. As I discussed above in **Part V.A**, Pinard teaches that an IEEE 802.11 wireless network is a cellular network, and can provide data channels for communication. I explained previously that the term "cellular data channel" simply refers to a data channel in a network in which wireless communications are provided through a series of "cells," each cell providing network access for a

particular geographic area. Thus, a "cellular data channel" under its broadest reasonable construction, therefore, is not limited to a particular type of wireless networking technology, or technology that provides the same type of wireless range as a commercial cellular carrier.

195. In this regard, I have cited **<u>Pinard</u>** for the simple proposition that a "cellular data channel" can be provided based on IEEE 802.11 wireless technology. Pinard states that it "relates generally to preemptive roaming among cells in a cellular network. In particular, the invention relates to a local area wireless network including a plurality of mobile units and a plurality of access points." (Pinard, 1:21-24.) More specifically, Pinard discloses a technique for improving the way in which a mobile unit selects the access point with which it will associate. (*Id.*, 2:16-22.) "Each mobile unit may select a group of eligible access points and select the most eligible access point from that group." (*Id.*, 2:45-47.) The selection may be based on the signal strength of the access points and the number of mobile units connected to each access point (the "loading factor"). (*Id.*, 2:30-50.) Pinard expressly confirms that "[t]he <u>cellular communications network may comprise a 1 Mbps frequency-hopping spread spectrum wireless LAN conforming to the IEEE 802.11 draft specification</u>." (*Id.*, 2:50-53 (underlining added).) Pinard further explains that this cellular network provides data channels

for communication. (*Id.*, 1:39-40 (describing the "data rates" featured in the draft 802.11 specification) (underlining added), 2:31-41, 4:26-35 (explaining that the invention "provide[s] a data communications network") (underlining added).)[10] Pinard therefore confirms that a "cellular data channel" as recited in claim 9 can be provided using IEEE 802.11 access points.

196. As noted previously, Pinard refers to the "IEEE 802.11 draft specification" because as of the filing of Pinard in 1995, IEEE 802.11 was still in draft form. It is common for persons of ordinary skill in the art to describe implementations using then-available "draft" standards, with the understanding that the final standard will be used when it becomes available. Accordingly, a person of ordinary skill in the art by June 2001 would have understood the reference to IEEE 802.11 in Pinard to include at least the full range of IEEE 802.11

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[10] To the extent there is any question as to whether an IEEE 802.11**a** cellular network provides "data channels" for communication, this is expressly disclosed in O'Hara. (O'Hara, at pp. 143 ("Each lower data rate bit stream is used to modulate a separate subcarrier from one of the channels in the 5 GHz band.") (underlining added), 144-46 (section entitled "OFDM Operating Channels and Transmit Power Requirements") (underlining added).)

technologies available by the time the standard was published by 2001, including IEEE 802.11a and its higher bit rates.

197. ***Rationale and Motivation to Combine:*** It would have been obvious to a person of ordinary skill in the art to combine Rolf with O'Hara, Tagg, and Pinard, predictably resulting in the transmission of a content-rich digital media file (e.g., MP3 file) to the cell phone **12**, as described in Rolf, in which the file is transmitted over an IEEE 802.11a cellular data channel by OFDM modulation. As noted previously, Pinard expressly confirms that a "cellular data channel" can be provided using IEEE 802.11 access points. (*See also* O'Hara, at pp. 166-67 (discussing "WLAN cells" implemented using IEEE 802.11 access points).) And Tagg, as I explained for claim 1[b] above, specifically discloses the ability to incorporate IEEE 802.11 wireless networking technology into a cell phone.

198. I have explained in **Part V.B.1.b** above the motivations for transmitting data to a cell phone by use of IEEE 802.11a networking, thus using OFDM modulation. Those motivations, including the benefits of speed and cost, apply with full force here. Moreover, a person of ordinary skill in the art would have appreciated that using multiple 802.11a-compliant access points to provide wireless communication for a series of cells (as opposed to a single access point) would be beneficial because it would enable network access over a larger

geographical area. A person of ordinary skill in the art would have been motivated to build a Pinard-style 802.11 network to achieve the dual and interrelated benefits of increased speed and decreased cost, and by using 802.11-based cells that provide a wider geographical range, to exploit these speed and cost benefits even further and avoid the disadvantages of more traditional cellular networks. (*See* O'Hara, at p. 3 ("In a laptop equipped with an IEEE 802.11 WLAN connection, the connection to the network is available in a coworker's office, down the hall in the conference room, downstairs in the lobby, across the parking lot in another building, even across the country on another campus.").)

199. Claim 9 ends by reciting that "**the wireless telephone is configured to receive and process OFDM transmitted content-rich digital media files**." As explained in **Part V.B.1.b** above, it would have been obvious in view of O'Hara and Tagg that the wireless telephone in Rolf could receive and process digital music files transmitted using OFDM. This limitation is therefore satisfied by the prior art.

6. Dependent Claim 10: "The system of claim 9, wherein the server and the wireless telephone are further operably coupled by a WI-FI data channel."

200. Claim 10 depends from claim 9 and recites: "The system of claim 9, wherein the server and the wireless telephone are further operably coupled by a

WI-FI data channel." As I discussed previously in **Part V.B.1.b**, Rolf discloses a server and cell phone **12** that are "**operably coupled**." The server can receive and respond to requests from the cell phone, and the server can transmit digital music files to the cell phone. (Rolf, 1:17-21, 5:46-53; *see also id.*, Fig. 1.)

201. Rolf does not expressly disclose that the server and cell phone **12** are coupled "**by a Wi-Fi data channel**." But as I noted in **Part V.A** above, "Wi-Fi" (or "WiFi" or "WI-FI") was known to persons of ordinary skill in the art as a name for the IEEE 802.11 technology. (*See, e.g.*, *WECA Applauds IEEE Ratification of High-Speed Additions to Wireless LAN Standard* (1999), **[Ex. 1079]**, at p. 1 ("802.11b, also known as 'Wi-Fi'"); *The Promise of Broadband Wireless* (2000), **[Ex. 1082]**, at pp. 33-34 ("The Wirelesss Ethernet Compatibility Alliance (WECA) certifies the interoperability of 802.11b equipment through an independent third-party tester. Products that pass the WECA test are stamped with a WiFi seal (pronounced 'Y-phi'), short for wireless fidelity, so that, consumers can readily identify them."); Sohil N. Parekh, *Evolution of Wireless Home Networks: The Role of Policy-Makers in a Standards-based Market* (2001), **[Ex. 1081]**, at p. 3 (dated May 11, 2001), p. 32 ("The mission of WECA is to certify interoperability of products based on the IEEE 802.11b standard (branded Wi-Fi, for Wireless

Fidelity) and to promote it as the global wireless LAN standard across all market segments.").)

202. A person of ordinary skill in the art would therefore have understood that 802.11, as described in O'Hara, discloses "**WI-FI**" and that a data channel provided using 802.11 discloses a "**WI-FI data channel**." (Pinard, 1:39-40 (describing the "data rates" featured in the draft 802.11 specification), 2:31-41, 4:26-35 (explaining that the invention "provide[s] a data communications network"); O'Hara, at pp. 143 ("Each lower data rate bit stream is used to modulate a separate subcarrier from one of the channels in the 5 GHz band."), 144-46 (section entitled "OFDM Operating Channels and Transmit Power Requirements").)

203. For the same reasons I explained in **Part V.B.1.b**, therefore, it would have been obvious in view of O'Hara and Tagg that the server and cell phone **12** in Rolf could be coupled using 802.11 ("Wi-Fi") technology that provides a "Wi-Fi data channel."

7. Dependent Claim 11: "The system of claim 10, wherein the WI-FI data channel utilizes orthogonal frequency-division multiplex (OFDM) modulation."

204. Claim 11 depends from claim 10 and recites: "The system of claim 10, wherein the WI-FI data channel utilizes orthogonal frequency-division

multiplex (OFDM) modulation." As I explained above for claim 1 (**Part V.B.1.b**) and claim 10, the 802.11 technology ("Wi-Fi") uses "orthogonal frequency-division multiplex (OFDM) modulation" to provide "data channels" for communication. Claim 11 is therefore obvious for the same reasons I previously explained.

VI. ENABLEMENT OF THE PRIOR ART

205. I am informed that in an *inter partes* review, the petitioning party does not have a burden to show that the prior art is enabling. Nevertheless, in my opinion, the Rolf, Frantz, Gilbert, Brumitt, Yukie, Van de Pol, O'Hara, Tagg, and Pinard references provide sufficient detail to enable a person of ordinary skill in the art to practice the limitations of the claims to which they apply without undue experimentation. To begin with, I am informed that, for purposes of assessing the prior art, the disclosures in issued U.S. patents (such as Rolf, Gilbert, Brumitt, Yukie, Tagg, and Pinard) are presumed enabling, and that this presumption extends to claimed and unclaimed material.

206. Nevertheless, the disclosures in these references are enabling regardless of whether they are issued patents. As I have explained in **Part III** above, the technological underpinnings of the challenged '465 patent claims were firmly in place well before June 2001. Cell phones with digital signal processors

were well-known and in use by millions of users. (Gatherer, Ex. 1005, at pp. 84, 89.) The '465 patent itself acknowledges that "[t]he cellular telephone **202** may be any commercially available cellular phone." ('465, 14:36-37.) Commercially available cell phones were also capable of accessing the Internet and displaying web content. In fact, by June 2001, industry standards existed for providing websites to cell phones (e.g., WAP), and well-known companies such as Amazon and Yahoo! were specifically designing their websites to be accessible to cell phones. (Forta, **[Ex. 1004]**, at pp. 314-18.)

207. Orthogonal frequency-division multiplexing (OFDM) was also a well-known transmission technology. (*See* **Part III.D**.) As I explained in **Part III.D** above, the use of OFDM in cellular systems was well known years before the '465 patent. Indeed, as I noted, telecom heavyweights such as Ericsson and Nokia were developing technologies and systems for using OFDM in cellular networks prior to June 2001.

208. Rolf, Frantz, Gilbert, Brumitt, Yukie, Van de Pol, O'Hara, Tagg, and Pinard all pre-date the '465 patent, and those references themselves treat cell phones, digital signal processors, websites, and OFDM as firmly in the prior art. As I explained above, a person of ordinary skill in the art would have been

motivated to combine their teachings and could have done so, due maturity of those technologies.

209. As I discussed above, the ability to add media selection, download, and playback (including streaming) to commercially available cell phones was also known. This is confirmed by Rolf, which predates the earliest possible priority date of the ’465 patent by more than six months and claims priority to the Rolf Provisional, which in turn predates the ’465 by more than a year and a half. Rolf describes in detail a system enabling a cell phone user to wirelessly select, download, and play music, using standard equipment. (E.g., Rolf, Abstract, 1:25-42.) In my opinion, the system described in Rolf could have been implemented using well-known hardware, networking, and software techniques familiar to persons of ordinary skill in the art.

210. In short, by June 2001, each aspect of the disclosures that I have cited from Rolf, Frantz, Gilbert, Brumitt, Yukie, Van de Pol, O’Hara, Tagg, and Pinard was already well-known and was the subject of extensive public documentation. A person of ordinary skill in the art would not have required disclosures any more detailed than the disclosures in the prior art to apply the prior art teachings in the manner described in this Declaration.

VII. CONCLUSION

211. In signing this Declaration, I recognize that the Declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in this proceeding. If required, I will appear for cross-examination at the appropriate time. I reserve the right to offer opinions relevant to the invalidity of the '465 patent claims at issue and/or offer testimony in support of this Declaration.

212. 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 18 U.S.C. § 1001.

Dated: January 16, 2017

Respectfully submitted,

Tal Lavian
Jan 16, 2007

Tal Lavian, Ph.D.
Sunnyvale, California

EXHIBIT A

Tal Lavian, Ph.D.

http://telecommnet.com
http://cs.berkeley.edu/~tlavian
tlavian@telecommnet.com

1640 Mariani Dr.
Sunnyvale, CA 94087
(408)-209-9112

Research and Consulting:Telecommunications,Network Communications, and Mobile Wireless Technologies

Scientist, educator, and technologist with over 25years of experience; co-author on over 25 scientific publications, journal articles, and peer-reviewed papers; named inventor on over 100 issued and filed patents; industry fellow and lecturer at UC Berkeley Engineering–Center for Entrepreneurship and Technology (CET)

EDUCATION

- **Ph.D.**, Computer Science specializing in networking and communications, UC Berkeley
- **M.Sc.**, Electrical Engineering, Tel Aviv University
- **B.Sc.**, Mathematics and Computer Science, Tel Aviv University

EXPERTISE

Network communications, telecommunications, Internet protocols, and mobile wireless:

- **Communication networks:** Internet protocols; TCP/IP suite; TCP; UDP; IP; VoIP; Ethernet; network protocols; network software applications; data link, network, and transport layers (L2, L3, L4)
- **Internet software:** Internet software applications; distributed computing; cloud computing; Web applications; FTP; HTTP; Java; client server; file transfer; multicast; streaming media
- **Routing/switching:** LAN; WAN; VPN; routing protocols; RIP; BGP; MPLS; OSPF; IS-IS; DNS; QoS; switching; packet switching; network infrastructure; network communication architectures
- **Mobile wireless:** wireless LAN; 802.11; cellular systems; mobile devices; smartphone technologies

ACCOMPLISHMENTS

- Selected as principal investigator for three US Department of Defense (DARPA) projects
- Directed research project on networking computation for the US Air Force Research Lab (AFRL)
- Led and developed the first network resourcescheduling service for grid computing
- Administered wireless research project for an undisclosed US federal agency
- Managed and engineered the first demonstrated transatlantic dynamic allocation of 10Gbs Lambdas as a grid service
- Spearheaded the development of the first demonstrated wire-speed active network on commercial hardware
- Invented over 100 patents; over 50 prosecuted *pro se* in front of the USPTO
- Created and chaired Nortel Networks' EDN Patent Committee

PROFESSIONAL EXPERIENCE

<u>University of California, Berkeley</u>, Berkeley, California 2000-Present
Berkeley Industry Fellow, Lecturer, Visiting Scientist, Ph.D. Candidate, Nortel's Scientist Liaison
Some positions and projects were concurrent, others sequential

- Serves as an industry fellow and lecturer at the Center for Entrepreneurship and Technology (CET).
- Studied network services, telecommunication systems and software, communications infrastructure, and data centers
- Developed long-term technology for the enterprise market, integrating communication and computing technologies
- Conducted research projects in data centers (RAD Labs), telecommunication infrastructure (SAHARA), and wireless systems (ICEBERG)
- Acted as scientific liaison between Nortel Research Lab and UC Berkeley, providing tangible value in advanced technologies
- Earned a Ph.D. in Computer Science with a specialization in communications and networking

<u>TelecommNet Consulting, Inc.</u>(Innovations-IP) Sunnyvale, California 2006-Present
Principal Scientist

- Consults in the areas of network communications, telecommunications, Internet protocols, and smartphone mobile wireless devices
- Provides architecture and system consultation for projects relating to computer networks, mobile wireless devices, and Internet web technologies
- Acts as an expert witness in network communications patent infringement lawsuits

<u>VisuMenu, Inc.</u>, Sunnyvale, California 2010-Present
Co- Founder and Chief Technology Officer (CTO)

- Designs and develops architecture and system of visual IVR technologies for smartphones and wireless mobile devices in the area of network communications
- Designs crawler/spider system for IVR / PBX using Asterisk, SIP, and VoIP
- Deploys the system as cloud networking and cloud computing utilizing Amazon Web Services

<u>Ixia</u>, Santa Clara, California 2008 - 2008
Communications Consultant

- Researched and developed advanced network communications testing technologies:
  • IxNetwork/IxN2X — tested IP routing and switching devices and broadband access equipment. Provided traffic generation and emulation for the full range of protocols: routing, MPLS, layer 2/3 VPNs, carrier Ethernet, broadband access, and data center bridging
  • IxLoad — quickly and accurately modeled high-volume video, data, and voice subscribers and servers to test real-world performance of multiservice delivery and security platforms
  • IxCatapult — emulated a broad range of wireless access and core protocols to test wireless components and systems that, when combined with IxLoad, provides an end-to-end solution for testing wireless service quality
  • IxVeriWave — employed a client-centric model to test Wi-Fi and wireless LAN networks by generating repeatable large-scale, real-world test scenarios that are virtually impossible to create by any other means

• Test automation — provided simple, comprehensive lab automation to help test engineering teams create, organize, catalog, and schedule execution of tests

Nortel Networks, Santa Clara, California 1996 - 2007
Originally employed by Bay Networks, which was acquired by Nortel Networks
Principal Scientist, Principal Architect, Principal Engineer, Senior Software Engineer

- Held scientific and research roles at Nortel Labs, Bay Architecture Labs, and in the office of the CTO

Principal Investigator for US Department of Defense (DARPA) Projects

- Conceived, proposed, and completed three research projects: active networks, DWDM-RAM, and a networking computation project for Air Force Research Lab (AFRL)
- Led a wireless research project for an undisclosed US federal agency

Academic and Industrial Researcher

- Analyzed new technologies to reduce risks associated with R&D investment
- Spearheaded research collaboration with leading universities and professors at UC Berkeley, Northwestern University, University of Amsterdam, and University of Technology, Sydney
- Evaluated competitive products relative to Nortel's products and technology
- Proactively identified prospective business ideas, which led to new networking products
- Predicted technological trends through researching the technological horizon and academic sphere
- Designed software for switches, routers, and network communications devices
- Developed systems and architectures for switches, routers, and network management
- Researched and developed the following projects:
  - Data-Center Communications: network and server orchestration 2006-2007
  - DRAC: SOA-facilitated L1/L2/L3 network dynamic controller 2003-2007
  - Omega: classified wireless project for undisclosed US Federal Agency 2006-2006
  - Open platform: project for the US Air Force Research Laboratory (AFRL) 2005-2005
  - Network resource orchestration for Web services workflows 2004-2005
  - Proxy study between Web/grids services and network services 2004-2004
  - Streaming content replication: real-time A/V media multicast at edge 2003-2004
  - DWDM-RAM: US DARPA-funded program on agile optical transport 2003-2004
  - Packet capturing and forwarding service on IP and Ethernet traffic 2002-2003
  - CO2: content-aware agile networking 2001-2003
  - Active networks: US DARPA-funded research program 1999-2002
  - ORE: programmable network service platform 1998-2002
  - JVM platform: Java on network devices 1998-2001
  - Web-based device management: network device management 1996-1997

Technology Innovator and Patent Leader

- Created and chaired Nortel Networks' EDN Patent Committee
- Facilitated continuous stream of innovative ideas and their conversion into intellectual property rights
- Developed intellectual property assets through invention and analysis of existing technology portfolios

Aptel Communications, Netanya, Israel 1994-1995

Software Engineer, Team Leader

Start-up company focused on mobile wireless CDMA spread spectrum PCN/PCS

- Developed a mobile wireless device using an unlicensed band [Direct Sequence Spread Spectrum (DSSS)]
- Designed and managed a personal communication network (PCN) and personal communication system (PCS), which are the precursors of short text messages (SMS)
- Designed and developed network communications software products (mainly in C/C++)
- Brought a two-way paging product from concept to development

Scitex Ltd.,Herzeliya, Israel 1990-1993

Software Engineer, Team Leader

Software and hardware company acquired by Hewlett Packard (HP)

- Developed system and network communications (mainly in C/C++)
- Invented Parallel SIMD Architecture
- Participated in the Technology Innovation group

Shalev, Ramat-HaSharon, Israel 1987-1990

Start-up company

Software Engineer

- Developed real-time software and algorithms (mainly in C/C++ and Pascal)

PROFESSIONAL ASSOCIATIONS

- IEEE senior member
- IEEE CNSV co-chair, Intellectual Property SIG (2013)
- President Next Step Toastmasters (an advanced TM club in the Silicon Valley) (2013-2014)
- Technical co-chair, IEEE Hot Interconnects 2005 at Stanford University
- Member, IEEE Communications Society (COMMSOC)
- Member, IEEE Computer Society
- Member, IEEE Systems, Man, and Cybernetics Society
- Member, IEEE-USA Intellectual Property Committee
- Member, ACM, ACM Special Interest Group on Data Communication (SIGCOM)
- Member, ACM Special Interest Group on Hypertext, Hypermedia, and Web (SIGWEB)
- Member, IEEE Consultants' Network (CNSV)
- Global Member, Internet Society (ISOC)
- President Java Users Group – Silicon Valley Mountain View, CA,1999-2000
- Toastmasters International

ADVISORY BOARDS

- Quixey –search engine for wireless mobile apps
- Mytopia – mobile social games
- iLeverage – Israeli Innovations

PROFESSIONAL AWARDS

- Top Talent Award – Nortel
- Top Inventors Award – Nortel EDN
- Certified IEEE-WCET - Wireless Communications Engineering Technologies
- Toastmasters International - Competent Communicator (twice)
- Toastmasters International - Advanced Communicator Bronze

Patents and Publications

(Not an exhaustive list)

Patents Issued

US 9,184,989	Grid proxy architecture for network resources	Link
US 9,083,728	Systems and methods to support sharing and exchanging in a network	Link
US 9,021,130	Photonic line sharing for high-speed routers	Link
US 9,001,819	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,949,846	Time-value curves to provide dynamic QoS for time sensitive file transfers	Link
US 8,929,517	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,903,073	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,898,274	Grid proxy architecture for network resources	Link
US 8,880,120	Device and method for providing enhanced telephony	Link
US 8,879,703	System method and device for providing tailored services when call is on-hold	Link
US 8,879,698	Device and method for providing enhanced telephony	Link
US 8,867,708	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,787,536	Systems and methods for communicating with an interactive voice response system	Link
US 8,782,230	Method and apparatus for using a command design pattern to access and configure network elements	Link
US 8,762,963	Translation of programming code	Link
US 8,762,962	Methods and apparatus for automatic translation of a computer program language code	Link
US 8,745,573	Platform-independent application development framework	Link
US 8,731,148	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,688,796	Rating system for determining whether to accept or reject objection raised by user in social network	Link
US 8,619,793	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link
US 8,572,303	Portable universal communication device	Link
US 8,553,859	Device and method for providing enhanced telephony	Link

US 8,548,131	Systems and methods for communicating with an interactive voice response system	Link
US 8,537,989	Device and method for providing enhanced telephony	Link
US 8,341,257	Grid proxy architecture for network resources	Link
US 8,161,139	Method and apparatus for intelligent management of a network element	Link
US 8,146,090	Time-value curves to provide dynamic QoS for time sensitive file transfer	Link
US 8,078,708	Grid proxy architecture for network resources	Link
US 7,944,827	Content-aware dynamic network resource allocation	Link
US 7,860,999	Distributed computation in network devices	Link
US 7,734,748	Method and apparatus for intelligent management of a network element	Link
US 7,710,871	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link
US 7,580,349	Content-aware dynamic network resource allocation	Link
US 7,433,941	Method and apparatus for accessing network information on a network device	Link
US 7,359,993	Method and apparatus for interfacing external resources with a network element	Link
US 7,313,608	Method and apparatus for using documents written in a markup language to access and configure network elements	Link
US 7,260,621	Object-oriented network management interface	Link
US 7,237,012	Method and apparatus for classifying Java remote method invocation transport traffic	Link
US 7,127,526	Method and apparatus for dynamically loading and managing software services on a network device	Link
US 7,047,536	Method and apparatus for classifying remote procedure call transport traffic	Link
US 7,039,724	Programmable command-line interface API for managing operation of a network device	Link
US 6,976,054	Method and system for accessing low-level resources in a network device	Link
US 6,970,943	Routing architecture including a compute plane configured for high-speed processing of packets to provide application layer support	Link
US 6,950,932	Security association mediator for Java-enabled devices	Link
US 6,850,989	Method and apparatus for automatically configuring a network switch	Link

US 6,845,397	Interface method and system for accessing inner layers of a network protocol	Link
US 6,842,781	Download and processing of a network management application on a network device	Link
US 6,772,205	Executing applications on a target network device using a proxy network device	Link
US 6,564,325	Method of and apparatus for providing multi-level security access to system	Link
US 6,175,868	Method and apparatus for automatically configuring a network switch	Link
US 6,170,015	Network apparatus with Java co-processor	Link
US 8,687,777	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,681,951	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,625,756	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,594,280	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,548,135	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,406,388	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,345,835	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,223,931	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,160,215	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,155,280	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,054,952	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,000,454	Systems and methods for visual presentation and selection of IVR menu	Link
EP 1,905,211	Technique for authenticating network users	Link
EP 1,142,213	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link
EP 1,671,460	Method and apparatus for scheduling resources on a switched underlay network	Link
CA 2,358,525	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link

Patent Applications Published and Pending
(Not an exhaustive list)

US 20150058490	Grid Proxy Architecture for Network Resources	Link
US 20150010136	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20140379784	Method and Apparatus for Using a Command Design Pattern to Access and Configure Network Elements	Link
US 20140105025	Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device	Link
US 20140105012	Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device	Link
US 20140012991	Grid Proxy Architecture for Network Resources	Link
US 20130080898	Systems and Methods for Electronic Communications	Link
US 20130022191	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20130022183	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20130022181	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20120180059	Time-Value Curves to Provide Dynamic QOS for Time Sensitive File Transfers	Link
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US 20100217854	Method and Apparatus for Intelligent Management of a Network Element	Link
US 20100146492	Translation of Programming Code	Link
US 20100146112	Efficient Communication Techniques	Link
US 20100146111	Efficient Communication in a Network	Link
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US 20090279562	Content-aware dynamic network resource allocation	Link
US 20080040630	Time-Value Curves to Provide Dynamic QoS for Time Sensitive File	Link

	Transfers	
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US 20050076339	Method and Apparatus for Automated Negotiation for Resources on a Switched Underlay Network	Link
US 20050076336	Method and Apparatus for Scheduling Resources on a Switched Underlay Network	Link
US 20050076173	Method And Apparatus for Preconditioning Data to Be Transferred on a Switched Underlay Network	Link
US 20050076099	Method and Apparatus for Live Streaming Media Replication in a Communication Network	Link
US 20050074529	Method and apparatus for transporting visualization information on a switched underlay network	Link
US 20040076161	Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device	Link
US 20020021701	Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device	Link
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WO 2007/008976	Technique for authenticating network users	Link
WO2000/0054460	Method and apparatus for accessing network information on a network device	Link
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US 20140156758	Reliable rating system and method thereof	Link

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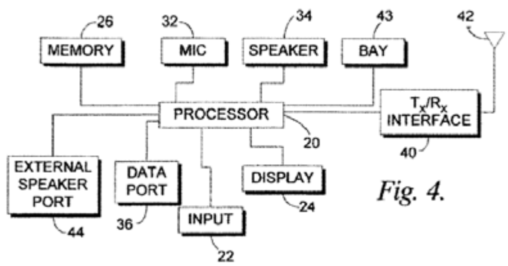
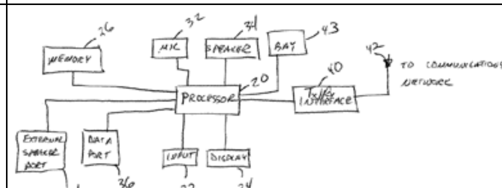
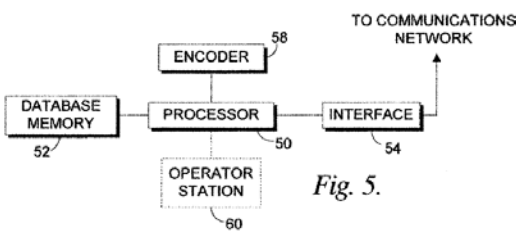
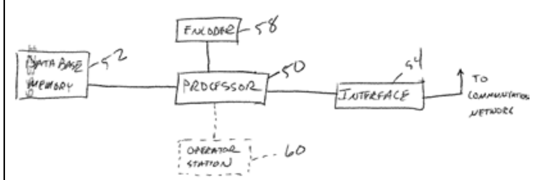
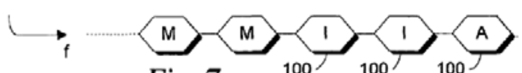
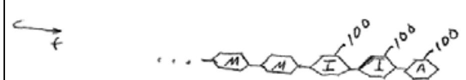
- Lambda Data Grid: An Agile Optical Platform for Grid Computing and Data-intensive Applications.
- Web Services and OGSA
- WINER Workflow Integrated Network Resource Orchestration.
- Technology & Society
- Abundant Bandwidth and how it affects us?
- Active Content Networking(ACN)
- DWDM-RAM:Enabling Grid Services with Dynamic Optical Networks
- Application-engaged Dynamic Orchestration of Optical Network Resources
- A Platform for Data Intensive Services Enabled by Next Generation Dynamic Optical Networks
- Optical Networks
- Grid Optical Network Service Architecture for Data Intensive Applications
- Optical Networking & DWDM
- OptiCal Inc.
- OptiCal & LUMOS Networks
- Optical Networking Services
- Business Models for Dynamically Provisioned Optical Networks
- Business Model Concepts for Dynamically Provisioned Optical Networks
- Optical Networks Infrastructure
- Research Challenges in agile optical networks
- Services and Applications' infrastructure for agile optical networks
- Impact on Society
- TeraGrid Communication and Computation
- Unified Device Management via Java-enabled Network Devices
- Active Network Node in Silicon-Based L3 Gigabit Routing Switch
- Active Nets Technology Transfer through High-Performance Network Devices
- Programmable Network Node: Applications
- Open Innovation via Java-enabled Network Devices
- Practical Considerations for Deploying a Java Active Networking Platform
- Open Java-Based Intelligent Agent Architecture for Adaptive Networking Devices

- Java SNMP Oplet
- Open Distributed Networking Intelligence: A New Java Paradigm
- Open Programmability
- Active Networking On A Programmable Networking Platform
- Open Networking through Programmability
- Open Programmable Architecture for Java-enabled Network Devices
- Integrating Active Networking and Commercial-Grade Routing Platforms
- Programmable Network Devices
- To be smart or not to be?

EXHIBIT B

EXHIBIT B

Cite	Rolf	Rolf Provisional
Fig. 1	 Fig. 1.	 FIG. 1
Fig. 4	 Fig. 4.	 FIG. 4
Fig. 5	 Fig. 5.	 FIG. 5
Fig. 7a	 Fig. 7a.	 Fig 7a
1:17-21	"The present invention is generally directed to a system and method for wirelessly transmitting encoded music, via a wireless communications link, to a portable or mobile communications device which includes a player for playing the music or audio."	"The present invention is generally directed to a system and method for wirelessly transmitting encoded music, via a wireless communications link, to a portable or mobile communications device which includes a player for playing the music or audio." P. 1
1:25-38	"In one embodiment, the present invention is a system for transmitting encoded music from a remote, central facility to a wireless communications device, such as a cellular telephone or personal	"In one embodiment, the present invention is a system for transmitting encoded music from a remote, central facility to a wireless communications device, such as a cellular telephone or personal

Cite	Rolf	Rolf Provisional
	digital assistant. In particular, a user of the cellular telephone (for example) may use the telephone to establish a wireless communications link with the remote, central facility, and then wirelessly download one or more selected music recordings for storage in a memory of the cellular telephone. In particular, the selected music recording(s) is/are transmitted via a wireless data communications link to the cellular telephone. Preferably, the music recordings are encoded and transmitted in packets, and may particularly be encoded by a compression algorithm into an encoded (such as MP3 or other) format."	digital assistant. In particular, a user of the cellular telephone (for example) may use the telephone to establish a wireless communications link with the remote, central facility, and then wirelessly download one or more selected music recordings for storage in a memory of the cellular telephone. In particular, the selected music recording(s) is/are transmitted via a wireless data communications link to the cellular telephone. Preferably, the music recordings are encoded and transmitted in packets, and may particularly be encoded by a compression algorithm into an encoded (such as MP3 or other) format." P. 1
1:39-42	"Using an input of the cellular telephone, a user may select one or more recordings for transmission to the cellular telephone. The selected music recordings, upon receipt by the cellular telephone, are stored in a memory."	"Using an input of the cellular telephone, a user may select one or more recordings for transmission to the cellular telephone. The selected music recordings, upon receipt by the cellular telephone, are stored in a memory." P. 1
1:64-67	"Additionally, the wireless communications device is preferably a cellular communications device and, in particular, is a cellular voice communications device, such as a cellular telephone."	"Additionally, the wireless communications device is preferably a cellular communications device and, in particular, is a cellular voice communications device, such as a cellular telephone." P. 2
2:1-6	"In accordance with yet an additional aspect of the present invention, the wireless	"In accordance with yet an additional aspect of the present invention, the wireless

Cite	Rolf	Rolf Provisional
	communications device of the present invention (whether it be handheld or installed within a vehicle) retrieves recorded music from a personal storage unit of the user.”	communications device of the present invention (whether it be handheld or installed within a vehicle) retrieves recorded music from a personal storage unit of the user.” P. 2
2:52-57	“It should be understood that the transmittal of the recording to the personal storage account may embody transmitting only a portion of the recording, such as the title and memory (e.g., address) storage location of the recording, such that the personal storage account serves as a directory or index for retrieval of acquired or accumulated recordings.”	“In accordance with an additional aspect of the present invention, information pertaining to the music recording, such as the artist, title of the recording, an album from which the recording came, the date of the recording, etc. is also transmitted with the recorded music, such that the informational data is displayed on a display of, or associated with, the wireless communications device when the particular recording is being played. Additionally, it is an aspect of the present invention that an identifier, such as a server address, associated with the remote central facility is encoded along with the transmitted data, such that a selected input on (or associated with) the wireless communications device may be pressed for automatically reconnecting with the central facility or personal storage unit.” PP. 3-4 “In accordance with an aspect of the invention, information relating to a music recording is preferably transmitted along with music recording data for storage in memory 26. For example, data

Cite	Rolf	Rolf Provisional
		indicative of the artist, the title of the recording, the album or CD from which the recording came, the recording label, the date of the recording, or any other desired information may be stored along with the recording at storage facility 14, and transmitted for storage in memory 26. Preferably, the informational data is stored as a header (e.g., in one or more integrally transmitted data packets) (See Fig. 1), such that processor 20 outputs the information to display 24." P. 22
2:62-67	"Upon access to the personal storage account by the account holder (via a communications device), and after entry of any required passwords, the user may select one or more recordings for streaming or download, whereupon the recording(s) will be retrieved."	"A plurality of recordings may be stored in the personal storage unit. The personal storage unit is accessible via a wireless communications link from the wireless communications device, to thereby enable the retrieval of selected music from the user's own storage facility. Additionally, such a system permits the user to easily mix recordings from a number of different recordings from his or her own storage unit." PP. 2-3 "In accordance with one aspect of the invention, personal storage unit 16 may also be a memory storage location at the central facility 14, or other remote site. In this way, a user of device 12 may have a personal account for storing pure based recordings, such that the account (e.g., personal storage unit

Cite	Rolf	Rolf Provisional
		16) is accessible via device 12 and other devices (such as a personal computer).” P. 16 “In accordance with yet an additional object of the present invention, the music recordings transmitted to the wireless communications device from the central storage facility, or from the personal storage unit of the user, may be transmitted in a real, or substantially real, time basis. In other words, rather than downloading one or more recordings to a memory within the wireless communications device, encoded music may be streamed directly from its source, for input into a buffer within the communications device, and for play at the communications device, without being otherwise stored in the device. In other words, the music is played as it is streamed from the central storage facility or personal storage unit of the user.” P. 4 “In making the purchase, the user may select whether to have the sound recording or its associated album downloaded to the wireless communications device (if memory space permits), or to a remote personal storage unit or account of the user, or to have the sound recording or album stored on a

Cite	Rolf	Rolf Provisional
		storage medium and transmitted to an address of the user by mail or courier.” PP. 5-6 “In summary, the wireless communications device may be used to download selected, encoded music recordings and played via the vehicle speakers., or to stream a real time encoded broadcast.” P. 25
3:11-12	“Additionally, it is an aspect of the present invention that an identifier, such as a server address, associated with the remote central facility is encoded along with the transmitted data...”	“Additionally, it is an aspect of the present invention that an identifier, such as a server address, associated with the remote central facility is encoded along with the transmitted data...” P. 4
3:17-21	“In preferred embodiments of the present invention, the wireless communications link established between the wireless communications device and the central facility is a cellular communications link and, more particularly, is an Internet link.”	“In preferred embodiments of the present invention, the wireless communications link established between the wireless communications device and the central facility is a cellular communications link and, more particularly, is an Internet link.” P. 4
3:64-4:3	“For example, when a music recording is being played at the wireless communications device, data indicative of that recording may be displayed on the display, and, additionally, a selected key on the wireless communications device may be pressed to transmit a signal to the source of the stream that the user of wireless communications device wishes to purchase the music recording.”	“For example, when a music recording is being played at the wireless communications device, data indicative of that recording may be displayed on the display, and, additionally, a selected key on the wireless communications device may be pressed to transmit a signal to the source of the stream that the user of wireless communications device wishes to purchase the music recording.” P.

Cite	Rolf	Rolf Provisional
		5
4:65-67	"FIG. **4** is a block diagram of a conventional wireless communications device utilized in accordance with the principles of the present invention;"	"FIG. 4 is a block diagram of a conventional wireless communications device utilized in accordance with the principles of the present invention;" P. 7
5:1-2	"FIG. **5** is a block diagram of a central facility of the present invention;"	"FIG. 5 is a block diagram of a central facility of the present invention;" P. 7
5:18-22	"With reference initially to FIG. **1**, a system of the present invention for playing encoded music on a wireless communications device is denoted generally by reference numeral **10**. In particular, system **10** has a wireless communications device **12**, such as a cellular telephone."	"With reference initially to FIG. 1, a system of the present invention for playing encoded music on a wireless communications device is denoted generally by reference numeral 10. In particular, system 10 has a wireless communications device 12, such as a cellular telephone." PP. 7-8
5:30-39	"A communications link may be established between wireless communications device **12** and a remote storage facility, denoted by reference numeral **14**. The remote storage facility may, for example, be at an address on the world wide web, and includes a data base having a plurality of music recordings therein. Preferably, the music recordings are categorized by a plurality of selectable fields, such as 'title', 'artist', 'album or CD type', 'recording label', etc. Additionally, the music recordings are preferably encoded in an encoded format, such as MP3 (Mpeg-1 Audio layer 3)."	"A communications link may be established between wireless communications device 12 and a remote storage facility, denoted by reference numeral 14. The remote storage facility may, for example, be at an address on the world wide web, and includes a data base having a plurality of music recordings therein. Preferably, the music recordings are categorized by a plurality of selectable fields, such as 'title', 'artist', 'album or CD type', 'recording label', etc. Additionally, the music recordings are preferably encoded in an encoded format, such as MP3 (Mpeg-1 Audio layer 3)." P. 8

Cite	Rolf	Rolf Provisional
5:46-53	"As will become apparent from the detailed discussion below, the wireless communications device **12** may be utilized to establish a communications link with the remote storage facility **14**. Then, using a keypad and input on the wireless communications device, or by voice commands, one or more selected music recordings may be retrieved from the storage facility **14**, for transmission, via wireless communications link, to the device **12**."	"As will become apparent from the detailed discussion below, the wireless communications device 12 may be utilized to establish a communications link with the remote storage facility 14. Then, using a keypad and input on the wireless communications device, or by voice commands, one or more selected music recordings may be retrieved from the storage facility 14, for transmission, via wireless communications link, to the device 12." P. 8
5:63-66	"In the embodiment of the present invention illustrated in FIG. **2**, a wireless communications device **12** communicates with a central facility **14** for retrieval of one or more stored music recordings. "	"In the embodiment of the present invention illustrated in FIG. 2, a wireless communications device 12 communicates with a central facility 14 for retrieval of one or more stored music recordings. " P. 9
6:20-30	"In accordance with yet an additional aspect of the invention, a music recording desired to be played on wireless communications device **12** need not be fully stored within the device **12**. In this regard, for example, a music recording stored in central facility **14** or personal storage unit **16** may be streamed to the wireless device **12** via an established communications link. In such an instance, data packets are streamed through a buffer for play by a player each of which are in a memory **26** (see FIG. **4**), such that, as one data	"In accordance with yet an additional aspect of the invention, a music recording desired to be played on wireless communications device 12 need not be fully stored within the device 12. In this regard, for example, a music recording stored in central facility 14 or personal storage unit 16 may be streamed to the wireless device 12 via an established communications link. In such an instance, data packets are streamed through a buffer for play by a player each of which are in a memory 26 (see FIG. 4), such that, as one data

Cite	Rolf	Rolf Provisional
	packet is played within the buffer, and then exits the buffer, an additional data packet is streamed into the buffer."	packet is played within the buffer, and then exits the buffer, an additional data packet is streamed into the buffer." PP. 9-10
6:53-7:7	"In accordance with a particular aspect of the present invention, at least a portion of that informational data is associated with a selected input on communications device **12**, such that upon activation of the input, the user of communications device **12** may order (for purchase) an authorized copy of the recording, or the album upon which the recording is placed. In this regard, upon activation of the key associated with the informational data, in one embodiment, while pressing the key associated with the selected information, data indicating that the user desires to make a purchase is transmitted to the station/source **17** or other facility. It should also be understood that the informational data may be retained at the server which is sourcing the recording, such that activation of a selected input causes a signal to be transmitted to the server, the receipt of which is matched with the information pertaining to the recording being transmitted. In any case, the purchase can be effected via the station/source **17** or other site, such as indicated by music storage source **19**, either through appropriate inputs on the	"In accordance with a particular aspect of the present invention, at least a portion of that informational data is associated with a selected input on communications device 12, such that upon activation of the input, the user of communications device 12 may order (for purchase) an authorized copy of the recording, or the album upon which the recording is placed. In this regard, upon activation of the key associated with the informational data, in one embodiment, while pressing the key associated with the selected information, data indicating that the user desires to make a purchase is transmitted to the station/source 17 or other facility. It should also be understood that the informational data may be retained at the server which is sourcing the recording, such that activation of a selected input causes a signal to be transmitted to the server, the receipt of which is matched with the information pertaining to the recording being transmitted. In any case, the purchase can be effected via the station/source 17 or other site, such as indicated by music storage source 19, either through appropriate inputs on the

Cite	Rolf	Rolf Provisional
	communications device **12**, or by establishment of a voice communications link with the central facility **14**."	communications device 12, or by establishment of a voice communications link with the central facility 14." PP. 10-11
7:8-18	"In addition to the user having a choice of whether to buy the single being played, or the entire album on which the single is located, the user also has the opportunity to select the manner in which the purchased recording or album will be distributed to the user. For example, the purchased recording or album may be downloaded to the wireless communications device **12** (if memory space suffices) or, alternatively, may be downloaded to the user's personal storage unit **16**. Alternatively, the user can select to have a storage medium upon which the music is recorded (such as a CD, for example) mailed to a selected address of the user."	"In addition to the user having a choice of whether to buy the single being played, or the entire album on which the single is located, the user also has the opportunity to select the manner in which the purchased recording or album will be distributed to the user. For example, the purchased recording or album may be downloaded to the wireless communications device 12 (if memory space suffices) or, alternatively, may be downloaded to the user's personal storage unit 16. Alternatively, the user can select to have a storage medium upon which the music is recorded (such as a CD, for example) mailed to a selected address of the user." P. 11
7:19-23	"Accordingly, the present invention provides a very unique feature for the distribution and purchasing of music recordings, by allowing an individual to make a purchase of a recording and/or its associated album upon hearing the recording."	"Accordingly, the present invention provides a very unique feature for the distribution and purchasing of music recordings, by allowing an individual to make a purchase of a recording and/or its associated album upon hearing the recording." P. 11
7:49-55	"With additional reference to FIG. **4**, wireless communications device **12** has a processor **20**. Connected to processor **20** are an input (such as a keypad **22**), a display **24**, a	"With additional reference to FIG. 4, wireless communications device 12 has a processor 20. Connected to processor 20 are an input (such as a keypad 22), a display 24, a

Cite	Rolf	Rolf Provisional
	memory **26**, a microphone **32**, a speaker **34**, and a port **36**. Additionally, a DTMF encoder/decoder (or just an encoder, if desired) **38**, and a transceiver **40**, and antenna **42** are connected as shown."	memory 26, a microphone 32, a speaker 34, and a port 36. Additionally, a DTMF encoder/decoder (or just an encoder, if desired) 38, and a transceiver 40, and antenna 42 are connected as shown." P. 12
8:54-55	"With reference initially to FIG. **5**, a block diagram of the central facility **14** is illustrated and described."	"With reference initially to FIG. 5, a block diagram of the central facility 14 is illustrated and described." P. 14
8:56-9:18	"In particular, a central facility **14** has a processor **50**. Connected to the processor **50** are a data base memory **52** and a interface **54** (such as a transceiver or modem) for transmitting and receiving communications signals. In addition, the central facility **14** may also have an encoder **58** and an operator station **60**. The encoder **58** is a set of processing instructions stored in a memory for encoding music recordings stored within data base memory **52**. In particular, when wireless communications device **12** accesses the central facility **14** via the communications network for purpose of retrieving one or more selected recordings, the encoder **58** may be utilized to encode the music, according to any preferred encryption and/or compression algorithm (such as mp3, liquid audio, etc.), for transmission of the encoded recording(s) to the wireless	"In particular, a central facility 14 has a processor 50. Connected to the processor 50 are a data base memory 52 and a interface 54 (such as a transceiver or modem) for transmitting and receiving communications signals. In addition, the central facility 14 may also have an encoder 58 and an operator station 60. The encoder 58 is a set of processing instructions stored in a memory for encoding music recordings stored within data base memory 52. In particular, when wireless communications device 12 accesses the central facility 14 via the communications network for purpose of retrieving one or more selected recordings, the encoder 58 may be utilized to encode the music, according to any preferred encryption and/or compression algorithm (such as mp3, liquid audio, etc.), for transmission of the encoded recording(s) to the wireless

Cite	Rolf	Rolf Provisional
	communications device **12**. Alternatively, the music recording stored within data base memory **52** may be stored in an encoded/compressed manner, such that the encoder **58** is not necessary. While the operator station **60** is not necessary, it may be provided for allowing the user of wireless communications device **12** to have a voice conversation with an operator employed at the operator station **60**. As will be appreciated, in the absence of an operator, processor **50** invokes application software for providing a menu driven system to wireless communications device **12**, such that the wireless communications device **12** can be utilized to select recording via a menu or listing of recordings. Alternatively, the central facility **14** may be equipped with a voice response system, such that an individual at wireless communications device **12** makes necessary entries/selections via voice commands."	communications device 12. Alternatively, the music recording stored within data base memory 52 may be stored in an encoded/compressed manner, such that the encoder 58 is not necessary. While the operator station 60 is not necessary, it may be provided for allowing the user of wireless communications device 12 to have a voice conversation with an operator employed at the operator station 60. As will be appreciated, in the absence of an operator, processor 50 invokes application software for providing a menu driven system to wireless communications device 12, such that the wireless communications device 12 can be utilized to select recording via a menu or listing of recordings. Alternatively, the central facility 14 may be equipped with a voice response system, such that an individual at wireless communications device 12 makes necessary entries/selections via voice commands." PP. 14-15
9:39-42	"Alternatively, it should be understood and appreciated that the encoded music received by the personal storage unit **16** may be stored in an encoded fashion, such that the decoder/encoder is unnecessary."	"Alternatively, it should be understood and appreciated that the encoded music received by the personal storage unit 16 may be stored in an encoded fashion, such that the decoder/encoder is unnecessary." PP. 15-16
10:6-20	"In particular, with reference to FIG. **7a**, data is transmitted in a	"In particular, with reference to FIG. 7 a, data is transmitted in a

Cite	Rolf	Rolf Provisional
	plurality of data packets **100**. In particular, for example, the first set of data packets, including one or more packets **100**, may include information pertaining to an identifier or address associated with a source of the streamed data. In the example of FIG. **7a**, the packet is marked with a 'A', and is an initially transmitted packet. Additional packets may contain information pertaining to a music recording being transmitted, and as illustrated in FIG. **7a**, any such packets are designated by a 'I'. The remainder of the packets include data indicative of the music recording being transmitted, and are labeled 'M'. In the example of FIG. **7a**, the address identifier and the information pertaining to the music recording are transmitted first, and thus serve as a header."	plurality of data packets 100. In particular, for example, the first set of data packets, including one or more packets 100, may include information pertaining to an identifier or address associated with a source of the streamed data. In the example of FIG. 7 a, the packet is marked with a 'A', and is an initially transmitted packet. Additional packets may contain information pertaining to a music recording being transmitted, and as illustrated in FIG. 7 a, any such packets are designated by a 'I'. The remainder of the packets include data indicative of the music recording being transmitted, and are labeled 'M'. In the example of FIG. 7a, the address identifier and the information pertaining to the music recording are transmitted first, and thus serve as a header." P. 16
10:44-48	"For example, data packets received by wireless communications device **12** are processed by processor **20**, and passed through at least one buffer."	"For example, data packets received by wireless communications device 12 are processed by processor 20, and passed through at least one buffer." P. 17
10:57-59	"As illustrated, each of the buffers **102**, **104** have corresponding buffer locations, indicated as Bdn, for streaming data packets..."	"As illustrated, each of the buffers 102, 104 have corresponding buffer locations, indicated as Bdn, for streaming data packets..." P. 17
11:48-51	"In accordance with an aspect of the present invention, data indicative of a site at which the	"In accordance with an aspect of the present invention, data indicative of a site at which the

Cite	Rolf	Rolf Provisional
	particular music recording is being played (and/or it associated album or video) can be ordered is transmitted and associated with a particular input…”	particular music recording is being played (and/or it associated album or video) can be ordered is transmitted and associated with a particular input…” P. 19
11:54-57	“Accordingly, while listening to the music recording, an individual may activate the order key and be connected with a source for ordering that particular music recording.”	“Accordingly, while listening to the music recording, an individual may activate the order key and be connected with a source for ordering that particular music recording.” P. 19
11:61-12:2	“Additionally, upon activation of the order key, either a data, a voice, or a combined voice/data link may be established with the source at which the music recording is to be purchased, and the purchase may be conducted in a purely electronic fashion, or by speaking with an operator. Preferably, such a link terminates the link with the streaming source, although terminating the initial link may not be necessary if there is sufficient bi-directional bandwidth available.”	“Additionally, upon activation of the order key, either a data, a voice, or a combined voice/data link may be established with the source at which the music recording is to be purchased, and the purchase may be conducted in a purely electronic fashion, or by speaking with an operator. Preferably, such a link terminates the link with the streaming source, although terminating the initial link may not be necessary if there is sufficient bi-directional bandwidth available.” P. 19
12:4-12	“For example, purchase may be made such that a complete copy of the sound recording (or its associated album) is downloaded to the memory **26** within wireless communications device **12**. Alternatively, the user can specify, either by input, or through a previously established account with the source at which the recording is being purchased, to have the music	“For example, purchase may be made such that a complete copy of the sound recording (or its associated album) is downloaded to the memory 26 within wireless communications device 12. Alternatively, the user can specify, either by input, or through a previously established account with the source at which the recording is being purchased, to have the music

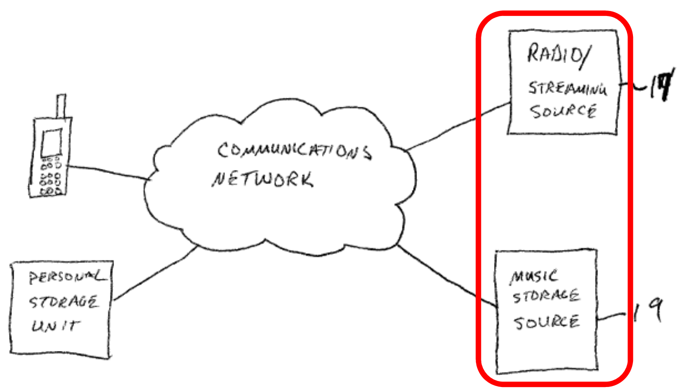
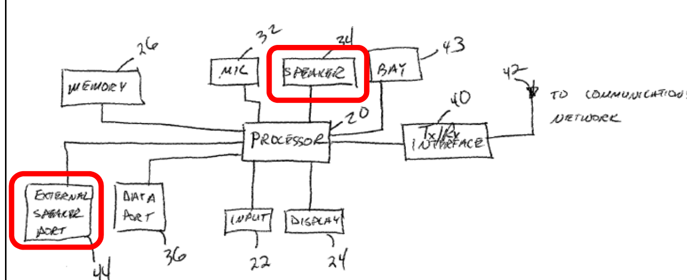
Cite	Rolf	Rolf Provisional
	recording downloaded to a remote, personal storage unit...”	recording downloaded to a remote, personal storage unit...” PP. 19-20
12:49-55	“In use, a user of communications device **12** may establish a communications link via the communications network with the remote storage facility **14**. In a preferred embodiment, the facility **14** has a uniform resource locator (URL) on a global communications network (such as the world-wide web), and device **12** accesses the facility **14** via a server in the communications network. “	“In use, a user of communications device 12 may establish a communications link via the communications network with the remote storage facility 14. In a preferred embodiment, the facility 14 has a uniform resource locator (URL) on a global communications network (such as the world-wide web), and device 12 accesses the facility 14 via a server in the communications network. “ P. 21
13:5-13	“As described, the personal storage unit **16** may be a memory storage location at an address on the global communications network and, indeed, may be located at the remote storage facility **14**. In such an instance, when a communications link with a remote storage facility **14** is established with wireless communications device **12**, the user can select whether he or she wishes to select new recordings, or enter his or her personal storage unit account for retrieval of recordings that have already been purchased.”	“As described, the personal storage unit 16 may be a memory storage location at an address on the global communications network and, indeed, may be located at the remote storage facility 14. In such an instance, when a communications link with a remote storage facility 14 is established with wireless communications device 12, the user can select whether he or she wishes to select new recordings, or enter his or her personal storage unit account for retrieval of recordings that have already been purchased.” PP. 21-22
13:38-41	“Preferably, the informational data is stored as a header (e.g., in one or more integrally transmitted data packets) (See FIG. **1**), such that processor **20** outputs the information to display **24**.”	“Preferably, the informational data is stored as a header (e.g., in one or more integrally transmitted data packets) (See FIG. 1), such that processor 20 outputs the information to display 24.” P. 22

Cite	Rolf	Rolf Provisional
14:35-53	"However, in accordance with an additional aspect of the invention, a concert schedule of the artist or group that recorded the song being played may be accessed at the source, for the purpose of buying concert tickets. Accordingly, upon hearing a particular song, a user of communications device **12** can activate a single input and establish a communications link with a source for purchasing concert link may be a voice communications link or, alternatively, may be a voice and/or data communications link, such that the tickets may be purchased electronically. In particular, while the concert information may be available at the described source, it should be understood and appreciate that additional data may be encoded in the data stream, and associated with a different input, such that activation of a first input establishes a communications link with a first source at which the music recording may be purchased, while activation of a second input establishes a communications link with a second source at which concert tickets may be purchased."	"However, in accordance with an additional aspect of the invention, a concert schedule of the artist or group that recorded the song being played may be accessed at the source, for the purpose of buying concert tickets. Accordingly, upon hearing a particular song, a user of communications device 12 can activate a single input and establish a communications link with a source for purchasing concert link may be a voice communications link or, alternatively, may be a voice and/or data communications link, such that the tickets may be purchased electronically. In particular, while the concert information may be available at the described source, it should be understood and appreciate that additional data may be encoded in the data stream, and associated with a different input, such that activation of a first input establishes a communications link with a first source at which the music recording may be purchased, while activation of a second input establishes a communications link with a second source at which concert tickets may be purchased." PP. 24-25
14:55-58	"It should also be understood that, while the invention has been described with respect to music or sound recordings, various features of the invention are applicable to	"In particular, the data stream is a stream of data packets which are streamed through a buffer of the wireless communications device

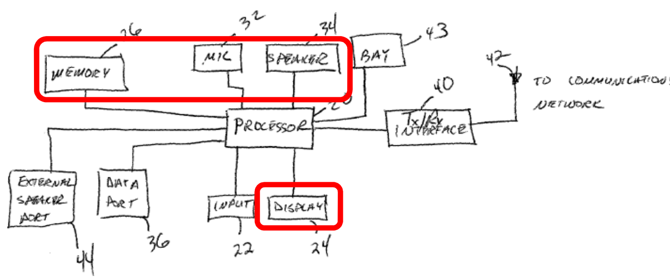
Cite	Rolf	Rolf Provisional
	recordings of other types, such as video recordings."	for decoding and play." P. 5 "In accordance with an aspect of the present invention, data indicative of a site at which the particular music recording is being played (and/or it associated album or video) can be ordered is transmitted and associated with a particular input, as evidenced by 'order' on the display at which location is associated with a particular keypad input on the wireless communications device." P. 19

EXHIBIT C

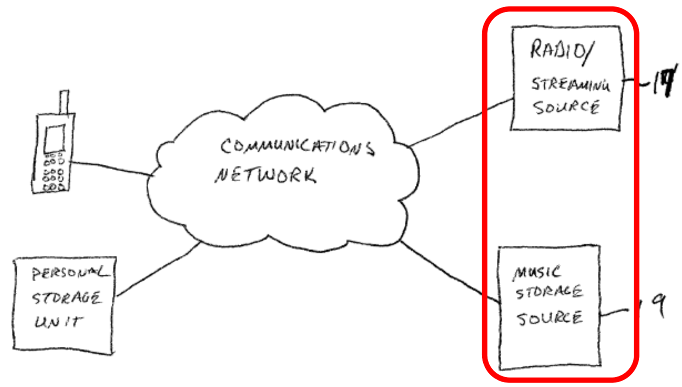
<u>**EXHIBIT C**</u>

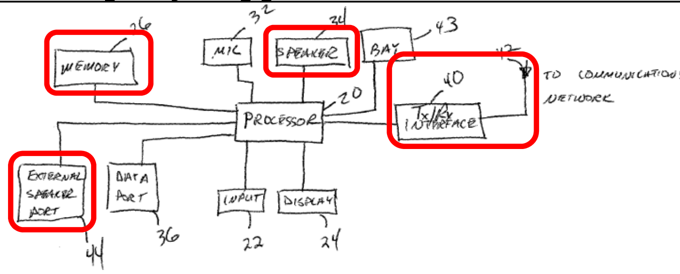
Issued Claims in Rolf	**Exemplary Support in Rolf Provisional**
	Note: The entirety of the Rolf Provisional would have been understood by a person of ordinary skill to disclose the support for the issued claims in Rolf. I intend this chart simply to highlight exemplary portions, not to be an exhaustive mapping of all support.
Claim 1	
A system for playing prerecorded music, said system comprising:	A person of ordinary skill would have understood that the Rolf Provisional describes a system for playing music, including the ability to download and stream music for replay that has been previously recorded. *See, e.g.*:  Fig. 3 (annotated). Showing two sources of prerecorded music available for download and playback.  Fig. 4 (annotated). Showing the internals of a cellular phone, having both internal speaker

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	and external speaker port for playing prerecorded music. “The present invention is generally directed to a system and method for wirelessly transmitting encoded music, via a wireless communications link, to a portable or mobile communications device which includes a player for playing the **music or audio**.” P. 1 (emphasis added). “Using an input of the cellular telephone, **a user may select one or more recordings for transmission to the cellular telephone.** The selected music recordings, upon receipt by the cellular telephone, are stored in a memory. In one embodiment, the memory is an internal memory. Alternatively, the memory may be a separate cartridge or memory stick (such as a flash memory cartridge) for movable installation in a bay on the telephone. **A player within the cellular telephone may then be initiated to play the music recordings, for output on a speaker.** In particular, the speaker may include earphones or earplugs connected to a port on the cellular telephone. Alternatively, the player may output the music through an internal speaker of the cellular telephone.” PP. 1-2 (emphasis added).
a portable, handheld wireless cellular telephone having a memory, a display[,] a player, a microphone for voice communications, and a speaker; and	A person of ordinary skill would have understood that the Rolf Provisional describes a cellular telephone with the components and features claimed in this limitation. *See, e.g.*: “In particular, system 10 has a **wireless communications device 12, such as a cellular telephone**. Preferably, wireless

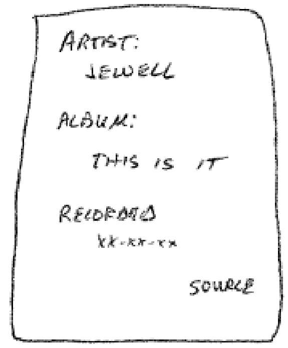
Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	communications device 12 is a digital, cellular communications device, and is **portable and handheld**." P. 8 (emphasis added).  Fig. 1 (annotated). Showing a portable, handheld wirless cellular telephone.  Fig. 4 (annotated). Showing the internals of the cellular telephone, including a memory, a display, a microphone, and a speaker. The cellular telephone also has a player: "The present invention is generally directed to a system and method for wirelessly transmitting encoded music, via a wireless communications link, to **a portable or mobile communications device which includes a player for playing the music or audio**." P. 1 (emphasis added). The microphone component is used to facilitate voice communication:

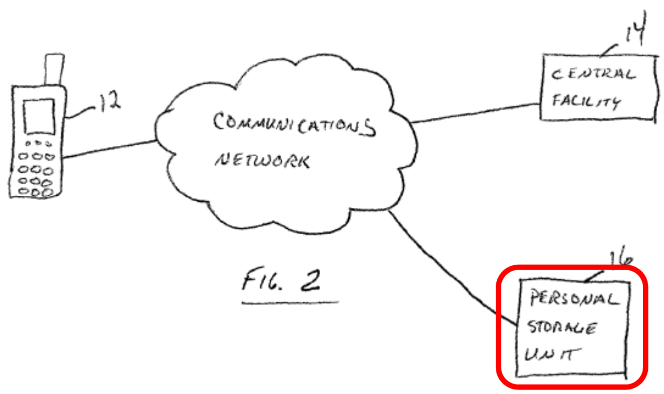
Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	"Additionally, the wireless communications device is preferably a cellular communications device and, in particular, is a **cellular voice communications device**, such as a cellular telephone." P. 9 (emphasis added). "In this regard, and in accordance with an aspect of the invention, a user of communications device 12 **may establish a communications link** with a central facility, such as storage facility 14, and utilizing inputs on the device, such as a keypad, **or a microphone (where the inputs are by voice)**, make appropriate selections for retrieving an encoded player for storage in the communications device 12." P. 13 (emphasis added). "Preferably, the wireless communications device is also a **voice communications** device, such that **voice connections** may be made with the device, as well." P. 25 (emphasis added).
a remote storage facility, wherein said remote storage facility stores a plurality of music recordings,	A person of ordinary skill would have understood that the Rolf Provisional describes a remote storage facility that stores multiple music recordings. *See, e.g.*:  Fig. 1 (annotated). Showing a central facility that is remote from the cellular telephone.

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	This is where music recordings are stored. "In use, a user of communications device 12 may establish a communications link via the communications network with the **remote storage facility 14**." P. 21 (emphasis added). The remote storage facility stores multiple music recordings:  Fig. 3 (annotated). Showing two categories of music recordings stored at the remote storage facility for both streaming and full download. "As will by now be appreciated in view of the foregoing, the communications device 12 may also be used for retrieving **one or more music recordings from a remote storage facility 14**…" P. 21 (emphasis added).
wherein said wireless cellular telephone is used to wirelessly select and retrieve from said remote storage facility at least one of said music recordings for complete storage of said music recording in said memory, and for playback through said speaker by said player,	A person of ordinary skill would have understood that the Rolf Provisional describes a wireless cellular telephone selecting and retriving at least one music recording for storage and playback on the cellular phone. *See, e.g.*:

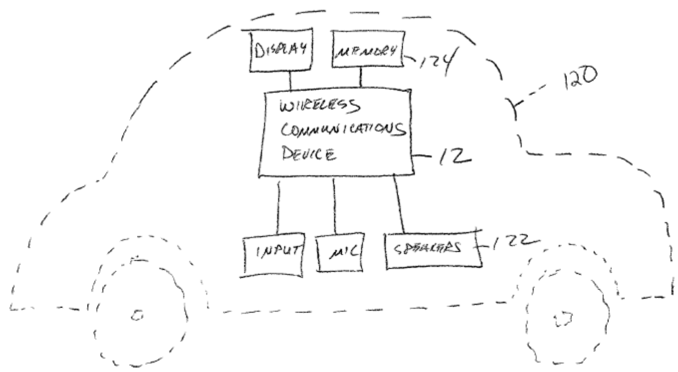
Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	 Fig. 4 (annotated). Showing the internals of the cellular telephone, including a memory where music recordings are stored, an internal speaker, an external speaker port for playback, and a wireless transciever and antenna. The cellular phone wirelessly selects and retrieves music recordings and stores them in its internal memory: "In particular, a user of the cellular telephone (for example) may use the telephone to establish a wireless communications link with the remote, central facility, and then **wirelessly download one or more selected music recordings for storage in a memory of the cellular telephone**." P. 1 (emphasis added). "**Using an input of the cellular telephone, a user may select one or more recordings for transmission to the cellular telephone**. The selected music recordings, upon receipt by the cellular 20 telephone, are **stored in a memory**." P. 1 (emphasis added). The player within the cellular telephone then plays back the music recording stored in the memory of the cellular telephone through the speaker (either internal or external):

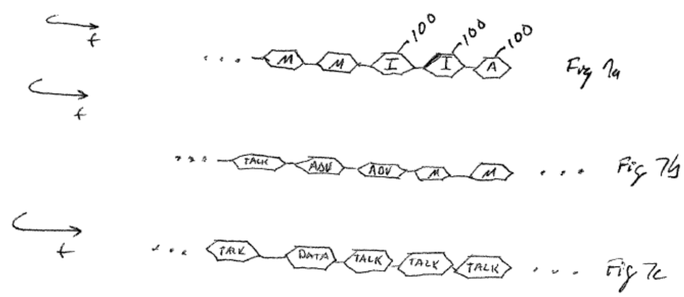
Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	"Once an encoded **music recording is stored in memory 26, or on a memory cartridge, of the wireless communications device 12**, the input 22 may be utilized to control the **player to play the recording**. In this regard, when a music recording is retrieved from memory for play, the player decodes the encoded data packet according to conventional steaming techniques in the buffer. **The player outputs the music via speaker 34** or, in the event earplugs or headphones are connected to port 44 of communications device 12, then **the music is outputted via the headphones or earplugs**." P. 22 (emphasis added).
wherein at least one of a name of an artist who recorded said selected music recording and a title of said music recording is wirelessly transmitted from said storage facility in conjunction with said music recording and is displayed on said display of said cellular telephone in conjunction with playback of said music recording, and	A person of ordinary skill would have understood that the Rolf Provisional describes transmitting artist name and title corresponding to a music recording to the cellular telephone for display during playback of the music recording. *See, e.g.*: "In accordance with an additional aspect of the present invention, **information pertaining to the music recording, such as the artist, title of the recording**, an album from which the recording came, the date of the recording, etc. **is also transmitted with the recorded music, such that the informational data is displayed on a display** of, or associated with, the wireless communications device **when the particular recording is being played**." PP. 3-4 (emphasis added).

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	 Fig. 9a. Showing a display on the user's cellular telephone of artist name and title associated with a music recording (in this case a collection of individual songs within an album by the artist Jewell).
wherein said storage facility further comprises a personal account associated with at least one of said cellular telephone and a user of said cellular telephone,	A person of ordinary skill would have understood that the Rolf Provisional describes a storage facility with personal accounts associated with particular cellular telephones and/or users. *See, e.g.*: "For example, **a user may have** a CD tower, flash memory unit, etc. in his or her home or apartment, or may have **a personal storage account at a central facility**." P. 2 (emphasis added). "The personal storage unit may comprise a personal computer or an entertainment center, including such components as a display screen (e.g., TV or information TV), stereo, speakers, etc, or as stated, **an account at a storage location**." P. 3 (emphasis added). "In accordance with one aspect of the invention, personal storage unit 16 may also be a memory storage location at the central facility 14, or other remote site. In this way, a

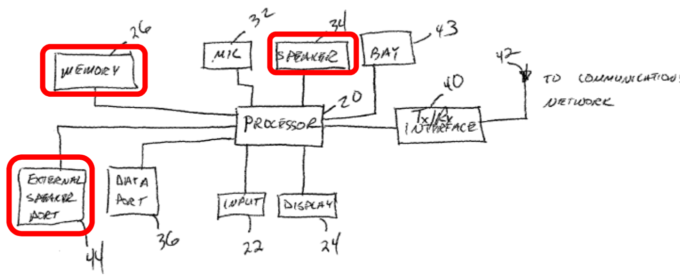
Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	user of device 12 may have a personal account for storing pure based recordings, such that the account (e.g., personal storage unit 16) is accessible via device 12 and other devices (such as a personal computer).” P. 16 (emphasis added).
wherein at least a title of said selected and retrieved music recording is stored in said personal account.	A person of ordinary skill would have understood that the Rolf Provisional describes the system storing at least a title of the selected and retrieved music recording in the personal account. *See, e.g.*: The Rolf Provisional describes embodiments where the personal account is comprised of a personal storage unit at a storage location within the central facility or another location:  Fig. 2 (annotated). Showing remote personal storage unit. “**The personal storage unit may comprise** a personal computer or an entertainment center, including such components as a display screen (e.g., TV or information TV), stereo, speakers, etc, or as stated, **an account at a storage location**.” P. 3 (emphasis added). “In accordance with one aspect of the

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	invention, **personal storage unit 16 may also be a memory storage location at the central facility 14, or other remote site**. In this way, a user of device 12 may have a personal account for storing pure based recordings, such that **the account (e.g., personal storage unit 16)** is accessible via device 12 and other devices (such as a personal computer).” P. 16 (emphasis added). The Rolf Provisional describes that information such as the title of a music recording is transmitted along with the music and stored together at both the storage facility and in the cellular telephone: “In accordance with an additional aspect of the present invention, information pertaining to the music recording, such as the artist, **title of the recording**, an album from which the recording came, the date of the recording, etc. is also transmitted with the recorded music…” P. 3 (emphasis added). “For example, data indicative of the artist, **the title of the recording**, the album or CD from which the recording came, the recording label, the date of the recording, or any other desired information **may be stored along with the recording at storage facility 14, and transmitted for storage in memory 26**.” P. 22 (emphasis added). A person of ordinary skill would have understood that the Rolf Provisional describes embodiments where the title of music recordings could be stored along with the music recordings themselves in a personal storage unit or personal account.

Issued Claims in Rolf	**Exemplary Support in Rolf Provisional**
Claim 2	
The system as set forth in claim 1, in combination with a vehicle, wherein said wireless cellular telephone is installed in said vehicle.	A person of ordinary skill would have understood that the Rolf Provisional describes the system of claim 1 combined with and installed in a vehicle. *See, e.g.*:  Fig. 10. Showing the system described in my analysis of claim 1 above, as combined with and installed in a vehicle, in this case an automobile. "In an alternate embodiment, the wireless communications device is **utilized in combination with a vehicle**, and a player, a memory for storing the music, and at least one speaker, are **located within the vehicle, such that selected recordings may be retrieved from the remote central facility, and played in the vehicle**." P. 2 (emphasis added).
Claim 3	
The system as set forth in claim 1, wherein a selected music recording is wirelessly transmitted from said remote storage facility in data packets.	A person of ordinary skill would have understood that the Rolf Provisional describes the system of claim 1 where wireless transmission is carried out using data packets. *See, e.g.*: "In particular, the data stream is **a stream of data packets** which are streamed through a

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	buffer of the wireless communications device for decoding and play." P. 5 (emphasis added).  Figs. 7a, 7b, 7c. Showing packetization of transmissions of music recordings. "With reference now to Fig. 7, a representative example of how **data packets** are transmitted in accordance with a protocol of the present invention is illustrated. In particular, with reference to Fig. 7a, data is transmitted in a plurality of **data packets** 100." P. 16 (emphasis added).
Claim 4	
The system as set forth in claim 3, wherein said data packets are transmitted via a third generation network.	A person of ordinary skill would have understood that the Rolf Provisional describes the system of claim 3 where the data packets are transmitted through a third generation network. *See, e.g.*: "In preferred embodiments of the present invention, the wireless communications link established between the wireless communications device and the central facility is a cellular communications link and, more particularly, is an Internet link. In other words, the encoded music and/or informational data is preferably transmitted via a packet switch network, and particularly is preferably transmitted at transmission

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	speeds greater than 50 KHz, such as by a next- or **third-generation wireless communications network**." P. 4 (emphasis added). "In accordance with a preferred aspect of the present invention, the music recordings are encoded in **data packets for transmission via a packet switched network**. In particular, it is preferred that the wireless communications network be a next or **third generation network**, such that data transmissions are at sufficiently high speeds, and preferably greater than 50 KHz." P. 22 (emphasis added).
Claim 5	
The system as set forth in claim 1, wherein said retrieved music recording is encoded in mp3 format.	A person of ordinary skill would have understood that the Rolf Provisional describes the system of claim 1 where the music recording is encoded in mp3 format. *See, e.g.*: "Preferably, the music recordings are encoded and transmitted in packets, and may particularly be **encoded by a compression algorithm into an encoded (such as MP3 or other) format**." P. 1 (emphasis added). "Additionally, the music recordings are preferably **encoded in an encoded format, such as MP3 (Mpeg-1 Audio layer 3)**." P. 8 (emphasis added).
Claim 6	
The system as set forth in claim 1, wherein said at least one music recording stored in said memory can be played without the need to establish and maintain a communications link with said	A person of ordinary skill would have understood that the Rolf Provisional describes the system of claim 1 where music recordings can be played without the need to establish and maintain communication links with the remote storage facility. *See, e.g.:*

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
remote storage facility.	The most obvious situation where a music recording can be played without a communications link to the remote storage facility is where the music recording was transmitted to and stored on the cellular telephone itself (i.e. not streamed). The Rolf Provisional discloses this:  Fig. 4 (annotated). Showing the internals of the cellular telephone, including an internal memory, internal speaker, and external speaker port for playback. "Once an encoded **music recording is stored in memory 26, or on a memory cartridge, of the wireless communications device 12**, the input 22 may be utilized to control the **player to play the recording**. In this regard, when a music recording is retrieved from memory for play, the player decodes the encoded data packet according to conventional steaming techniques in the buffer. **The player outputs the music via speaker 34** or, in the event earplugs or headphones are connected to port 44 of communications device 12, then **the music is outputted via the headphones or earplugs**." P. 22 (emphasis added). A person of ordinary skill would have understood from this disclosure that music

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	stored on internal memory could later be replayed without the need for a communications link to a remote storage facility.
Claim 7	
The system as set forth in claim 1, wherein said system further makes said selected and retrieved music recording available for download to a personal computer associated with a user of said cellular telephone.	A person of ordinary skill would have understood that the Rolf Provisional describes the system of claim 1 making the music recording available for download to a personal computer associated with a cellular telephone user. *See, e.g.*: The Rolf Provisional discloses an embodiment where the personal storage unit itself, which is associated with the user, is a personal computer: "**The personal storage unit may comprise a personal computer** or an entertainment center, including such components as a display screen (e.g., TV or information TV), stereo, speakers, etc, or as stated, an account at a storage location." P. 3 (emphasis added). "**In this embodiment, when a user selects one or more recordings from the central facility**, rather than the recordings being transmitted to the wireless communications unit directly via a wireless communications link, **they are rather transmitted to the personal storage unit of the user.**" P. 3 (emphasis added). The Rolf Provisional also discloses an embodiment where the personal account is accessible via a personal computer: "In accordance with one aspect of the invention, personal storage unit 16 may also

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	be a memory storage location at the central facility 14, or other remote site. In this way, a user of device 12 may have a personal account for storing pure based recordings, **such that the account (e.g., 5 personal storage unit 16) is accessible via device 12 and other devices (such as a personal computer)**." P. 16 (emphasis added). A person of ordinary skill would have understood from this disclosure that the personal computer in either embodiment could download music recordings.
Claim 8	
The system as set forth in claim 1, wherein said selected and retrieved music recording is purchased from said remote storage facility.	A person of ordinary skill would have understood that the Rolf Provisional describes the system of claim 1 where the music recording is purchased from the remote storage facility. *See, e.g.*: "Alternatively, the signal may be transmitted to a **remote music storage facility for effecting a purchase of the recording** or its associated album. In this regard, the purchase can be conducted in an electronic input mode or, alternatively, a **link may be established for transmitting voice communications to and from the source or music storage facility (as the case may be) at which the sound recording or its associated album is to be purchased**." P. 5 (emphasis added). "As such, the **purchase** can be effected via the station/source 17 or other site, such as indicated by music storage source 19, either through appropriate inputs on the communications device 12, or **by establishment of a voice communications link with the central facility 14**." P. 11

Issued Claims in Rolf	Exemplary Support in Rolf Provisional
	(emphasis added). “In such an instance, when a communications link with a **remote storage facility 14** is established with wireless communications device 12, **the user can select whether he or she wishes to select new recordings, or** enter his or her personal storage unit account **for retrieval of recordings that have already been purchased.**” PP. 21-22 (emphasis added).